Call: HORIZON-INFRA-2021-DEV-02

(Developing and consolidating the European research infrastructures landscape, maintaining global leadership (2021))

Topic: HORIZON-INFRA-2021-DEV-02-01

Type of Action: HORIZON-CSA

Proposal number: 101079696

Proposal acronym: ET-PP

Type of Model Grant Agreement: HORIZON Action Grant Budget-Based

Table of contents

Proposal ID **101079696**

Acronym **ET-PP**

1 - General information

Fields marked * are mandatory to fill.

Topic	HORIZON-INFRA-2021-DEV-02-01	Type of Action	HORIZON-CSA
Call	HORIZON-INFRA-2021-DEV-02	Type of Model Grant Agreement	HORIZON-AG

Acronym ET-PP

Proposal title Preparatory Phase for the Einstein Telescope Gravitational Wave Observatory

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months 48

Free keywords *Einstein Telescope Consortium, Governance, Finances, Project Office, Site Selection, Technical Design, Industry, Sustainability, Science Program, Multi-messenger, Data Access, Social Awareness, Impact*

Abstract *

Einstein Telescope (ET) will be the European Third-Generation (3G) Gravitational Wave (GW) Observatory, designed to observe the Universe by covering the whole spectrum observable from Earth with interferometric GW detectors. ET will put Europe at the forefront of the GW research being the first and most advanced 3G GW observatory. Europe will take the lead in the newborn multi-messenger astronomy by combining information delivered by ET with optical, IR, UV, gamma, cosmic ray and neutrino telescopes observations. ET will impact on our fundamental physics knowledge, and our understanding of the fundamental interactions governing the evolution of black-holes and neutron stars.

The ET preparatory phase (ET-PP) will address a number of fundamental prerequisites for the approval, construction and operation of ET: the enlargement of the ET consortium, the legal framework, governance schemes, and financial regulations under which ET will be constructed and operated; the detailed technical design and costing of the ET observatory; the preparation of the ET site selection; detailing and cost-estimation of the required site infrastructure, and its socioeconomic and environmental impacts; the schemes for technology transfer, procurement and industry involvement in the technical design and construction of ET; the required linking with relevant science communities regarding the detailed definition of the science program, and the user services and data access model.

For ET-PP, support is sought for work on the legal, governance and financial issues, for the installation of a project office coordinating and supporting management of ET-PP as well as the design of ET and the planning of the implementation, for site-related work, for studies regarding the optimization and production of ET components by industry, for linking with science communities and for increasing social awareness. Hence, ET-PP will deliver a detailed implementation plan for the ET infrastructure.

Remaining characters 9

Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under any EU programme, including the current call? ○ Yes ◉ No

Please give the proposal reference or contract number.

Administrative forms

Proposal ID **101079696**

Acronym **ET-PP**

Declarations

Field(s) marked * are mandatory to fill.

1) We declare to have the explicit consent of all applicants on their participation and on the content of this proposal. *	☒
2) We confirm that the information contained in this proposal is correct and complete and that none of the project activities have started before the proposal was submitted (unless explicitly authorised in the call conditions).	☒
3) We declare: - to be fully compliant with the eligibility criteria set out in the call - not to be subject to any exclusion grounds under the EU Financial Regulation 2018/1046 - to have the financial and operational capacity to carry out the proposed project.	☒
4) We acknowledge that all communication will be made through the Funding & Tenders Portal electronic exchange system and that access and use of this system is subject to the Funding & Tenders Portal Terms and Conditions.	☒
5) We have read, understood and accepted the Funding & Tenders Portal Terms & Conditions and Privacy Statement that set out the conditions of use of the Portal and the scope, purposes, retention periods, etc. for the processing of personal data of all data subjects whose data we communicate for the purpose of the application, evaluation, award and subsequent management of our grant, prizes and contracts (including financial transactions and audits).	☒
6) We declare that the proposal complies with ethical principles (including the highest standards of research integrity as set out in the ALLEA European Code of Conduct for Research Integrity, as well as applicable international and national law, including the Charter of Fundamental Rights of the European Union and the European Convention on Human Rights and its Supplementary Protocols. Appropriate procedures, policies and structures are in place to foster responsible research practices, to prevent questionable research practices and research misconduct, and to handle allegations of breaches of the principles and standards in the Code of Conduct.	☒
7) We declare that the proposal has an exclusive focus on civil applications (activities intended to be used in military application or aiming to serve military purposes cannot be funded). If the project involves dual-use items in the sense of Regulation 428/2009, or other items for which authorisation is required, we confirm that we will comply with the applicable regulatory framework (e.g. obtain export/import licences before these items are used).	☒
8) We confirm that the activities proposed do not - aim at human cloning for reproductive purposes; - intend to modify the genetic heritage of human beings which could make such changes heritable (with the exception of research relating to cancer treatment of the gonads, which may be financed), or - intend to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer. - lead to the destruction of human embryos (for example, for obtaining stem cells) These activities are excluded from funding.	☒
9) We confirm that for activities carried out outside the Union, the same activities would have been allowed in at least one EU Member State.	☒

The coordinator is only responsible for the information relating to their own organisation. Each applicant remains responsible for the information declared for their organisation. If the proposal is retained for EU funding, they will all be required to sign a declaration of honour.

False statements or incorrect information may lead to administrative sanctions under the EU Financial Regulation.

2 - Participants

List of participating organisations

#	Participating Organisation Legal Name	Country	Action
1	INSTITUTO DE FISICA DE ALTAS ENERGIAS	Spain	
2	BARCELONA SUPERCOMPUTING CENTER-CENTRO NACIONAL DE SUPERCOMPUTACION	Spain	
3	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Italy	
4	UNIWERSYTET WARSZAWSKI	Poland	
5	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS	FR	
6	STICHTING NEDERLANDSE WETENSCHAPPELIJK ONDERZOEK INSTITUTEN	Netherlands	
7	UNIVERSITE CATHOLIQUE DE LOUVAIN	BE	
8	UNIVERSITEIT ANTWERPEN	BE	
9	EUROPEAN GRAVITATIONAL OBSERVATORY(EGO) (OSSERVATORIO GRAVITAZIO NALEEUROPEO)	IT	
10	DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY	DE	
11	WIGNER FIZIKAI KUTATOKOZPONT	HU	
12	MONTANUNIVERSITAET LEOBEN	AT	
13	UNIVERSITE DE GENEVE	CH	
14	UNITED KINGDOM RESEARCH AND INNOVATION	United Kingdom	
15	CARDIFF UNIVERSITY	United Kingdom	
16	UNIVERSITY OF GLASGOW	United Kingdom	

Organisation data

PIC	Legal name
999613907	*INSTITUTO DE FISICA DE ALTAS ENERGIAS*

Short name: IFAE

Address

Street	CAMPUS DE BELLATERRA - UNIVERSIDAD AUTON
Town	CERDANYOLA DEL VALLES
Postcode	08193
Country	Spain
Webpage	http://www.ifae.es

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	05/08/1991 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: EXPERIMENTAL DIVISION ☐ not applicable

☒ Same as proposing organisation's address

Street: CAMPUS DE BELLATERRA - UNIVERSIDAD AUTON

Town: CERDANYOLA DEL VALLES

Postcode: 08193

Country: Spain

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Prof.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Mario**

Last name* **MARTINEZ**

E-Mail* **mmp@ifae.es**

Position in org. ICREA RESEARCH PROFESSOR

Department INSTITUTO DE FISICA DE ALTAS ENERGIAS

☒ Same as organisation name

☒ Same as proposing organisation's address

Street CAMPUS DE BELLATERRA - UNIVERSIDAD AUTONOMA DE BARCELONA

Town CERDANYOLA DEL VALLES

Post code 08193

Country Spain

Website www.ifae.es

Phone +34 616395798

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
MARTA	BALZA	mbalza@ifae.es	+34 656 41 43 76

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	MARIO	MARTINEZ	Man	Spain	mmp@ifae.es	Category A Top grade re	Leading	0000-0002-3135-945X	Orcid ID
Dr	LLUISA MARIA	MIR	Woman	Spain	mir@ifae.es	Category A Top grade re	Team member	0000-0002-4276-715X	Orcid ID
Mrs	SEBASTIAN	GRINSCHPUN	Man	Spain	sgrinschpun@ifae.es	Category C Recognised	Team member		
Mr	CHRISTIAN	NEISSNER	Man	Germany	neissner@pic.es	Category B Senior resea	Team member	0000-0001-8524-4968	Orcid ID
Mr	JAVIER	ECHAVARRI	Man	Spain	javier.echavarri@cdti.es	Category A Top grade re	Team member		
Dr	ISABEL	CORDERO	Woman	Spain	isabel.cordero@uv.es	Category B Senior resea	Team member	0000-0002-1985-1361	Orcid ID
Prof	ALICIA	SINTES	Woman	Spain	alicia.sintes@uib.es	Category A Top grade re	Team member	0000-0001-9050-7515	Orcid ID
Mr	ALEXIS	MENENDEZ	Man	Spain	amenendez@ifae.es	Category D First stage r	Team member	0000-0002-0828-8219	Orcid ID
Mrs	ALBA	ROMERO	Woman	Spain	aromero@ifae.es	Category D First stage r	Team member	0000-0003-2275-4164	Orcid ID
Dr	OSCAR	BLANCH	Man	Spain	blanch@ifae.es	Category A Top grade re	Team member	0000-0002-8380-1633	Orcid ID
Mr	CHRISTOS	KARATHANASIS	Man	Greece	ckarathanasis@ifae.es	Category D First stage r	Team member	0000-0002-0642-5507	Orcid ID
Mr	MARC	ANDRES	Man	Spain	mandres@ifae.es	Category D First stage r	Team member	0000-0002-8738-1672	Orcid ID
Mrs	GIADA	CANEVA	Woman	Italy	gcaneva@ifae.es	Category D First stage r	Team member	0000-0002-2935-1600	Orcid ID
Mr	ISAAC	ESPARBE	Man	Spain	iesparbe@ifae.es	Category C Recognised	Team member		
Dr	JAVIER	CASTAÑEDA	Man	Spain	jcastapo@fqa.ub.edu	Category B Senior resea	Team member		
Ms	ANNA	ARGUDO	Woman	Spain	anna.argudo@icc.ub.edu	Category C Recognised	Team member		

Dr	GONZALO	MERINO	Man	Spain	merino@pic.es	Category A Top grade re	Team member	0000-0002-9540-5742	Orcid ID

Role of participating organisation in the project

Project management	☒
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☒
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☒

Center of fundamental research

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*The LIGO Scientific Collaboration, the Virgo Collaboration, the KAGRA Collaboration, "Upper Limits on the Isotropic Gravitational-Wave Background from Advanced LIGO's and Advanced Virgo's Third Observing Run", Phys. Rev. D 104, 022004 (2021).*
Publication	*A. Romero et al., "Determination of the light exposure on the photodiodes of a new instrumented baffle for the Virgo input mode cleaner end-mirror", Class. Quantum Grav. 38 045002 (2021).*
Publication	*LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA Collaboration, "All-sky search for long-duration gravitational-wave bursts in the third Advanced LIGO and Advanced Virgo run", Phys. Rev. D 104, 102001 (2021).*
Publication	*Romero, Alba; Martinovic, Katarina; Callister, Thomas A.; Guo, Huai-Ke; Martinez, Mario; Sakellariadou, Mairi; Yang, Feng-Wei; Zhao, Yue 2021, 'Implications for First-Order Cosmological Phase Transitions from the Third LIGO-Virgo Observing Run', Physical Review Letters, 126, 15, 151301 (2021).*
Publication	*Menendez-Vazquez, A.; Kolstein, M.; Martinez, M.; Mir, LI M. 2021, 'Searches for compact binary coalescence events using neural networks in the LIGO/Virgo second observation period', Physical Review D, 103, 6, 062004 (2021).*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
PROBES H2020-MSCA-RISE-2020 project (101003460)	*IFAE participates in PROBES, A cooperative Europe - United States - Asia effort to define probes of new physics and technological advancements from particle and gravitational wave physics experiments.*
ESCAPE H2020 Grant Agreement no. 824064.	*ESCAPE - The European Science Cluster of Astronomy & Particle Physics ESFRI Research Infrastructures. IFAE is contributing to the design and implementation of public data models and analysis tools for gamma-ray astronomy.*
ASTEROID H2020-COMPET project (730161)	*IFAE is part of ASTEROID, an EU funded H2020-COMPET project whose main objective is to provide Europe with the capability to manufacture high performance infrared very large Focal Plane Arrays of 15-20 µm pitch pixels that can be used in scientific and astronomical space and ground telescope missions.*
ASTERICS H2020 grant agreement n. 653477	*IFAE is member of the ASTERICS project, a collaborative cluster for the next generation ESFRI telescope facilities (ELT, CTA, SKA, KM3NeT, EST) and other relevant research infrastructure initiatives in the area of astronomy, astrophysics and astroparticle physics.*
AIDA 2020 Horizon 2020 Grant Agreement no. 654168	*IFAE participates in AIDA2020 project. The AIDA-2020 project brings together the leading European research infrastructures in the field of detector development and testing and a number of institutes, universities and technological centers, thus assembling the necessary expertise for the ambitious programme of work.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
PIC - Computing Center	*PIC is a scientific-technological center specialized in data-intensive fundamental particle and astro-particle physics research located in Barcelona. A 8800 cores high throughput cluster, a tape storage system with 7000 tape slots with a capacity of 33PB, 11PB of disk storage.*
Laboratory	*IFAE facilities include a microelectronics laboratory with state-of-the-art packaging and assembly technologies, clean rooms, a data center, a mechanical workshop, electronics labs, an optical room and a shielded room.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999655520	*BARCELONA SUPERCOMPUTING CENTER-CENTRO NACIONAL DE SUPERCOMPUTACION*

Short name: BSC CNS

Address

Street	CALLE JORDI GIRONA 31
Town	BARCELONA
Postcode	08034
Country	Spain
Webpage	www.bsc.es

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	13/01/2022 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: Operations Department ☐ not applicable

☐ Same as proposing organisation's address

Street: Street Plaça Eusebi Güell, 1-3Street Pla

Town: Barcelona

Postcode: 08034

Country: Spain

Links with other participants

Type of link	Participant

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	Sergi	Girona	Man	Spain	sergi.girona@bsc.es	Category A Top grade re	Leading	0000-0002-1975-1918	Orcid ID
Dr	Nadia	Tonello	Woman	Italy	nadia.tonello@bsc.es	Category B Senior resea	Team member	0000-0003-0550-1667	Orcid ID
Dr	Jesús	Labarta	Man	Spain	jesus.labarta@bsc.es	Category A Top grade re	Team member	0000-0002-7489-4727	Orcid ID

Role of participating organisation in the project

Project management	☒
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☒

Knowledge in computing and data models

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Gaia Data Release 2: Variable stars in the colour-absolute magnitude diagram Astronomy and Astrophysics 2019 | Journal article DOI: 10.1051/0004-6361/201833304* *The ESA Gaia mission provides a unique time-domain survey for more than 1.6 billion sources with G $\lesssim$ 21 mag. We showcase stellar variability in the Galactic colour-absolute magnitude diagram (CaMD), and the most complete description of variability-induced motion within the CaMD to date.*
Publication	*Gaia Early Data Release 3 Astronomy and Astrophysics 2021 | Journal article DOI: https://doi.org/10.1051/0004-6361/202039657 (Catalogs and data)* *Early installment of the third Gaia data release, Gaia EDR3, consisting of astrometry and photometry for 1.8 billion sources brighter than magnitude 21, complemented with the list of radial velocities from Gaia DR2. Recommendations are made on the responsible use of Gaia EDR3 results.*
Publication	*Big data and extreme-scale computing: Pathways to Convergence-Toward a shaping strategy for a future software and data ecosystem for scientific inquiry International Journal of High Performance Computing Applications 2018 | Journal article DOI: 10.1177/1094342018778123* *We suggest the prospects for the future integration of technological infrastructures and research ecosystems.*
Publication	*CosmoHub: Interactive exploration and distribution of astronomical data on Hadoop, Astronomy and Computing 2020-07 | Journal article DOI: 10.1016/j.ascom.2020.100391* *CosmoHub (https://cosmohub.pic.es) is a web application based on Hadoop to perform interactive exploration and distribution of massive cosmological datasets.*
Publication	*PyCOMPSs: Parallel computational workflows in Python. The International Journal of High Performance Computing Applications. Vol. 31, Issue: 1, pp. 66-82. January 2017. http://journals.sagepub.com/doi/10.1177/1094342015594678* *PyCOMPSs is a task based environment that parallelizes algorithms and workflows written in sequential python and automatically schedules then for execution on grid/cloud/HPC infrastructures.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
EOSC-hub	*The project brought together multiple service providers to create a single contact point for European researchers and innovators to discover, access, use and reuse a broad spectrum of resources for advanced data-driven research, called Hub. It allows researchers a broader access to services supporting their scientific discovery and collaboration across disciplinary and geographical boundaries. The project mobilises providers from the major European research infrastructures.*
PRACE	*The Partnership for Advanced Computing in Europe (PRACE) mission is to enable high-impact scientific discovery and engineering research and development across all disciplines to enhance European competitiveness for the benefit of society. PRACE seeks to realise this mission by offering world class computing and data management resources and services through a peer review process.*
EUDAT	*The EUDAT Collaborative Data Infrastructure (CDI) is offering data services and resources supporting research in Europe. It is sustained by a network of more than 20 European research organisations, data and computing centres, collaborating with over 50 research communities. EUDAT offers data management services and storage resources, for research communities and individuals, through a distributed network across 15 European nations. EUDAT has received funding from the EU's FP7 & H2020.*

POP	*POP is a Center of Excellence in HPC providing performance assessment services to both academia and industry in the use of HPC infrastructures. The project relies on the BSC tools (https://tools.bsc.es/paraver) and promotes an analysis methodology that delivers new insight to application developers on the performance and efficiency they achieve. The project also promotes best practices in the use of the features of task based parallel programming models.*
EFLOWs4HPC	*The project aims to deliver a workflow software stack and a set of services to enable the integration of HPC simulation and modelling with big data analytics and machine learning in science and industry. They allow to develop adaptive workflows that efficiently use the computing resources and also considering innovative storage solutions. The project provides HPC Workflows as a Service, an environment for sharing, reusing, deploying and executing existing workflows on HPC systems.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	**Short description (Max 300 characters)**
MareNostrum	*MareNostrum is a supercomputer with more than 11PFlops of computing power. The main cluster has 3,456 nodes of two Intel Xeon Platinum chips with 24 processors each, and a main memory of 390 TB. A second cluster consists of three different emerging technologies developed in the US and Japan.*
Agora	*Agora is the BSC data storage, with a capacity of 135 PB, distributed in 15 PB of disk space and 120 PB of tape storage. The hardware is a 6000 tapes library of 12TB each, and 64 Drives for data migration between tape and disk.*
Nord 3	*Nord 3 computing cluster is composed by machines with a high flexibility of usage through VMs, and suited for High Performance computing. They are provided with Intel SandyBridge processors and Infiniband interconnection. The current peak performance is 251,6 TFlops.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999992789	*ISTITUTO NAZIONALE DI FISICA NUCLEARE*

Short name: INFN

Address

Street	Via Enrico Fermi 54
Town	FRASCATI
Postcode	00044
Country	Italy
Webpage	www.infn.it

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	25/05/2016	- no
SME self-assessment	unknown	
SME validation	19/09/2008	- no

Departments carrying out the proposed work

Department 1

Department name: Sezione di Roma 1 ☐ not applicable

☐ Same as proposing organisation's address

Street: Piazzale Aldo Moro, 2

Town: Roma

Postcode: 00185

Country: Italy

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Prof.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **FERNANDO**

Last name* **FERRONI**

E-Mail* **fernando.ferroni@roma1.infn.it**

Position in org. Full Professor

Department Sezione di Roma 1

☐ Same as organisation name

☐ Same as proposing organisation's address

Street Piazzale Aldo Moro, 2

Town Roma

Post code 00185

Country Italy

Website *Please enter website*

Phone *+xxx xxxxxxxxx*

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Alessia	D'Orazio	alessia.dorazio@lnf.infn.it	+xxx xxxxxxxxx

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	Fernando	Ferroni	Man	Italy	fernando.ferroni@roma1.infn.it	Category A Top grade re	Leading	0000-0001-7486-7211	Orcid ID
Dr	Michele	Punturo	Man	Italy	michele.punturo@pg.infn.it	Category A Top grade re	Leading	0000-0001-8722-4485	Orcid ID
Prof	Marco	Pallavicini	Man	Italy	marco.pallavicini@ge.infn.it	Category A Top grade re	Team member	0000-0001-7309-3023	Orcid ID
Dr	Gianluca	Gemme	Man	Italy	gianluca.gemme@ge.infn.it	Category A Top grade re	Team member	C-7233-2008	Researcher ID
Prof	Domenico	D'Urso	Man	Italy	ddurso@uniss.it	Category B Senior resea	Team member		
Prof	Marica	Branchesi	Woman	Italy	marica.branchesi@gssi.it	Category A Top grade re	Team member	P-2296-2015	Researcher ID
Prof	Eugenio	Coccia	Man	Italy	eugenio.coccia@lngs.infn.it	Category A Top grade re	Team member	0000-0002-6669-5787	Orcid ID
Dr	Mauro	Morandin	Man	Italy	mauro.morandin@pd.infn.it	Category A Top grade re	Leading	A-3308-2016	Researcher ID
Prof	Massimo	Carpinelli	Man	Italy	massimo.carpinelli@gmail.com	Category A Top grade re	Leading	0000-0002-8205-930X	Orcid ID
Prof	Maria Antonietta	Marsella	Woman	Italy	maria.marsella@uniroma1.it	Category A Top grade re	Leading	0000-0003-3236-934X	Orcid ID
Dr	Livia	Conti	Woman	Italy	livia.conti@pd.infn.it	Category B Senior resea	Team member	0000-0003-2731-2656	Orcid ID

Role of participating organisation in the project

Project management	☒
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☒
IPR management incl. technology transfer	☒
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*A Seismological Study of the Sos Enattos Area-the Sardinia Candidate Site for the Einstein Telescope.* *Di Giovanni, M; Giunchi, C; (...); Punturo, M et al.* *Jan 2021 | SEISMOLOGICAL RESEARCH LETTERS 92 (1) , pp.352-364* *This article describes a seismological study of the site in Sardinia (Italy) candidate to host the 3rd generation gravitational wave observatory Einstein Telescope. It reveals the impressive quality of the site in terms of low seismicity and noise.*
Publication	*Observation of Gravitational Waves from a Binary Black Hole Merger* *Abbott, BP; Abbott, R; (...); Zweizig, J et al* *Feb 11 2016 | PHYSICAL REVIEW LETTERS 116 (6)* *This article, cited more than 5600 times, describes the first direct detection of a gravitational wave; the signal, emitted by a binary system of black holes, known as GW150914, has been revealed by the 2 LIGO detector and analysed by LIGO and Virgo collaboration. The detection has been awarded with the 2017 Nobel Prize in Physics.*
Publication	*GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral* *Abbott, BP; Abbott, R; (...); Zweizig, J et al* *Oct 16 2017 | PRL 119 (16)* *This article has more than 3900 citations and it describes the first direct detection of the gravitational wave signal by the coalescence of a binary system of neutron stars; the gravitational wave has been revealed in Virgo and LIGO detectors. It marks the beginning of the new era of the multimessenger astronomy with gravitational waves.*
Publication	*GW170814: A Three-Detector Observation of Gravitational Waves from a Binary Black Hole Coalescence* *Abbott, BP; Abbott, R; (...); Zweizig, J et al.* *Oct 6 2017 | PHYSICAL REVIEW LETTERS 119 (14)* *This article, cited more than 1170 times, describes the first detection by three gravitational wave interferometers, the LIGO-Virgo network, of the signal emitted by the coalescence of two black holes. For the first time the source of a gravitational wave has been localised.*
Publication	*The Einstein Telescope: a third-generation gravitational wave observatory* *Punturo, M; Abernathy, M; (...); Yamamoto, K et al.* *Oct 7 2010 | CLASSICAL AND QUANTUM GRAVITY 27 (19)* *This article describes the conceptual design report of the Einstein Telescope and it is the first reference publication of the Einstein project. It has been cited more than 670 times.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Advanced Virgo	*Advanced Virgo is the largest gravitational wave RI in Europe, realised by INFN and CNRS in Italy and upgraded with the support of Nikhef and other European partners. It participated with the two LIGO interferometers to the first detection of the gravitational wave signal emitted by the binary system GW170817. Now it routinely detects gravitational waves in network with LIGO.*
Einstein Telescope (ET) design study	*The Einstein Gravitational Wave Telescope (ET) design study (2008-2011, GA 211743) has been a cornerstone project that defined, for the first time, the concept of 3rd generation gravitational wave observatory and realised its conceptual design.*
ELiTES	*ELiTES: has been a FP7-IRSES (2012-2017, GA 295153), focused on the development of the Einstein Telescope technologies through the exchange of scientists between ET and the Japanese KAGRA collaboration.*

AHEAD2020	*AHEAD2020 (GA 871158) is an research infrastructure integration activity developing the multi-messenger astronomy scenario with Einstein Telescope and high energy photon satellites.*
GraWIToN	*GraWIToN (2014-2018, GA 606176) has been an Initial Training Network (ITN) focused on the training of a new generation of scientists in the field of gravitational wave research and Einstein Telescope.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	**Short description (Max 300 characters)**
Advanced Virgo	*Advanced Virgo is the largest gravitational wave research infrastructure in Europe, realised by INFN and CNRS in Italy and upgraded with the support of Nikhef and other European partners. It participated with the two LIGO interferometers to the first detection of the gravitational wave signal emitt.*
Sos Enattos mine	*Sos Enattos mine is the underground infrastructure and surface buildings where the tests for the qualification of the site in Sardinia are realised. A large set of seismic, acoustic, magnetic and environmental sensors are continuously acquired to achieve this objective.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999572294	*UNIWERSYTET WARSZAWSKI*

Short name: UW

Address

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Postcode	00 927
Country	Poland
Webpage	www.uw.edu.pl

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	12/01/2022 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name	Astronomical Observatory	☐ not applicable
	☐ Same as proposing organisation's address	
Street	Aleje Ujazdowskie 4	
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Country	Poland	

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Prof.

Gender (•) Woman ( ) Man ( ) Non Binary

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Last name* **ROSINSKA**

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Position in org. Professor

Department Astronomical Observatory

☐ Same as organisation name

☐ Same as proposing organisation's address

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Researchers involved in the proposal

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Prof	Marek	Biesiada	Man	Poland	Marek.Biesiada@ncbj.gov.pl	Category A Top grade re	Team member	0000-0003-1308-7304	Orcid ID
Prof	Michał	Bejger	Man	Poland	bejger@camk.edu.pl	Category A Top grade re	Team member	0000-0002-4991-8213	Orcid ID
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Dr	Mariusz	Sterzel	Man	Poland	m.sterzel@cyfronet.pl	Category B Senior resea	Team member	0000-0003-0187-3471	Orcid ID
Prof	Andrzej	Krolak	Man	Poland	krolak@impan.pl	Category A Top grade re	Team member	0000-0003-4514-7690	Orcid ID
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Dr	Marek	Cieslar	Man	Poland	mcie@astrouw.edu.pl	Category B Senior resea	Team member	0000-0001-8912-5587	Orcid ID
Dr	Piotr	Gawron	Man	Poland	gawron@camk.edu.pl	Category A Top grade re	Team member	0000-0001-7476-9160	Orcid ID
Not applicab	Mateusz	Pietrzak	Man	Poland	mpietrzak@camk.edu.pl	Category C Recognised	Team member	0000-0002-8651-9852	Orcid ID
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Role of participating organisation in the project

Project management	☒
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☒
Public procurer of results	☒
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Observation of Gravitational Waves from a Binary Black Hole Merger* *Abbott, BP; Abbott, R; (...); Zweizig, J et al.* *Feb 2016 | PHYSICAL REVIEW LETTERS 116 (6)* *The first direct detection of the gravitational waves from coalescing binary black holes. The Nobel Prize in Physics in 2017 was awarded for this detection.*
Publication	*GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral* *Abbott, BP; Abbott, R; (...); Zweizig, J et al.* *Oct 2017 | PRL 119 (16)* *The first direct detection of the gravitational waves from the coalescing binary neutron stars.*
Publication	*The first gravitational-wave source from the isolated evolution of two stars in the 40-100 solar mass range* *Belczynski, Krzysztof; Holz, Daniel E., Bulik, Tomasz; O'Shaughnessy, Richard* *June 2016 | NATURE 534, 7608, pp. 512-515* *The formation scenario for the first gravitational wave event detected was analyzed. The epoch of formation of this particular binary was estimated and the metallicity of its progenitor was analyzed.*
Publication	*Site-selection criteria for the Einstein Telescope* *Amann, Florian ; Bonsignorio, Fabio; Bulik, Tomasz et al.* *Sept 2020 | Review of Scientific Instruments 91, 9, 094504* *The paper describes and analyzes the site characteristics that affect the sensitivity of ET. Additionally the socio-economic impacts are analyzed. The paper constitutes a summary and a baseline for the ET site studies and the site selection effort that is taking place right now and is a subject of this grant application.*
Publication	*Black holes, gravitational waves and fundamental physics: a roadmap* *Barack, Leor ; Cardoso, Vitor et al.* *July 2019 | Classical and Quantum Gravity 36, 14, 143001* *This comprehensive work is a summary of the science cases for the future gravitational wave detectors. It underlines the astrophysical challenges and fundamental physical problems that can be solved in the coming era of gravitational wave astronomy.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
ASPERA R&D for the Einstein Telescope	*ET-R&D – Networking and R&D for the Einstein Telescope, 3rd generation gravitational waves observatory. The aim of the project was to investigate the science potential of ET, to study underground long term seismic noise to provide scientific site selection criteria, to measure the optical properties of silicon at cryogenic temperatures and to do simulations of control aspects that are specific to the technology and arrangement of ET.*
ASTROCENT International Research Agenda	*Astrocent, an ultramodern centre for particle astrophysics with the aim of detection and study of extremely weak signals and hidden information in physics, particularly in the studies of the Universe.*
TEAM grant, the Foundation for Polish Science	*Advanced algorithms for detection and modelling of newtonian noise for interferometric gravitational wave detectors*
Polish Ministry of Science	*Seismic monitoring system for Newtonian Noise cancellation in Virgo.* *The project had the aim to design, build, test and install a system of seismometers in Virgo buildings to monitor seismic noise. The system is the backbone of the Newtonian Noise cancellation system in Virgo, an consists of 100 sensors that are precisely synchronised.*

Advanced Virgo	*Advanced Virgo is the largest interferometric gravitational waves detector in Europe. UW and other polish institutes (Polish Virgo Consortium) are members of the Virgo and LIGO Scientific Collaborations and contributed to both the upgrade of Virgo detector and data analysis, participating to the first detections of gravitational waves. In particular the Polish contributions included upgrades of the vacuum systems, seismic monitoring systems, as well as infrasound monitoring systems.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	**Short description (Max 300 characters)**
Seismic and acoustic monitoring for Advanced Virgo	*The team at the Astronomical Observatory at UW in collaboration with Astrocent developed and installed a system for seismic and infra-sound sensors with data acquisition systems and precise time synchronization. The system is used for the estimates of the Newtonian noise at Virgo.*
Seismic monitoring for ET candidate sites	*A system of seismic monitoring was developed and installed at the Sos Enattos mine and at other three locations in Europe (Matra in Hungary), Ksiaz in Poland and Canfranc in Spain)*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999997930	*CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS*

Short name: CNRS

Address

Street	RUE MICHEL ANGE 3
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Postcode	75794
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Webpage	www.cnrs.fr

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	17/12/2021 - no
SME self-assessment	unknown
SME validation	18/11/2008 - no

Departments carrying out the proposed work

Department 1

Department name: IN2P3 National Institute for Nuclear Physics and Particle Physics ☐ not applicable

☒ Same as proposing organisation's address

Street: RUE MICHEL ANGE 3

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Postcode: 75794

Country: France

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr

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Department IN2P3 National Institute for Nuclear Physics and Particle Physics

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☒ Same as proposing organisation's address

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Researchers involved in the proposal

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Dr	Samuel	Deléglise	Man	France	deleglise@lkb.upmc.fr	Category B Senior resea	Team member	0000-0002-8680-5170	Orcid ID
Dr	Thibaut	Jacqmin	Man	France	jacqmin@lkb.upmc.fr	Category B Senior resea	Team member	0000-0002-0693-4838	Orcid ID
Dr	Matteo	Barsuglia	Man	France	barsu@apc.in2p3.fr	Category A Top grade re	Team member	0000-0002-1180-4050	Orcid ID
Dr	Edward	Porter	Man	Ireland	porter@apc.in2p3.fr	Category A Top grade re	Team member	0000-0001-7042-0914	Orcid ID
Dr	Capocasa	Eleonora	Woman	Italy	capocasa@apc.in2p3.fr	Category C Recognised	Team member	0000-0001-7042-0914	Orcid ID
Dr	Marie-Anne	Bizouard	Woman	France	marieanne.bizouard@oca.eu	Category A Top grade re	Team member	0000-0002-4618-1674	Orcid ID
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Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☒
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☒
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☒

science policy definition and advisory

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*M. Punturo et al., "The Einstein Telescope: A third-generation gravitational wave observatory", Class.Quant.Grav. 27 (2010) 194002; doi:10.1088/0264-9381/27/19/194002.*
Publication	*J. Degallaix et al., "Large and extremely low loss: the unique challenges of gravitational wave mirrors," Journal of the Optical Society of America A Vol. 36, Issue 11, pp. C85-C94 (2019); doi:10.1364/JOSAA.36.000C85.*
Publication	*Y. Zhao et al., "Frequency-Dependent Squeezed Vacuum Source for Broadband Quantum Noise Reduction in Advanced Gravitational-Wave Detectors," Phys. Rev. Lett. 124 (2020) no.17, 171101; doi:10.1103/PhysRevLett.124.171101.*
Publication	*M. Maggiore et al, "Science case for the Einstein telescope," JCAP03 (2020) 050; doi:10.1088/1475-7516/2020/03/050.*
Publication	*L. Pinard et al, "Mirrors used in the LIGO interferometers for first detection of gravitational waves," Applied optics, Optical Society of America, 2017, 56 (4); doi:10.1364/AO.56.000C11.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Advanced Virgo	*CNRS and INFN, with the support of Nikhef and other European partners, build and operate within the EGO consortium ("European Gravitational Observatory"), the VIRGO interferometer which contributed with LIGO to the first wave detections gravitational and which is now one the 2G interferometers in operation in the world.*
AHEAD2020	*CNRS teams participate to this research infrastructure integration activity aiming to develop multi-messenger astronomy scenario with gravitational waves, neutrinos and high energy gamma ray detection.*
ESCAPE	*CNRS is coordinating the ESCAPE H2020-INFRAEOSC project which aims to address the Open Science challenges shared by ESFRI facilities as well as other pan-European research infrastructures in astronomy and high energy physics.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Laboratoire des Matériaux Avancés	*LMA in Lyon is a unique technological French platform dedicated to provide large and very low loss mirrors for frontier optical experiments. In particular, all the most critical large mirrors of gravitational wave interferometers, Virgo, LIGO and KAGRA were coated and characterised at LMA.*
CC-IN2P3	*CC-IN2P3 is the French National Computing Centre which provides resources and services to experiments supported by IN2P3 in the domains of High Energy Physics. Supported experiments include especially the 4 LHC experiments at CERN (T1 of WLCG), LSST, Belle-II, KM3Net, Auger and Virgo.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999624092	*STICHTING NEDERLANDSE WETENSCHAPPELIJK ONDERZOEK INSTITUTEN*

Short name: NIKHEF

Address

Street	WINTHONTLAAN 2
Town	UTRECHT
Postcode	3526 KV
Country	Netherlands
Webpage	www.nwo.nl/instituten

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	15/04/1946	- no
SME self-assessment	15/04/1946	- no
SME validation	15/04/1946	- no

Departments carrying out the proposed work

Department 1

Department name: Nikhef ☐ not applicable

☐ Same as proposing organisation's address

Street: Science Park 105

Town: Amsterdam

Postcode: 1098 XG

Country: Netherlands

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title: Prof.

Gender: ○ Woman ◉ Man ○ Non Binary

First name*: **ANDREAS**

Last name*: **FREISE**

E-Mail*: **a.freise@nikhef.nl**

Position in org.: staff scientist, deputy program leader

Department: Nikhef

☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Science Park 105

Town: Amsterdam

Post code: 1098 XG

Country: Netherlands

Website: www.nikhef.nl

Phone: 31205925177

Phone 2: *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Arjen	van Rijn	avr@nikhef.nl	+31205925000
Rob	van der Meer	meerr@nikhef.nl	+xxx xxxxxxxxx

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	Andreas	Freise	Man	Germany	a.freise@nikhef.nl	Category A Top grade re	Leading	0000-0001-6586-9901	Orcid ID
Prof	Frank	Linde	Man	Netherlands	f.linde@nikhef.nl	Category A Top grade re	Leading		
Prof	Jo	van den Brand	Man	Netherlands	jo@nikhef.nl	Category A Top grade re	Leading	0000-0003-4434-5353	Orcid ID
Dr	Rob	van der Meer	Man	Netherlands	r.van.der.meer@nikhef.nl	Category B Senior resea	Leading		Other ID
Prof	Chris	van den Broeck	Man	Netherlands	vdbroeck@nikhef.nl	Category A Top grade re	Team member	0000-0001-6800-4006	Orcid ID
Dr	Sarah	Caudill	Woman	United States	caudills@nikhef.nl	Category B Senior resea	Team member	0000-0002-8927-6673	Orcid ID
Prof	Stefan	Hild	Man	Germany	s.hild@nikhef.nl	Category A Top grade re	Team member	A-3864-2010	Researcher ID
Dr	Conor	Mow-Lowry	Man	Australia	c.m.mow-lowry@nikhef.nl	Category B Senior resea	Team member	0000-0002-0351-4555	Orcid ID
Dr	Alessandro	Bertolini	Man	Italy	alberto@nikhef.nl	Category B Senior resea	Team member	0000-0002-0456-2452	Orcid ID
Dr	Gideon	Koekoek	Man	Netherlands	gideon.koekoek@maastrichtuniversity.nl	Category B Senior resea	Team member	0000-0002-7750-1925	Orcid ID
Dr	Henk Jan	Bulten	Man	Netherlands	henkjan@nikhef.nl	Category B Senior resea	Team member		
Dr	Jessica	Steinlechner	Woman	Germany	jessica.steinlechner@maastrichtuniversity.nl	Category B Senior resea	Team member	0000-0002-6697-9026	Orcid ID
Dr	Bas	Swinkels	Man	Netherlands	swinkels@nikhef.nl	Category B Senior resea	Team member	0000-0002-3066-3601	Orcid ID
Dr	Martin	van Beuzekom	Man	Netherlands	martinb@nikhef.nl	Category B Senior resea	Team member	0000-0002-0500-1286	Orcid ID
Dr	Sebastian	Steinlechner	Man	Germany	s.steinlechner@maastrichtuniversity.nl	Category B Senior resea	Team member	0000-0003-4710-8548	Orcid ID

Dr	Stefan	Danilishin	Man	Russian Federati	stefan.danilishin@maastrichtuniversity.nl	Category B Senior resea	Team member	0000-0001-7758-7493	Orcid ID
Dr	Matteo	Tacca	Man	Italy	m.tacca@nikhef.nl	Category B Senior resea	Team member	J-1599-2015	Researcher ID
Dr	Samaya	Nissanke	Woman	United Kingdom	s.m.nissanke@uva.nl	Category B Senior resea	Team member	0000-0001-6573-7773	Orcid ID

Role of participating organisation in the project

Project management	☒
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☒
IPR management incl. technology transfer	☒
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*B. Abbott et al. (LIGO Scientific and Virgo Collaborations), "Observation of Gravitational Waves from a Binary Black Hole Merger", Phys. Rev. Lett. 116 (2016) 061102*
Publication	*B. Abbott et al. (LIGO Scientific and Virgo Collaborations): "GW170817 Observation of gravitational waves from a binary neutron star inspiral", Physical Review Letters, 119, (2017) 161101*
Publication	*B. Abbott et al. (LIGO Scientific and Virgo Collaborations), "Tests of General Relativity with the Binary Black Hole Signals from the LIGO-Virgo Catalog GWTC-1", Phys. Rev. D100 (2019) no. 10, 104036*
Publication	*B. Abbott et al. (LIGO Scientific and Virgo Collaborations), "Binary Black Hole Population Properties Inferred from the First and Second Observing Runs of Advanced LIGO and Advanced Virgo", Astrophys. J. 882 (2019) no. 2, L24*
Publication	*B. Abbott et al. (LIGO Scientific and Virgo Collaborations), "GW170817: Measurements of neutron star radii and equation of state", Phys. Rev. Lett. 121 (2018) no. 16, 161101*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Virgo	*Nikhef researchers are members of the Virgo and LIGO Scientific Collaborations and are focused on the direct detection of gravitational waves, using them to explore the fundamental physics of gravity, and developing the emerging field of gravitational wave science as a tool of astronomical discovery.*
DUNE	*Nikhef participates in the DUNE Collaboration which is building the Deep Underground Neutrino Experiment (DUNE) which will be installed in the Long-Baseline Neutrino Facility under construction in the United States.*
PROBES	*PROBES is a H2020-MSCA-RISE-2020 project funded under GA no. 101003460 (2021-2025) aimed at exploring elusive aspects of the Standard Model of particle physics and the Standard Model of Cosmology and search for new physics exploring particle accelerators and gravitational wave interferometers. This will be done through knowledge sharing and technological advancements with applications also outside fundamental physics and the collaboration with world-class laboratories in US and Asia.*
LISA	*Nikhef participates in the LISA (Laser Interferometer Space Antenna) consortium. LISA is a planned space-based gravitational-wave observatory, which will observe the gravitational-wave Universe in the milli-Hertz frequency band.*
KM3Net	*Nikhef has coordinated the KM3NeT-INFRADEV project funded under H2020-INFRADEV 2016-2, No. 739560 (2017-2021), This project addressed the coordination and support actions to prepare a legal entity for KM3NeT (http://www.km3net.org/). KM3NeT is a distributed research facility hosting a network of neutrino telescopes deployed in the deep waters of the Mediterranean Sea which is pursued by a large international collaboration comprising about 250 persons from 15 different countries.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Laboratory	*Nikhef has a world-class infrastructure to develop semiconductor detectors, read- out electronics, gaseous detectors, ultra-fast photon detectors, Xenon detectors, accelerometers and gravity gradiometers, and instrumentation for Gravitational Wave interferometers.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999980664	*UNIVERSITE CATHOLIQUE DE LOUVAIN*

Short name: UCL

Address

Street	PLACE DE L UNIVERSITE 1
Town	LOUVAIN LA NEUVE
Postcode	1348
Country	Belgium
Webpage	www.uclouvain.be

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	13/01/2009 - no
SME self-assessment	unknown
SME validation	13/01/2009 - no

Departments carrying out the proposed work

Department 1

Department name	Institute of Research in Mathematics and Physics (IRMP)	☐ not applicable
	☐ Same as proposing organisation's address	
Street	chemin du Cyclotron 2	
Town	Louvain-la-Neuve	
Postcode	1348	
Country	Belgium	

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Prof. Gender ○ Woman ◉ Man ○ Non Binary

First name* **GIACOMO** Last name* **BRUNO**

E-Mail* **giacomo.bruno@uclouvain.be**

Position in org. professeur ordinaire

Department Institute of Research in Mathematics and Physics (IRMP) ☐ Same as organisation name

☐ Same as proposing organisation's address

Street chemin du cyclotron 2

Town Louvain-la-Neuve Post code 1348

Country Belgium

Website https://uclouvain.be/en/research-institutes/irmp

Phone +32 10473215 *Phone 2* *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Eleonore	Couder	eleonore.couder@uclouvain.be	+32 10 47 49 92
Stephanie	Landrain	stephanie.landrain@uclouvain.be	+32 10 47 30 80

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	Joris	van Heijningen	Man	Netherlands	joris.vanheijningen@uclouvain.be	Category C Recognised	Team member	0000-0002-8391-7513	Orcid ID
Dr	Chiara	Arina	Woman	Italy	chiara.arina@uclouvain.be	Category C Recognised	Team member	0000-0002-5480-363X	Orcid ID
Dr	Andres	Tanasijczuk	Man	Germany	Andres.Tanasijczuk@uclouvain.be	Category C Recognised	Team member		
Prof	Giacomo	Bruno	Man	Italy	Giacomo.Bruno@uclouvain.be	Category A Top grade re	Leading	0000-0001-8857-8197	Orcid ID
Dr	Pavel	Demin	Man	Russian Federati	Pavel.Demin@uclouvain.be	Category C Recognised	Team member		

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☒
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☒

financial architecture; computing; TDR

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*J.V. van Heijningen, J. Winterflood and L. Ju arXiv:2104.03734* *Multi-blade monolithic Euler springs with optimised stress distribution*
Publication	*J.V. van Heijningen et al. (5 pages) NIM A 824, pp 665–669* *Interferometric readout of a monolithic accelerometer, towards the fm/!Hz*
Publication	*J.V. van Heijningen (11 pages) JINST 15 P06034* *A fiftyfold improvement in thermal noise limited inertial sensitivity by oper-* *ating at cryogenic temperatures*
Publication	*LIGO Scientific and Virgo Collaborations, "Open data from the first and second observing runs of Advanced LIGO and Advanced Virgo", arXiv:1912.11716 [gr-qc],*
Publication	*LIGO Scientific and Virgo and KAGRA Collaborations, "Search for anisotropic gravitational-wave backgrounds using data from Advanced LIGO's and Advanced Virgo's first three observing runs"; arXiv:2103.08520 ; Phys.Rev.D 104 (2021) 2, 022005*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Virgo	*participation in Virgo international Collaboration. Virgo is the European laser interferometer for the detection of gravitational waves. The UCLouvain group contributes to data analysis, computing, instrumentation, and operation of the detctor. As far as computing is concerned UCLouvain is providing one of the computer centers where data analysis jobs can be executed after being submitted to the GRID. UCLouvain The center also provides general services ("StashCash origin" server).*
ETpathfinder	*participation in the interreg project ETpathfinder aiming to develop a prototype for the Einstein Telescope project. Contribution to the project office through budget management and follow-up of tenders. Contribution to mirror suspensions design and construction.*
ETEST	*participation in the interreg project ETEST aiming to develop the technology for the Einstein Telescope project. Contribution to design and construction of cryogenic and superconducting active accelerometers to be used for the seismic isolation of the mirror suspensions for the Einstein Telescope.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
computing center	*The UCLouvain IRMP institute hosts a computing center dedicated to projects in fundamental physics: CMS and NA62 experiments at CERN, the Virgo gravitational wave laser interferometer at the EGO laboratory, the Madgraph simulation tool. This center is GRID-enabled and maintained by IT specialists*
optics laboratory	*The UCLouvain IRMP institute hosts an optical lab where optical setups are operated to develop instrumentation for gravitational wave experiments or facilities like Virgo and ETEST.*
mechanical workshop	*The UCLouvain IRMP institute hosts a mechanical workshop where mechanical parts for gravitational wave experiments have been and can be fabricated.*
project and finance office	*The UCLouvain IRMP institute has a project and financial office providing support for large scientific projects.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (●) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999902870	*UNIVERSITEIT ANTWERPEN*

Short name: ANTW

Address

Street	PRINSSTRAAT 13
Town	ANTWERPEN
Postcode	2000
Country	Belgium
Webpage	www.uantwerpen.be

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	26/03/2019	- no
SME self-assessment	26/03/2019	- no
SME validation	unknown	

Departments carrying out the proposed work

Department 1

Department name	Physics department, EDF research unit	☐ not applicable
	☐ Same as proposing organisation's address	
Street	Groenenborgerlaan 171	
Town	Antwerpen	
Postcode	2020	
Country	Belgium	

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Prof.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Nick**

Last name* **van Remortel**

E-Mail* **nick.vanremortel@uantwerpen.be**

Position in org. academic staff (ZAP)

Department Department of Physics, Faculty of Science

☐ Same as organisation name

☐ Same as proposing organisation's address

Street Groenenborgerlaan 171

Town Antwerpen

Post code 2020

Country Belgium

Website www.uantwerpen.be/en/research-groups/particle-physics-group

Phone +32 (3) 265 35 68

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Frederik	Verleysen	frederik.verleysen@uantwerpen.be	+xxx xxxxxxxxx

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	Nick	van Remortel	Man	Belgium	nick.vanremortel@uantwerpen.be	Category A Top grade re	Team member	0000-0003-4180-8199	Orcid ID
Prof	Hans	Van Haevermaet	Man	Belgium	hans.vanhaevermaet@uantwerpen.be	Category A Top grade re	Team member	0000-0003-2386-957X	Orcid ID

Role of participating organisation in the project

Project management	☒
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☒
IPR management incl. technology transfer	☒
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*R. Abbott et al. (LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA Collaboration) Phys. Rev. Lett. 126, 241102*
Publication	*D. Davis et al 2021 Class. Quantum Grav. 38 135014*
Publication	*R. Abbott et al. (LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA Collaboration) Phys. Rev. D 104, 022005*
Publication	*R. Abbott et al. (LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA Collaboration) Phys. Rev. D 104, 022004*
Publication	*Khachatryan, V., Sirunyan, A.M., Tumasyan, A. et al., Eur. Phys. J. C 75, 212 (2015).*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
ETpathfinder	*PI on Interreg project on ET R&D infrastructure (funding 14 MEur) 2019-2023*
E-TEST	*sattelite partner in Interreg project on ET R&D infrastructure (funding 15 MEur) 2020-2022*
E2SME	*sattelite partner in Interreg project to maximize the economic and social impact of the implementation of the Einstein Telescope (ET) in Euregio Meuse-Rhine (EMR) (funding 2.2 MEur) 2021-2023*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
ETpathfinder R&D platform	*500m2 research infrastructure with corresponding hardware investement of 14,5 MEur to develop key technologies for Einstein Telescope. Supported by the EU-INTERREG funding program.*
E-TEST	*goals* *- developing a innovative prototype through high-level technological innovations and,* *- developing a geological model supporting the exact location for ET,* *- developing an underground observatory,* *- building knowledge and innovation capacity for the EMR enterprises and knowledge institutes.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999540672	*EUROPEAN GRAVITATIONAL OBSERVATORY(EGO) (OSSERVATORIO GRAVITAZIO NALEEUROPEO)*

Short name: EGO

Address

Street	VIA EDOARDO AMALDI SANTO STEFANO A MAC
Town	CASCINA
Postcode	56021
Country	Italy
Webpage	www.ego-gw.it

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is no (small- and medium-sized enterprise) for the call.

SME self-declared status	unknown
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

No department involved

Department name *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street *Please enter street name and number.*

Town *Please enter the name of the town.*

Postcode *Area code.*

Country *Please select a country*

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Prof.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **STRAVROS**

Last name* **KATSANEVAS**

E-Mail* **stavros.katsanevas@ego-gw.it**

Position in org. Director

Department EUROPEAN GRAVITATIONAL OBSERVATORY(EGO) (OSSERVATORIO GRAVITAZIO NA

☒ Same as organisation name

☒ Same as proposing organisation's address

Street VIA EDOARDO AMALDI SANTO STEFANO A MACERATA

Town CASCINA

Post code 56021

Country Italy

Website *Please enter website*

Phone *+xxx xxxxxxxxx*

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
FRANCESCA	SPAGNUOLO	francesca.spagnuolo@ego-gw.it	050752424

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	Stavros	Katsanevas	Man	Greece	stavros.katsanevas@ego-gw.it	Category A Top grade re	Leading		
Dr	Francesca	Spagnuolo	Woman	Italy	francesca.spagnuolo@ego-gw.it	Category B Senior resea	Team member		
	Andrea	Paoli	Man	Italy	andrea.paoli@ego-gw.it	Category A Top grade re	Team member		
	Antonella	Bozzi	Woman	Italy	antonella.bozzi@ego-gw.it	Category A Top grade re	Team member		

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run (arXiv: 2111.03606- 5 Nov. 2021)*
Publication	*GWTC-2.1: Deep Extended Catalog of Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run O3 CBC GWTC summary - 2108.01045 P2100063*
Publication	*GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo during the First Half of the Third Observing Run O3 CBC GWTC summary Phys. Rev. X 11, 021053 (2021) 2010.14527 P2000061 (Oct 28, 2020)*
Publication	*Trigger Data to Accompany "GWTC-1: A Gravitational-Wave Transient Catalog of Compact Binary Mergers Observed by LIGO and Virgo during the First and Second Observing Runs" O2 O1 CBC GWTC -P1900392 (Feb 26, 2020)*
Publication	*GW170817: Observation of gravitational waves from a binary neutron star inspiral O2 CBC GW170817 summary Phys. Rev. Lett. 119, 161101 (2017) 1710.05832 P170817 (Oct 16, 2017)*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
AHEAD2020 (H2020-INFRAIA-01-2018-2019) (GA 871158)	*AHEAD2020 aims to integrate the communities of high energy astrophysics and gravitational waves into a new large community. This goal is better articulated in 4 objectives: Defining and improving a common policy on the issues of low latency alerts, data sharing and publication rules; Supporting the exchange and common interpretation of experimental results; Discussing interdisciplinary issues; Defining new enabling technologies for the next generation of relevant large infrastructures (ET).*
ESCAPE (H2020-INFRAEOSC-2018-2) (GA 824064)	*ESCAPE is a large research and innovation action aimed at addressing the Open Science Challenges shared by the European Strategy Forum on Research and Innovation facilities and other pan-European research infrastructures in astronomy and particle physics. To this end ESCAPE brings together astrophysics and particle physics communities by setting up a data infrastructure in support of FAIR principles.*
REINFORCE (H2020-SwafS-2019-1) (GA 872859)	*REINFORCE is a Science with and for Society project, coordinated by EGO. The project aims to minimize the gap between Society and Large Research Infrastructures in the field of Physics through the development of 4 cutting-edge citizen science projects in the fields of gravitational waves, neutrino astronomy, particle physics and cosmic ray interplay with geoscience and archaeology.*
NEWS (H2020-MSCA- RISE-2016) (GA734303)	*NEWS is a MSCA-RISE project, which promotes the collaboration between European, US and Japanese research institutions in some key areas of fundamental physics. The project is a joint effort of Academic and non-Academic partners and includes partners from US, Japan, Russia and China.The merging of academic with non-academic partners is beneficial to the training of the researchers and to reinforce industrial innovation capacity.*
Coordination of the ET Design Study	*EGO coordinated the Einstein Telescope Design Study.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
VIRGO Gravitational Waves Detector	*VIRGO has been designed and built by a collaboration between INFN and CNRS and is now hosted at EGO, near Pisa (Italy) where it is operated and improved by EGO and the VIRGO Collaboration (650 members from 14 different countries and 119 institutions).*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999986969	*DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY*

Short name: DESY

Address

Street	NOTKESTRASSE 85
Town	HAMBURG
Postcode	22607
Country	Germany
Webpage	www.desy.de

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	14/03/2016 - no
SME self-assessment	14/03/2016 - no
SME validation	unknown

Departments carrying out the proposed work

No department involved

Department name *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street *Please enter street name and number.*

Town *Please enter the name of the town.*

Postcode *Area code.*

Country *Please select a country*

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Thomas**

Last name* **Berghoefer**

E-Mail* **thomas.berghoefer@desy.de**

Position in org. Senior scientist and group leader

Department DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY ☒ Same as organisation name

☒ Same as proposing organisation's address

Street NOTKESTRASSE 85

Town HAMBURG

Post code 22607

Country Germany

Website www.desy.de

Phone +49 40 89982537

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Lisa	Kamlade	lisa.kamlade@desy.de	+49 40 89985021

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	Michèle	Heurs	Woman	Germany	michele.heurs@aei.mpg.de	Category A Top grade re	Team member		
Dr	Harald	Lück	Man	Germany	harald.lueck@aei.mpg.de	Category B Senior resea	Team member		
Prof	Achim	Stahl	Man	Germany	stahl@physik.rwth-aachen.de	Category A Top grade re	Team member		

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
ASPERA	*Astroparticle Physics ERA-NET funded by the EC in FP6 to strengthen a Europe-wide collaboration between research communities and funders in astroparticle physics*
ASPERA-2	*Astroparticle Physics ERA-NET funded by the EC in FP7 to deepen and broaden the astroparticle physics European coordination*
CTA-PP	*The Preparatory Phase for the Cherenkov Telescope Array funded by the EC in FP7*
GENERA	*Gender Equality Network in the European Research Area funded by the EC in Horizon 2020 to address gender equality in physics in Europe*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
954722113	*WIGNER FIZIKAI KUTATOKOZPONT*

Short name: Wigner RCP

Address

Street	Konkoly Thege Miklos ut 29-33
Town	Budapest
Postcode	1121
Country	Hungary
Webpage	wigner.mta.hu

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is no (small- and medium-sized enterprise) for the call.

SME self-declared status	unknown
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: Institute for Particle and Nuclear Physics ☐ not applicable

☒ Same as proposing organisation's address

Street: Konkoly Thege Miklos ut 29-33

Town: Budapest

Postcode: 1121

Country: Hungary

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Matyas**

Last name* **VASUTH**

E-Mail* **vasuth.matyas@wigner.hu**

Position in org. senior scientist

Department Institute for Particle and Nuclear Physics

☐ Same as organisation name

☒ Same as proposing organisation's address

Street Konkoly Thege Miklos ut 29-33

Town Budapest

Post code 1121

Country Hungary

Website https://wigner.hu/en

Phone +36 30 3279545

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Erika	SZENDRAK	szendrak.erika@wigner.mta.hu	+36 30 2434558

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	Matyas	VASUTH	Man	Hungary	vasuth.matyas@wigner.hu	Category B Senior resea	Leading	0000-0003-4573-8781	Orcid ID
Dr	Robert	KOVACS	Man	Hungary	kovacs.robert@wigner.hu	Category C Recognised	Team member	0000-0001-5822-6035	Orcid ID
Mr	Laszlo	SOMLAI	Man	Hungary	somlai.laszlo@wigner.hu	Category D First stage r	Team member	0000-0003-2112-0258	Orcid ID
Mr	Balazs	KACSKOVICS	Man	Hungary	kacskovics.balazs@wigner.hu	Category D First stage r	Team member	0000-0001-9216-8713	Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Van P. et al.: Long term measurements from the Matra Gravitational and Geophysical Laboratory, EUROPEAN PHYSICAL JOURNAL-SPECIAL TOPICS 228 : 8 pp. 1693-1743. , 51 p. (2019), https://doi.org/10.1140%2Fepjst%2Fe2019-900153-1*
Publication	*Berezovski A., Van P.: Internal Variables in Thermoelasticity; Cham, Deutschland, Springer International Publishing (2017) , 220 p., https://www.worldcat.org/search?q=isbn%3A9783319569338*
Publication	*Jozsa V., Kovacs R.: Solving Problems in Thermal Engineering: A Toolbox for Engineers, Cham, Switzerland: Springer-Verlag (2020), 203 p., https://doi.org/10.1007%2F978-3-030-33475-8*
Publication	*Barnafoldi G.G. et al.: First report of long term measurements of the MGGL laboratory in the Matra mountain range, CLASSICAL AND QUANTUM GRAVITY 34 : 11 Paper: 114001 , 22 p. (2017), https://doi.org/10.1088%2F1361-6382%2Faa69e3*
Publication	*Fulop, T. ; Kovacs, R. ; Szucs, M. ; Fawaier, M.: Thermodynamical extension of a symplectic numerical scheme with half space and time shifts demonstrated on rheological waves in solids, ENTROPY 22 : 2 Paper: 155 , 24 p. (2020), https://doi.org/10.3390%2Fe22020155*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
OTKA K-124366	*Hungarian Scientific Research Fund (OTKA), Consortional main: Geophysical noises in gravitational wave detection, 2017.09.01 - 2021.08.31*
I.FAST (H2020 No.101004730)	*Innovation Fostering in Accelerator Science and Technology; H2020-INFRAINNOV-2020-2*
HITRIplus (H2020 No. 101008548)	*Heavy Ion Therapy Research Integration plus;H2020-INFRAIA-2020-1*
AIDA-2020 (H2020 No.654168)	*Advanced European Infrastructures for Detectors at Accelerators; H2020-INFRAIA-2014-2015*
ARIES (H2020 No.730871)	*Accelerator Research and Innovation for European Science and Society; H2020-INFRAIA-2016-1*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Wigner Datacenter	*The Datacenter provides infrastructure lease, enhanced hosting service, and value added services i.e. hardware maintenance and network diagnostics. Its Cloud service provides an infrastructural service (IaaS) and platform service (PaaS). Our Secure Cloud service distinguishes us from other vendors.*
Matra Gravitational and Geophysical Laboratory	*The Matra Gravitational and Geophysical Laboratory has been established near Gyongyosoroszi, Hungary. It is located at 88 m below the surface and specialized instruments have been installed to measure seismic, infrasound, electromagnetic noise, and the variation of the cosmic muon flux.*
Janossy Underground Physics Laboratory	*Wigner RCP's Janossy Lajos Underground Laboratory located within the KFKI Campus at Csilleberc, Hungary. The lab was built originally for cosmic particle measurements during the 1960s, it provides good basis for low cosmic background and seismic measurements.*
Eotvos Balances of Auterbal and Pekar types	*The Eotvos-Rybar (Auterbal) torsion balance has been reconstructed and modernized. Calibration and processing of field measurements were digitalized to meet today's requirements.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999898117	*MONTANUNIVERSITAET LEOBEN*

Short name: MUL

Address

Street	FRANZ JOSEF STRASSE 18
Town	LEOBEN
Postcode	8700
Country	Austria
Webpage	www.unileoben.ac.at

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is no (small- and medium-sized enterprise) for the call.

SME self-declared status	unknown
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: Chair of Subsurface Engineering ☐ not applicable

☐ Same as proposing organisation's address

Street: Erzherzog-Johann Straße 3

Town: Leoben

Postcode: 8700

Country: Austria

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Robert**

Last name* **Galler**

E-Mail* **robert.galler@unileoben.ac.at**

Position in org. Head of Department

Department Chair of Subsurface Engineering

☐ Same as organisation name

☐ Same as proposing organisation's address

Street Erzherzog-Johann Straße 3

Town Leoben

Post code 8700

Country Austria

Website https://www.subsurface.at/

Phone +43 3842 402 3400

Phone 2 +43 3842 402 6700

Other contact persons

First Name	Last Name	E-mail	Phone
Karin	Rehatschek	karin.rehatschek@unileoben.ac.at	+43 3842 402 8411
Elisabeth	Hauzinger	elisabeth.hauzinger@unileoben.ac.at	+43 3842 402 3421

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	Robert	Galler	Man	Austria	robert.galler@unileoben.ac.at	Category A Top grade re	Team member		
Ms	Elisabeth	Hauzinger	Woman	Austria	elisabeth.hauzinger@unileoben.ac.at	Category D First stage r	Team member		

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Title: Applicability of excavated rock mterial: A European technical review implying opportunities for future tunnelling projects* *Authors: M. Haas, R. Galler, L. Mongeard, L. D'Aloia, A. Cherrey, M. Benedikt* *Journal: Jounal of Cleaner Production* *Year: 2021* *DOI: doi.org/10.1016/j.clepro.2021.128049*
Publication	*Title: Waste or valueable resource - a critical European review on re-using and managing tunnel excavation material* *Authors: M. Haas, R. Galler, L, Scibile, M. Benedikt* *Journal: Resources, Conservation and Recycling* *Year: 2020* *DOI: doi.org/10.1016/j.resconrec.2020.105048*
Publication	*Title: A mineralogical re-use classification of molasse rock mass in the Geneva Basin* *Authors: M. Haas, N. Gegenhuber, R. Galler, A. de Haller, A. Moscariello, L. Scibile, M. Benedikt* *Conference: ISRM International Symposium - EUROCK 2020* *Year: 2020* *DOI: doi.org/10.5281/zonodo.4267949* *Year: 2020*
Publication	*Title: Development of resource-efficient tunnelling technologies - Results of the European research project DRAGON* *Authors: R. Galler* *Journal: Geomechanics and Tunnelling* *Year: 2015* *DOI: doi.org/10.1002/geot.201500017*
Publication	*Title: MineralBay - the portal for raw materials and projects from subsurface construction* *Authors: H. Erben, R. Galler, T. Grechenig* *Journal: Geomechanics and Tunnelling* *Year: 2015* *DOI: 10.1002/geot.201500009*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
DRAGON (2015 - 2018)	*EU research project: Development of resource-efficient and advanced unerground technologies.* *Description: Excavated material is usually disposed of in landfills. Efficient use on site or in other industrial sectors is therefore of great economic and ecological interest.*
Re-use of tunnel excavation material (2008 - 2012)	*Research project financed by the Austrian Research Promotion Agency (FFG)* *Description: Resource-efficient tunnel construction by the use of the excavated tunnel material as construction raw material directly at the construction site*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
ZaB - Zentrum am Berg	*Tunnel test facility for underground research, development and training at a 1:1 scale in Eisenerz, Austria. Website: https://www.zab.at/en/*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999974650	*UNIVERSITE DE GENEVE*

Short name: UNIGE

Address

Street	RUE DU GENERAL DUFOUR 24
Town	GENEVE
Postcode	1211
Country	Switzerland
Webpage	www.unige.ch

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	10/09/2008	- no
SME self-assessment	unknown	
SME validation	10/09/2008	- no

Departments carrying out the proposed work

Department 1

Department name	Gravitational-wave Science Center	☐ not applicable
	☐ Same as proposing organisation's address	
Street	Chemin Pegasi 51	
Town	Versoix	
Postcode	1295	
Country	Switzerland	

Links with other participants

Type of link	Participant

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	Anastasios	Fragkos	Man	Greece	anastasios.fragkos@unige.ch	Category B Senior resea	Leading	0000-0003-1474-1523	Orcid ID
Prof	Michele	Maggiore	Man	Italy	Michele.Maggiore@unige.ch	Category A Top grade re	Team member	0000-0001-7348-047X	Orcid ID
Prof	Steven	Schramm	Man	Canada	steven.schramm@unige.ch	Category B Senior resea	Team member	0000-0001-9031-6751	Orcid ID
Prof	Stefano	Foffa	Man	Italy	stefano.foffa@unige.ch	Category B Senior resea	Team member	0000-0002-4530-3051	Orcid ID

Role of participating organisation in the project

Project management	☒
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*The origin of spin in binary black holes. Predicting the distributions of the main observables of Advanced LIGO"* *Bavera, Simone S.; Fragos, Tassos; Qin, Ying ; Zapartas, Emmanouil; Neijssel, Coenraad J.; Mandel, Ilya; Batta, Aldo; Gaebel, Sebastian M.; Kimball, Chase; Stevenson, Simon* *Astronomy & Astrophysics, Volume 635, id.A97, 18 pp. (2020)*
Publication	*"Science case for the Einstein telescope"* *Maggiore, Michele ; Van Den Broeck, Chris ; Bartolo, Nicola ; Belgacem, Enis ; Bertacca, Daniele ; Bizouard, Marie Anne ; Branchesi, Marica ; Clesse, Sebastien ; Foffa, Stefano ; García-Bellido, Juan ; Grimm, Stefan ; Harms, Jan ; Hinderer, Tanja ; Matarrese, Sabino ; Palomba, Cristiano ; Peloso, Marco ; Ricciardone, Angelo ; Sakellariadou, Mairi* *Journal of Cosmology and Astroparticle Physics, Issue 03, article id. 050 (2020).*
Publication	*"Computer science: Data analysis meets quantum physics"* *Schramm, Steven,* *Nature, Volume 550, Issue 7676, pp. 339-340 (2017).*
Publication	*“Gravity and Light: Combining Gravitational Wave and Electromagnetic Observations in the 2020s”* *Foley Ryan et al. (including Anastasios Fragkos)* *Astro2020: Decadal Survey on Astronomy and Astrophysics, science white papers, no. 295; Bulletin of the American Astronomical Society, Vol. 51, Issue 3, id. 295 (2019)*
Publication	*"The Next Generation Global Gravitational-Wave Observatory: The Science Book"* *Kologera, V. et al. (including Michele Maggiore)* *Publication of the International Gravitational-Wave Observatory Network (IGWN), arXiv:2111.06990 (2021)*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
LISA (the Laser Interferometer Space Antenna)	*LISA (the Laser Interferometer Space Antenna) is a planned space-based gravitational-wave observatory, which will observe the gravitational wave Universe in the milli-Hertz frequencies. Swiss researchers, including the participant of this proposal, contribute to instrumentation aspects, as well as the activities of the data processing group and the astrophysics working group. The Swiss participation has been supported through the Swiss Space Office and the Swiss National Science foundation.*
LISA-pathfinder (Science Team)	*The mission tested technologies needed for the Laser Interferometer Space Antenna (LISA), an ESA gravitational wave observatory planned to be launched in 2034. In April 2016 ESA announced that LISA Pathfinder demonstrated that the LISA mission is feasible. The Swiss participation has been supported through the Swiss Space Office.*
ASRTOSTAT & ASRTOSTAT II Projects	*A consortium of astronomy, statistics, and computer science experts from 8 European and American universities working on the development of novel statistical algorithms and technics for the analysis of astronomical data. The project is supported by two MSCA-RISE grants (2015-2019, 2020-2024).*
POSYDON collaboration	*A collaboration of 25+ astrophysicists and computer scientists that work on the next-generation of simulations tools for the modeling of the formation of gravitational-wave sources, using state-of-the-art binary evolution models and machine learning technics. The project is supported and a Swiss National Science Foundation Professorship grant and a Moore Foundation grant (2018 - Present).*

DISCOVERHEP project	*The DISCOVERHEP project (Turning noise into data: a discovery strategy for new weakly-interacting physics). The project will search for rare new physics produced in particle physics experiments, such as the CERN Large Hadron Collider and the ATLAS Experiment, by exploiting novel machine-learning and data-science techniques. The project is supported by the Swiss National Science Foundation and the European Commission.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	**Short description (Max 300 characters)**
CDCi (Common Data Center Infrastructure)	*The Gravitational-Wave Science Center at the University of Geneva is a newly-founded, interdepartmental research center whose aim is to bring together cross-disciplinary expertise in theory, computations, experiments and instrumentation, in order to explore the gravitational-wave Universe.*
Data & Analysis Center for Exoplanets (DACE)	*CDCi (Common Data Center Infrastructure) is associated with the Astronomy Department of the University of Geneva and provides services for data centers & ground segment projects, the long-term preservation of astronomical data and data analysis tools, public data access, and data analysis systems.*
The Electronics Lab at UNIGE	*The Electronics Lab at the Nuclear and Particle Physics Department of the University of Geneva specializes in the design and construction of custom electronics, e.g. FPGAs, for a variety of environments, including readout and triggering tasks in physics experiments (e.g. ATLAS, T2k, AMS, DAMPE).*
Swiss National Supercomputing Center (CSCS)	*The Swiss National Supercomputing Center (CSCS) develops and operates cutting-edge high-performance computing systems as an essential service facility for Swiss researchers. Moreover, CSCS can provide to its partner dedicated data processing, analysis, and storage solutions.*
Swiss Data Science Center (SDSC	*The Swiss Data Science Center (SDSC), established in 2017, has as its mission to accelerate the use of data science and machine learning techniques within academic disciplines of the Swiss academic community at large, and the industrial sector.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
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    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
906446474	*UNITED KINGDOM RESEARCH AND INNOVATION*

Short name: UKRI

Address

Street	POLARIS HOUSE NORTH STAR AVENUE
Town	SWINDON
Postcode	SN2 1FL
Country	United Kingdom
Webpage	https://www.ukri.org/

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is no (small- and medium-sized enterprise) for the call.

SME self-declared status	unknown
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name	Science and Technology Facilities Council	☐ not applicable
	☐ Same as proposing organisation's address	
Street	Polaris House, North Star Avenue	
Town	Swindon	
Postcode	SN2 1SZ	
Country	United Kingdom	

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Neil**

Last name* **Geddes**

E-Mail* **neil.geddes@stfc.ac.uk**

Position in org. Executive Director National Laboratories Science and Technologies

Department Rutherford Appleton Laboratory building R71,2.09

☐ Same as organisation name

☐ Same as proposing organisation's address

Street Harwell Campus

Town Didcot

Post code OX11 0QX

Country United Kingdom

Website https://www.ukri.org/councils/stfc/

Phone +44 (0)1235 445 000

Phone 2 +441235446084

Other contact persons

First Name	Last Name	E-mail	Phone
SHEILA	ROWAN	sheila.rowan@glasgow.ac.uk	+44 (141) 330 4701
Justin	Greenhalgh	justin.greenhalgh@stfc.ac.uk	+44 792 205 7362

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier	
Mr	Justin	OByrne	Man	United Kingdom	Justin.OByrne@stfc.ukri.org	Category A Top grade re	Team member		Other ID	

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☒
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*E Chassande-Mottin, M Hendry, PJ Sutton, et al. Gen Relativ Gravit 43, 437–464 (2011)- This paper provides a broad review from the multimessenger perspective of the science reach offered by the third generation interferometric GW detectors and by the Einstein Telescope (ET) in particular, essential for underpinning effective outreach for ET.*
Publication	*M Punturo et al Class. Quantum Grav. 27 194002 (2010) This paper describes the progress of the ET project in its design study phase.*
Publication	*ML Chan, C Messenger, IS Heng, and M Hendry Phys. Rev. D 97, 123014 (2018) This paper shows that the Einstein Telescope alone can localize the majority of detectable binary neutron stars at a distance of ≤200 Mpc to within 100 deg squared with 90% confidence. A network consisting of the Einstein Telescope and Cosmic Explorer can enhance the sky localization performance significantly.*
Publication	*M Bailes, B.K. Berger, P.R. Brady, et al. Gravitational-wave physics and astronomy in the 2020s and 2030s. Nat Rev Phys 3, 344–366 (2021). This Roadmap of future developments surveys the potential for growth in bandwidth and sensitivity of future gravitational-wave detectors, and discusses the science results anticipated to come from upcoming instruments. This is a summary of the work done by a subcommittee of the Gravitational Waves International Committee - see projects.*

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Name of Project or Activity	Short description (Max 500 characters)
Einstein Telescope (ET) design study (2008-2011)	*The Einstein Gravitational Wave Telescope (ET) design study was a cornerstone project that defined, for the first time, the concept of 3rd generation gravitational wave observatory and realised its conceptual design.*
ELiTES ELiTES: FP7-IRSES (2012-2017)	*This project focused on the development of Einstein Telescope technologies through the exchange of scientists between ET and the Japanese KAGRA collaboration.*
GraWIToN GraWIToN (2014-2018)	*GraWIToN was been an Initial Training Network (ITN) focused on the training of a new generation of scientists in the field of gravitational wave research and Einstein Telescope.*
GWIC 3G Subcommittee (2018-21)	*https://gwic.ligo.org/3Gsubcomm/ The GWIC Committee on Third Generation Ground-based Detectors was charged with examining the path to the development of a network of future ground-based gravitational-wave (GW) observatories, by working with the global community and funding agencies, to explore and develop the science case, R&D needs and operational frameworks for next-gen GW observatories.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
GEO600	*GEO600 is a 600m-baseline gravitational wave interferometer which has both operated alongside first generation and advanced GW observatories, and operated as a test-bed for sophisticated GW detector technologies*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

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    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999979694	*CARDIFF UNIVERSITY*

Short name: CARDIFF UNIVERSITY

Address

Street	NEWPORT ROAD 30-36
Town	CARDIFF
Postcode	CF24 ODE
Country	United Kingdom
Webpage	www.cardiff.ac.uk

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	31/05/2016	- no
SME self-assessment	31/05/2016	- no
SME validation	04/12/2008	- no

Departments carrying out the proposed work

Department 1

Department name: Science and Technology Facilities Council ☐ not applicable

☐ Same as proposing organisation's address

Street: Polaris House, North Star Avenue

Town: Swindon

Postcode: SN2 1SZ

Country: United Kingdom

Links with other participants

Type of link	Participant

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	Chris	North	Man	United Kingdom	northce@cardiff.ac.uk	Category B Senior resea	Team member		

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

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    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999974165	*UNIVERSITY OF GLASGOW*

Short name: UNIVERSITY OF GLASGOW

Address

Street	UNIVERSITY AVENUE
Town	GLASGOW
Postcode	G12 8QQ
Country	United Kingdom
Webpage	www.gla.ac.uk

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	06/05/2016	- no
SME self-assessment	06/05/2016	- no
SME validation	unknown	

Departments carrying out the proposed work

Department 1

Department name: Science and Technology Facilities Council ☐ not applicable

☐ Same as proposing organisation's address

Street: Polaris House, North Star Avenue

Town: Swindon

Postcode: SN2 1SZ

Country: United Kingdom

Links with other participants

Type of link	Participant

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	Martin	Henry	Man	United Kingdom	Martin.Henry@glasgow.ac.uk	Category A Top grade re	Leading		

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

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    - measures against gender-based violence including sexual harassment.

3 - Budget

?

No.	Name of beneficiary	Country	Role	Personnel costs/€	Subcontracting costs/€	Purchase costs - Travel and substistence /€	Purchase costs - Equipment/€	Purchase costs - Other goods, works and services/€	Internally invoiced goods and services/€ (Unit costs-usual accounting practices)	Indirect costs/€	Total eligible costs	Funding rate	Maximum EU contribution to eligible costs	Requested EU contribution to eligible costs/€	Max grant amount	Income generated by the action	Financial contributions	Own resources	Total estimated income
1	Instituto De Fisica De Altas Energias	ES	Coordinator	849,100	22,500	120,000		10,000	0	244775.00	1246375.00	100	1246375.00	328,750	328750.00			917,625	1246375.00
2	Barcelona Supercomputing Center-centro Nacional De Supercomputacion	ES	Affiliated	286,800	0	11,000			0	74450.00	372250.00	100	372250.00	231,250	231250.00			141,000	372250.00
3	Istituto Nazionale Di Fisica Nucleare	IT	Partner	1,761,040	100,000	244,500		162,000	0	541885.00	2809425.00	100	2809425.00	735,000	735000.00			2,074,425	2809425.00
4	Uniwersytet Warszawski	PL	Partner	835,200	20,000	147,200		20,000		250600.00	1273000.00	100	1273000.00	167,500	167500.00			1,105,500	1273000.00
5	Centre National De La Recherche Scientifique Cnrs	FR	Partner	1,900,651		106,000	0		0	501662.75	2508313.75	100	2508314.00	907,500	907500.00			1,600,814	2508314.00
6	Stichting Nederlandse Wetenschappelijk Onderzoek Instituten	NL	Partner	2,049,958	155,000	40,000		179,000	0	567239.50	2991197.50	100	2991198.00	728,750	728750.00		0	2,262,448	2991198.00
7	Universite Catholique De Louvain	BE	Partner	195,000			0		0	48750.00	243750.00	100	243750.00	56,250	56250.00			187,500	243750.00

Proposal ID **101079696**

Acronym **ET-PP**

8	Universiteit Antwerpen	BE	Partner	483,200	0	12,000	0	0	0	123800.00	619000.00	100	619000.00	15,000	15000.00			604,000	619000.00
9	European Gravitational Observatory(ego) (Osservatorio Gravitazio Naleeuropeo)	IT	Partner	250,000		23,000	0	0	0	68250.00	341250.00	100	341250.00	120,000	120000.00			221,250	341250.00
10	Deutsches Elektronen-synchrotron Desy	DE	Partner	45,000	0	5,000	0	0	0	12500.00	62500.00	100	62500.00	62,500	62500.00		0	0	62500.00
11	Wigner Fizikai Kutatokozpont	HU	Partner	68,500	0	12,000	0	0	0	20125.00	100625.00	100	100625.00	15,000	15000.00			85,625	100625.00
12	Montanuniversitaet Leoben	AT	Partner	105,000		6,000	0	0	0	27750.00	138750.00	100	138750.00	82,500	82500.00			56,250	138750.00
13	Universite De Geneve	CH	Associated							0.00	0.00	100	0.00	0	0.00		638,376	363,571	1001947.00
14	United Kingdom Research And Innovation	UK	Partner	49,400	0	0	0	0	0	12350.00	61750.00	100	61750.00	0	0.00			61,750	61750.00
15	Cardiff University	UK	Affiliated	47,100	0	0	0	0	0	11775.00	58875.00	100	58875.00	0	0.00			58,875	58875.00
16	University Of Glasgow	UK	Affiliated	70,700	0	0		0		17675.00	88375.00	100	88375.00	0	0.00			88,375	88375.00
			TOTAL	8,996,649	297,500	726,700	0	371,000	0	2523587.25	12915436.25		12915437.00	3,450,000	3450000.00	0	638,376	9,829,008	13917384.00

Proposal ID **101079696**

Acronym **ET-PP**

4 - Ethics & security

Ethics Issues Table

1. Human Embryonic Stem Cells and Human Embryos			Page
Does this activity involve Human Embryonic Stem Cells (hESCs)?	○ Yes	◉ No	
Does this activity involve the use of human embryos?	○ Yes	◉ No	
2. Humans			**Page**
Does this activity involve human participants?	○ Yes	◉ No	
Does this activity involve interventions (physical also including imaging technology, behavioural treatments, etc.) on the study participants?	○ Yes	◉ No	
Does this activity involve conducting a clinical study as defined by the Clinical Trial Regulation (EU 536/2014)? (using pharmaceuticals, biologicals, radiopharmaceuticals, or advanced therapy medicinal products)	○ Yes	◉ No	
3. Human Cells / Tissues (not covered by section 1)			**Page**
Does this activity involve the use of human cells or tissues?	○ Yes	◉ No	
4. Personal Data			**Page**
Does this activity involve processing of personal data?	○ Yes	◉ No	
Does this activity involve further processing of previously collected personal data (including use of preexisting data sets or sources, merging existing data sets)?	○ Yes	◉ No	
Is it planned to export personal data from the EU to non-EU countries? Specify the type of personal data and countries involved	○ Yes	◉ No	
Is it planned to import personal data from non-EU countries into the EU or from a non-EU country to another non-EU country? Specify the type of personal data and countries involved	○ Yes	◉ No	
Does this activity involve the processing of personal data related to criminal convictions or offences?	○ Yes	◉ No	
5. Animals			**Page**
Does this activity involve animals?	○ Yes	◉ No	
6. Non-EU Countries			**Page**
Will some of the activities be carried out in non-EU countries?	○ Yes	◉ No	
In case non-EU countries are involved, do the activities undertaken in these countries raise potential ethics issues?	○ Yes	◉ No	
It is planned to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)?	○ Yes	◉ No	
Is it planned to import any material (other than data) from non-EU countries into the EU or from a non-EU country to another non-EU country? For data imports, see section 4.	○ Yes	◉ No	
Is it planned to export any material (other than data) from the EU to non-EU countries? For data exports, see section 4.	○ Yes	◉ No	
Does this activity involve low and/or lower middle income countries, (if yes, detail the benefit-sharing actions planned in the self-assessment)	○ Yes	◉ No	
Could the situation in the country put the individuals taking part in the activity at risk?	○ Yes	◉ No	
7. Environment, Health and Safety			**Page**

Proposal ID **101079696**

Acronym **ET-PP**

Does this activity involve the use of substances or processes that may cause harm to the environment, to animals or plants.(during the implementation of the activity or further to the use of the results, as a possible impact) ?	◯ Yes	◉ No	
Does this activity deal with endangered fauna and/or flora / protected areas?	◯ Yes	◉ No	
Does this activity involve the use of substances or processes that may cause harm to humans, including those performing the activity.(during the implementation of the activity or further to the use of the results, as a possible impact) ?	◯ Yes	◉ No	

8. Artificial Intelligence			Page
Does this activity involve the development, deployment and/or use of Artificial Intelligence? (if yes, detail in the self-assessment whether that could raise ethical concerns related to human rights and values and detail how this will be addressed).	◯ Yes	◉ No	

9. Other Ethics Issues			Page
Are there any other ethics issues that should be taken into consideration?	◯ Yes	◉ No	

I confirm that I have taken into account all ethics issues above and that, if any ethics issues apply, I will complete the ethics self-assessment as described in the guidelines How to Complete your Ethics Self-Assessment ☒

Administrative forms

Proposal ID **101079696**

Acronym **ET-PP**

Ethics Self-Assessment

Ethical dimension of the objectives, methodology and likely impact

These aspects are not relevant to this proposal.

Remaining characters 4952

Compliance with ethical principles and relevant legislations

Not relevant for this proposal.

Remaining characters 4969

Administrative forms

Proposal ID **101079696**

Acronym **ET-PP**

Security issues table

1. EU Classified Information (EUCI)[2]			Page
Does this activity involve information and/or materials requiring protection against unauthorised disclosure (EUCI)?	○ Yes	◉ No	
Does this activity involve non-EU countries?	○ Yes	◉ No	
2. Misuse			**Page**
Does this activity have the potential for misuse of results?	○ Yes	◉ No	
3. Other Security Issues			**Page**
Does this activity involve information and/or materials subject to national security restrictions? If yes, please specify: (Maximum number of characters allowed: 1000)	○ Yes	◉ No	
Are there any other security issues that should be taken into consideration? If yes, please specify: (Maximum number of characters allowed: 1000)	○ Yes	◉ No	

[2]According to the Commission Decision (EU, Euratom) 2015/444 of 13 March 2015 on the security rules for protecting EU classified information, "European Union classified information (EUCI) means any information or material designated by an EU security classification, the unauthorised disclosure of which could cause varying degrees of prejudice to the interests of the European Union or of one or more of the Member States".

[3]Classified background information is information that is already classified by a country and/or international organisation and/or the EU and is going to be used by the project. In this case, the project must have in advance the authorisation from the originator of the classified information, which is the entity (EU institution, EU Member State, third state or international organisation) under whose authority the classified information has been generated.

[4]EU classified foreground information is information (documents/deliverables/materials) planned to be generated by the project and that needs to be protected from unauthorised disclosure. The originator of the EUCI generated by the project is the European Commission.

Part B: technical description

Einstein Telescope Preparatory Phase (ET-PP)

List of participants

Participant No. *	Participant organisation name	Country
1 (Coordinator)	INSTITUTO DE FÍSICA DE ALTAS ENERGÍAS (IFAE)	Spain
2 (affiliated to 1)	BARCELONA SUPERCOMPUTING CENTER (BSC)	Spain
3 Partner	ISTITUTO NAZIONALE DI FISICA NUCLEARE (INFN)	Italy
4 Partner	UNIWERSYTET WARSZAWSKI (UW)	Poland
5 Partner	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)	France
6 Partner	STICHTING NEDERLANDSE WETENSCHAPPELIJK ONDERZOEK INSTITUTEN (NIKHEF)	The Netherlands
7 Partner	UNIVERSITE CATHOLIQUE DE LOUVAIN (UCL)	Belgium
8 Partner	UNIVERSITEIT ANTWERPEN (ANTW)	Belgium
9 Partner	EUROPEAN GRAVITATIONAL OBSERVATORY (EGO)	Italy
10 Partner	DEUTSCHES ELEKTRONEN-SYNCHROTRON (DESY)	Germany
11 Partner	WIGNER FIZIKAI KUTATOKOZPONT (WIGNER RCP)	Hungary
12 Partner	MONTANUNIVERSITAET LEOBEN (MUL)	Austria
13 Associated	UNIVERSITE DE GENEVE (UNIGE)	Switzerland
14 Partner	UNITED KINGDOM RESEARCH AND INNOVATION (UKRI)	UK
15 (affiliated to 14)	CARDIFF UNIVERSITY (CU)	UK
16 (affiliated to 14)	UNIVERSITY OF GLASGOW (UG)	UK

1. Excellence

The core scientific field of Einstein Telescope (ET) is gravitational wave (GW) physics. GWs are opening a new window on the cosmos that can revolutionise humanity's understanding of the universe up to cosmological distances and unlock unexplored territories of extreme physical conditions that no experiment on Earth can ever provide. ET has the ambitious mission to push the limits of our ability to detect GWs and learn more about the evolution of our Universe back to its earliest form right after the Big Bang. Based on well proven and experimentally tested concepts, ET will exploit cutting-edge technologies and push them to their physical limits. It combines the well-proven technologies from the current advanced LIGO and Virgo detectors with beyond-state-of-the-art systems planned for the next evolution stage of the advanced detectors, in an infrastructure designed to accommodate several technology upgrades over many decades. ET has been recently included in the ESFRI roadmap 2021.

The ET Collaboration is steadily growing and it is constituted by 83 institutions from 10 European countries. The collaboration already counts with a well-defined internal organization in several boards with the required technical and scientific competence. The ET political support has increased since 2020, when the ESFRI candidature was formally supported by five European countries. A first step towards an initial ET governance model was recently made in the form of a Project Directorate chaired by F. Ferroni (INFN) and J. van den Brand (NIKHEF), and two boards: a Board of Governmental Representatives (BGR) including representatives from Ministries from interested countries and a Board of Scientific Representatives (BSR) including representatives from funding agencies from 11 countries. With time the BGR and BSR may merge in future to form a proto-Council. For the purpose of this preparatory phase (ET-PP) application, the participation is concentrated in 13 partner institutions (plus affiliated institutions), acting as liaisons and coordinators at the national level.

1.1 Objectives

The main objective of this ET-PP proposal is to support crucial items in the preparatory phase of the experiment, including: the enlargement of the ET consortium, the legal framework, governance schemes, and financial regulations under which the ET Research Infrastructure (RI) will be constructed and operated; the technical design and costing of the ET observatory; the preparation of the site selection, where ET will be deployed, detailing and cost-estimation of the required site infrastructure, and its socio-economic and environmental impacts; the schemes for technology transfer, procurement and industry involvement in the technical design and construction of ET; and the required linking with relevant science communities regarding the detailed definition of the science program, and the user services and data access model. We anticipate a EU budget request of 3.45M€ for a total duration of four years. This complements a very significant in-kind contribution from participants and third parties of about 10.55M€, for a total estimated cost of the ET-PP project of 14 M€.

The activities are organized in a set of ten well-defined work packages (WPs) with precise deliverables and milestones. Some of the work packages address explicitly aspects that were singled out during the ESFRI selection process. In the following, the definition and a brief description of the different WPs is provided. As detailed in Section 1.2, strong links between WPs are built.

WP1 - Management and Coordination [led by IFAE] - will be responsible for the global management and coordination of the WP activities within ET-PP, with the aim to guarantee an adequate use of the resources, and to facilitate a continuous and strong coordination across WPs and technical activities, by applying a transparent transfer-of-knowledge and information policy. In addition, WP1 will be responsible for the ET-PP administrative activities including regular reports and the follow-up of financial execution, and will contribute globally to increase the social awareness of the ET project. M. Martinez (IFAE) acts as IP and coordinator of the ET-PP project, under the responsibility of the ET Project Directorate, in charge of the birth of the ET RI.

WP2 - ET Organization, Governance and Legal Aspects [led by NIKHEF]- has the mandate to put the foundations for establishing the internal organization model and the governance of the ET RI, including the framework related to the definition of ET as a legal entity, and to facilitate the geographic enlargement of the ET consortium. WP2 will contribute to the political convergence across stakeholders on critical decisions affecting the main aspects of the research infrastructure like, for example, the final ET RI layout, site selection, total cost, etc. In addition, WP2 has the mandate to define the formal connections with other GW observatories and scientific communities. J. O'Byrne (STFC UKRI), F. Ferroni (INFN) and J. van den Brand (NIKHEF) act as co-coordinators of WP2 in this proposal.

WP3 - Financial Architecture [led by UCL]- has the mandate to investigate all aspects of the funding architecture required to ensure the construction, operation, and eventual decommissioning of ET with different alternatives in construction and legal settings; to identify risks (price, time, technological, legal, etc.); to define guidelines with a fair sharing of costs and scientific, industrial and socio-economic returns among all participating parties in the ET consortium; and to set a strong financial model and a common tool for all financial data. In the framework of ET-PP, the main objective is to prepare the financial items of a signature-ready contract to commonly fund and build ET. Ch. Arina (U. Louvain), T. Berghöfer (DESY), A. Sequi (INFN) act as co-coordinators of WP3 in this proposal.

WP4 - Site Preparation [led by NIKHEF]- is responsible for collecting and processing, from each potential site, all the required information necessary for site qualification. This includes site specific characteristics that might impact the ET scientific performance, socio-economic impacts, legal implications, and civil engineering costs. The information will be treated in a coherent and transparent manner, with the aim of facilitating a site selection process in a timescale consistent with ET anticipated schedule. M. Campinelli (INFN) and F. Linde (NIKHEF) act as co-coordinators of WP4 in this proposal.

WP5 - Project Office and Engineering Department [led by CNRS]- has the mission to establish the ET RI Project Office and the corresponding Engineering Department. The role of this WP is to set-up a project management environment for the ET construction project. This environment will be supported by consultative and executive bodies equipped with means to monitor, control, coordinate and report on the technical design, the engineering, the technical specifications, the risks, the budget and the schedule. These activities are project-wide and make use of methodologies and tools which are the same across the whole of the ET construction project. R. Flaminio (CNRS), A. Freise (NIKHEF), and R. Saban (INFN) act as co-coordinators of WP5 in this proposal.

WP6 - Technical Design [led by INFN]- has the mandate to provide the ET-PP project management with a refined scientific case, the Technical Design Report (TDR) of the RI hosting the ET interferometers, and the TDR of the set of detectors (interferometers) and facilities (vacuum and cryogenic apparatuses and plants) composing ET. Furthermore WP6 has the duty to elaborate a data management plan (DMP) and a Data Access Policy in synergy with WP8 (see below) and WP2. The activities in WP6 take place inside the ET Collaboration and will take full advantage of the existing technical and scientific boards inside the experiment. The chairs of the ET Steering Committee: H. Lück (Hanover) and M. Punturo (INFN) act, together with P. Chiggiato (CERN), as co-coordinators of WP6. P. Chiggiato coordinates the R&D and technical design of the ET pipe-arm vacuum system.

WP7 – Innovation and Industrial engagement [led by INFN]- will be responsible for all the aspects related to Technology Transfer including the promotion of innovative technologies inside the ET project, the proper management of the intellectual property, and establishing the liaisons with industry to maximize the industrial returns. M. Morandin (INFN) and R. van der Meer (NIKHEF) act as co-coordinators of WP7 in this proposal.

WP8 – Computing and Data Access [led by BSC]- is devoted to realizing the model for computing and data access for ET, including: the definition of the workflow, the estimation of the required resources, the design of the online Tier-0 data center, and the clarification of the policy for the storage and the access to the ET data on all relevant time scales, respecting the EU policies on open data. To a very large extent, the work relies on existing efforts in the ET Collaboration, and also counts with the presence of experts from large computing centers with long experience on massive computing demanding challenges. S. Girona (BSC) and A. Stahl (Aachen) act as co-coordinators of WP8 in this proposal.

WP9 - Sustainable Development Strategy [led by EGO]- focuses on those crucial aspects necessary for the design of a sustainable RI, minimizing the landscape and environmental impacts. This includes, for example, strategies for low carbon footprint, low energy consumption, sustainable reuse of excavation materials and a smart model for transportation. N. Arnaud (CNRS), S. Katsanevas (EGO) and M. Marsella (INFN/U. Rome) act as co-coordinators of WP9 and count on the presence of M. R. Galler (MUL).

WP10 - Education, Outreach and Citizen Engagement [led by UW] - has the mandate to promote to the widest possible audience the game-changing scientific potential of ET for astronomy, cosmology and fundamental physics. It will coordinate across all member countries of our Consortium the creation and dissemination of educational and promotional materials that will bring the scientific vision of the ET RI to all relevant stakeholders - including other scientists, journalists, politicians and policy makers, industry leaders, school and university students and the general public. M. Hendry (UKRI) and D. Rosinska (U. Warsaw) act as co-coordinators of WP10 in this proposal.

1.2 Coordination and/or support measures and methodology

In Figure 1, the global structure of the ET-PP project is shown and the main connections and interplays across WPs are presented. The WPs are naturally clustered into four main areas related to the organization, the instrument

design, the instrument site and the sustainability and social related aspects, with WP1 orchestrating the global coordination. In the following some relevant aspects are discussed.

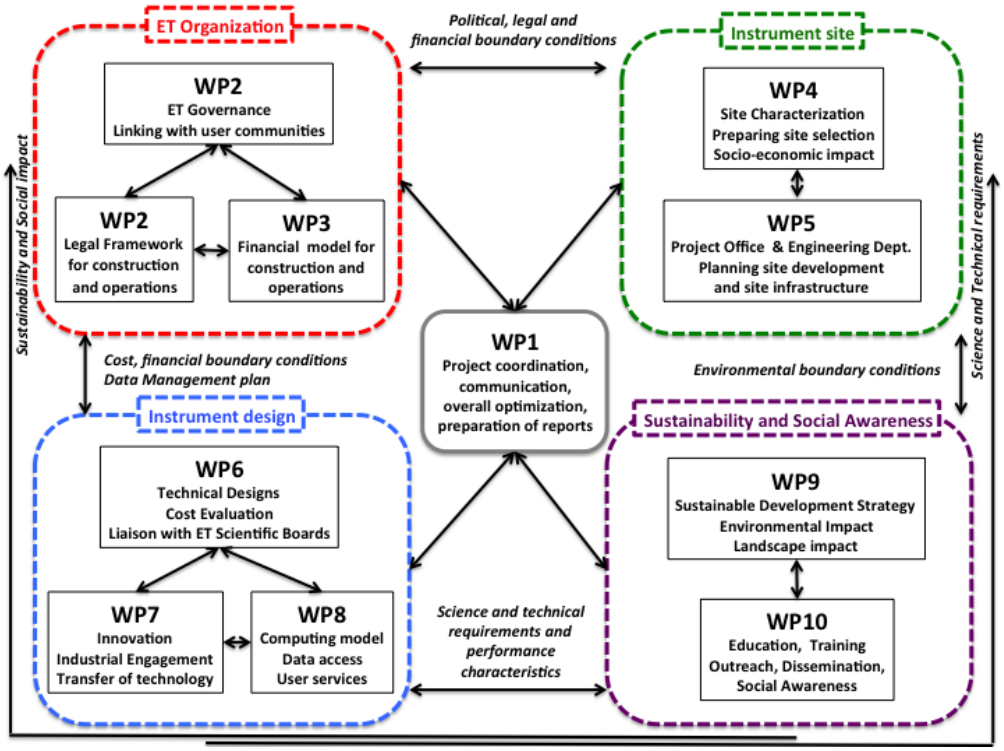


Figure 1: Project structure and interrelation of the different work packages, aiming to illustrate the most important relations between work packages.

Organization, Governance, Legal Entity and Site Selection. ET-PP must ensure that the main decision making bodies, i.e. Ministries are provided with the relevant information in a transparent manner as much as possible. This includes at least a detailed science case document. This includes multi-messenger topics and will require discussions and possibly agreements with astronomy organizations such as ESA and ESO. The scientific and technical requirements for ET will be defined in the context of a future third-generation (3G) global network of observatories. As ET will be embedded in a global network, a common framework must be developed to tackle the computing and data issues, including low latency and alert distribution. Moreover, an international collaboration on R&D will be developed. This includes topics as mirrors, coating, quantum and cryogenic technologies, vibration isolation, vacuum technology, environmental monitoring and control, and civil infrastructure technologies (e.g. excavation). Here we strive towards detector architectures that include a level of design homogeneity in order to simplify the implementation, taking into account local conditions. At present LIGO, Virgo and KAGRA constitute a global 2G network of gravitational-wave observatories where various computational aspects have been integrated in an International Gravitational Wave Network (IGWN) framework. In this context a common engaged roadmap must be developed to go from the current generation 2G to 3G. Associated governance documents for the next phase must be developed together with involved funding agencies. Finally, the site-selection will be prepared at the level of Ministries, and again WP2, in close coordination with WP4 and WP1, will ensure that adequate information is provided in a transparent manner. This includes both geophysical information and cost studies for site infrastructure and detector architectures and identification of value engineering priorities and cost cap targets.

A primary objective of ET-PP is to prepare a legal entity for the ET RI. The preferred implementation has to be determined and may be that of an Intergovernmental Organization (IGO) based upon a treaty-strength international Convention as exemplified by CERN or the recently formed SKA IGO. In this model, governments sign the fixed Convention in a durable and powerful commitment. like CERN and SKA. Alternatively, a European Research Infrastructure Consortium (ERIC) model can be considered in which each partner deposits with the European Commission a letter of commitment to the agreed work of the consortium, signed by an appropriate government official. Another option that will be considered is an International non-profit member company such as a Delaware LLC, German GmbH, Dutch Stichting, or a Belgian Association International sans but Lucrative [AISBL]. Governments can be members of the corporation and can make written company formation documents and

contribution agreements that are legally binding and internationally recognized. These can have independent and appropriate procurement and employment systems and are fully responsible for all financial matters.

Note that all three governance models contain a strong central management. The final selection of which model to adopt must be prepared by the Ministries, project leaders and the funding agencies together. The path to the ultimate governance structure is similar no matter which of these three is chosen. An important objective is to expand the number of stakeholders participating in the ET project. We expect that during this process a Council will be established for ET that will run the "in-creation" RI management, leading to the disappearance of the existing ET-PP management structure.

In the present governance model under consideration, the ET Council is the highest authority of the Organization and has responsibility for all-important decisions. It controls ET's activities in scientific, technical and administrative matters. It approves programmes of activity, adopts the budgets and reviews expenditure. The Council is assisted by the Scientific Policy Committee and the Finance Committee. The Director-General, appointed by the Council, manages the ET Observatory. The Director-General is assisted by a directorate and runs the Laboratory through a structure of departments. ET is run by the Member States, each of which has two official delegates to the ET Council. One represents his or her government's administration; the other represents national scientific interests. The Scientific Policy Committee evaluates the scientific merit of activities proposed by physicists and makes recommendations on ET's scientific programme. Its members are scientists elected by their colleagues on the committee and appointed by Council on the basis of scientific eminence without reference to nationality. Some members are also elected from Non-Member States. The Finance Committee is composed of representatives from national administrations and deals with all issues relating to financial contributions by the Member States and to the Organization's budget and expenditure.

Site Preparation. A timely selection of the RI site, currently foreseen by 2025, is a fundamental aspect of the ET-PP program. As already pointed out, the task of the WP4 is to collect –and wherever possible to quantify – all relevant site-specific aspects entering the project's site selection process. This for all sites that aspires to submit a bid book to host the RI. Without being exhaustive, these aspects range from issues directly impacting the sensitivity/performance i.e. discovery potential of ET like seismic noise, seismic activity and duty cycle, to aspects that impact the construction/operation costs such as rock stability and sub-surface hydrology to 'softer' aspects such socio-economic impact, accessibility and quality of life. In view of the anticipated prolonged operation of the RI, the site must also be safeguarded against the future installation of noise-generating facilities such as windmills, railroads, etc. in the vicinity. Apart from that each site must commit to the to be agreed upon schedule once selected i.e. possible delays in the start-up of notably the excavation works related to legal procedures, permitting, land acquisition, etc. must be taken care of beforehand.

Two items are at the core of the WP4 objective: how to arrive at robust and comparable cost and schedule estimates of the civil engineering (excavations) work in view of taking into account aspects such as the geology, the local population, nature conservation; and how to establish the impact of site characteristics on ET sensitivity and operation and, if needed, how to compensate it and at which level it would be possible to mitigate it. For many of the aspects the actual work will not be done within WP4 itself, but will be provided by the ET Collaboration via WP6 (in particular the parameters affecting the ET sensitivity) or will be outsourced to a professional organisation (e.g. socio-economic impact studies, quality of life assessment). Instead, within this WP4 the relevant aspects will be defined, collected, analysed and if needed quantified.

Financial Architecture. To develop the financial architecture for ET, it is important to establish commonly accepted and well-defined guidelines for the planning, monitoring and reviewing of costs, the provisioning of in-kind contribution and the financing and evaluation of R&D activities that will be run during this preparatory phase. It's also important to agree rules to measure and recognize effort and contribution provided by the partners through national and EU funded projects. These internal rules will be set and described in handbooks, one for the design and construction phase and one for the operating phase and, at the end, set in a signature-ready contract to fund and build ET. A financial module of the project management information system (PMIS) will be implemented to set up a living model for scheduling and budgeting. According to modern industry standards a "rolling wave" approach will be followed in funding and expenses management to progressively improve the financial planning. Cost risks in procurement will be identified and measures will be developed to mitigate these risks in close collaboration with the governance and project management working groups. Key indicators will be identified to monitor project execution. The financial plan will be developed, at different levels, according to the possible

governance and legal status. Then, different scenarios will be elaborated to run sensibility analysis to cost and time variability and different procurement methodology. The results will help to set the right quantity of contingencies and "when and how" they can be used. WP3 in charge of the financial architecture, in close coordination with WP2, will be responsible for preparing, carrying out and following up biannual meetings during the ET preparatory phase. Annual progress reports will be shared with all involved funding agencies and ministries as well as the Physical Sciences and Engineering Strategic Working Group of ESFRI. As already mentioned, the ET Finance Committee will be established.

Project Office and Engineering Department. One of the main missions of ET-PP is the creation and consolidation of the ET Project Office and the corresponding Engineering Department. It is foreseen that a significant fraction of the requested ET-PP funds (about 43%) are devoted to this mission. Holding to the primary constraints which are the scope, the schedule, and the budget, the role of the Project Office is to guarantee, that the as built RI -comprising infrastructure, technical systems and the interferometer itself- fully complies with the requirements, the parameters, the layout detailed in the TDR without having undergone changes which were not endorsed by the stakeholders. While the requirements, the parameters, the layout of the interferometer are set by the collaboration in charge of the GW observatory, the infrastructure and technical systems associated with the interferometer are designed, procured, installed, commissioned, maintained and eventually dismantled by an Engineering Department yet to be created. The scope, the mandate and the composition of this unit will be defined within WP5. The architecture and location of the Project Office will be defined early during the ET-PP project to allow the start-up of the Project Office well before the completion of the project. The host(s) of the project office is expected to provide office space and the relevant infrastructure free of charge. The project office will be established for the preparatory phase; for the construction and operational phases, once the ET site selection process has been concluded, a different organization and location may be appropriate, with a proposal arising from the work in the preparatory phase.

The work to set-up the Project Office will be carried-out by personnel hired in the scope of ET-PP that will be supervised by engineers and scientists who have been involved in project management in their home institutions. The leaders of WP5 will constitute the Steering Board which will monitor and take part in the activities of the team until the end of the ET-PP project. It is also assumed that both the Head of the Project Office and the Head of the Engineering Department will be picked among the experienced staff in the community of GW observatories without receiving financial support from ET-PP.

Technical Design. One of the main objectives of the ET-PP is to provide a revisited/refined TDR of ET including both the infrastructure and the experiment together with updated cost estimates. Not a surprise, this work will be developed to a large extent within the ET Collaboration, and will count with the assistance of experts on civil engineering, vacuum, cryogenics and infrastructure services in the ET Project Office. In particular, the vacuum system for ET's arms will be one of the most challenging ever built for research facilities. An intimate relation with experts from the CERN vacuum department has been established. CERN will coordinate the TDR on the baseline solution for the vacuum system for ET's arms. This includes detailed information on the proposed technologies, planning and tunnel integration, and budget. In parallel CERN will coordinate the activity on value engineering to find the best compromise between cost and performance. For that purpose, material selection, manufacturing techniques and pumping technologies will be investigated in close collaboration with the European industry and the collaborating institutes.

WP6 serves as a bridge to the ET Collaboration, already well organised in specific boards (see Figure 2), with the required technical and scientific competences and precise mandates. The Observational Science Board (OSB), currently composed by more than 200 scientists, and led by three co-chairs with specific skills in Fundamental Physics, Multi-Messenger Astronomy and Data Analysis, will deliver a refined ET science case, taking into account the latest update in the observatory design. The Instrument Science Board (ISB), currently composed of a few hundred scientists and engineers, will take care of the development of the TDR of the interferometers composing the ET detectors. The TDR of the RI and the design of the vacuum system will be realised under the management of the project directorate and the Project Office in WP5, in close collaboration with the ISB. Technological collaboration with major laboratories in Europe and in the world, highly skilled on the specific technological aspects will be pursued. The coherence between the WP6 activities and the ET Collaboration actions are guaranteed by the chairs of WP6 and of the ET steering committee. Given the existing resources in the ET Collaboration, the WP6 activities will be done without receiving support from this ET-PP action.

Computing model and data access. The development of a valid computing and data access model is an objective of ET-PP. It requires close cooperation with ISB, OSB and E-Infrastructure Board (EIB) of the ET Collaboration to define the workflow from the instrument to the publication. A geographically distributed model of resources is foreseen as the only way to match the computing needs of the experiment over its lifetime. A powerful T0 on-site computing center will receive the data taken by the experiment. The model will define the services provided by the center, and the delimitation against services realized with distributed computing. The development of the model is intimately linked to a proper estimate of the computing resources (computing power and data storage), the personnel, and the operational cost required for all aspects of ET computing, where the potential for mitigation must be addressed. Similarly, the ET computing solutions must include those aspects related to the sustainability and energy efficiency of the model. Moreover, ET-PP will develop a policy on the storage, curation, preservation of the data and the access to the data, following all the EU open data standards. As pointed out, this requires the close coordination of WP8 with WP6 and WP2, where the latter addresses the required coordination with other GW observatories.

Innovation and Industrial engagement. Establishing the proper contacts with industry for R&D and in preparation for the future massive industrial production during the RI construction phase is a pillar of the ET-PP program. Goods and services needed to build the RI facility are demanding in terms of technical, engineering, managerial or manufacturing capabilities. It can be expected therefore that the number of companies that can satisfy the requirements imposed in the tendering procedures might be in some cases limited. In order to guarantee a sufficient level of competition and industrial capability, measures are needed to attract the interest of a sufficient number of companies and, in some extreme cases, where suppliers with sufficient capabilities may not exist, engage companies in the R&D phases to prepare them for subsequent effective involvement in the production phase. ET-PP will define the appropriate objectives that ET could establish to support and enhance the development of innovative technologies and the incorporation of new ventures in the implementation of the ET project. At the same time, a mapping of the engagement initiatives already in place in partner countries, both for ET and other RIs will be made along with the validation of the maturity of the technologies and industry capabilities needed in the construction and operations phase. This might translate into the need for a new engagement plan for national and international activities. Those activities will be driven by WP7 in close cooperation with the Project Office. The proper balance of industrial returns to the countries that constitute the ET consortium will be at the root of the success of the ET project. During ET-PP, and in coordination with WP3, models for a balanced industrial return in tendering procedures used in other RI will be studied, with the aim to arrive at a satisfactory solution. Finally, ET-PP will bring the opportunity to determine the approach ET will follow for the management of the Technology Transfer processes and, specifically, the management of the Intellectual Property.

Sustainability. As already mentioned, one crucial aspect of the ET-PP is to develop the strategy for the realization of a sustainable RI. During the next few years, an accurate evaluation of the ET carbon footprint during both its construction and initial operation stages will take place. All power consumptions of the infrastructure will be taken into account (instruments, service plants, computing facilities) as well as those linked to the transportations (commuting, supplies, travels) by analysing all the scientific scenarios envisioned. The study will be based on simulations and projections using literature standards, plus some critical revision of the existing studies for the current ground-based gravitational-wave detectors: the two LIGO instruments (USA), Virgo at EGO (Italy) and KAGRA (Japan, underground). Surveys made by large research infrastructures like CERN and SKA will be used as well, both for their methodology and as inspiration for the actions for ET. A responsible energy consumption policy will be reinforced by increasing the efficiency of all devices, reducing the ET global need for energy thanks to an optimised design of the most energy-consuming areas, and by recovering as much emitted energy as possible (e.g. heat from cooling systems) to reuse it. Moreover, a responsible production for the consumed energy will be promoted, whether it be produced on site (e.g. by arrays of solar panels) or provided by external suppliers. Such optimization will be done separately for the three main elements of the on-site infrastructure –underground constructions, surface buildings and the local computing center – that all have different requirements to fulfil and challenges to meet. A joint work of WP9 with WP6 and WP8 is foreseen.

Landscape and environmental impact. The ET-PP plan includes specific actions on how to optimize the surface transportation network and design an underground transportation system for personnel and materials, by identifying the paths, the types of users, the vehicles needed, and also by considering the highest safety standards; on the planning and management issues related to the definition of critical areas (safety and environmental) and to the necessary investigations to obtain the associated risk assessments; on the impact of different scenarios for the

design of the underground structures (tunnels, shafts and caverns) to minimize interference with external surface infrastructure networks, urban and natural areas; on the development of layout concepts for the foreseen surface infrastructures taking into account technical requirements, environmental constraints and connection with existing infrastructure and service plants; on the development of integrated processes for environmental assessment evaluation in agreement with local regulations; on the study of the impact on biodiversity and on the hydrologic cycle; and, finally, on a global approach for non-hazardous and hazardous waste management and recycling both during the construction and operation phases. A joint work of WP9 with WP5 is foreseen.

Inspired by relevant CERN actions, ET-PP will study the organization to manage environmental issues. As part of its Environmental Protection Strategy, ET may launch an ET Environmental Protection Steering Board to identify and prioritize environmental areas to be addressed and to propose programs of action, and an ET Energy Management Panel to monitor the ET energy consumption and identify measures to improve efficiency and promote energy re-use. These actions will be developed in the framework of WP9 and WP2 and the environmental protection regulations of the ET hosting and member states.

Social awareness. The ET project relies on a significant investment of public funds from the different countries forming the ET consortium. Therefore, the awareness and recognition of the project value by the society is of utmost importance. Moreover, the ET project has the duty to return the investment to society also in the form of outreach, education and training opportunities for the general public and the next generations of scientists. In the ET-PP structure, WP10 is formed by a large community with huge experience on outreach and communication activities in the framework of LIGO/Virgo gravitational wave experiments. WP10, in close collaboration with WP1, will establish procedures for coordination of outreach and communications across national networks and WPs. It will create, disseminate and curate high-quality promotional materials on ET science and technology, and design educational resources on ET science and technology, aligned with national STEM curricula. In particular, this involves the design, development and maintenance of a dedicated ET website and social media platforms, as well as the design and production of a range of professional-quality videos and interactive resources on ET science and technology. In addition, ET-PP will develop a sustainable mentorship and training programme for early career researchers, including gender balance aspects, and a training plan for design and delivery of future summer schools.

2. Impact

2.1 Project's pathways towards impact

The clear WP structure and the strong links built across WPs (see Figure 1) are key aspects of ET-PP that pave the path towards reaching the goals and the required impact. The appointed co-coordinators of the different WPs were carefully selected and are a distinguished set of prominent and internationally recognized experts on the field with great experience on managing Big Science projects. In many cases, the WP co-coordinators bring first-hand experience from international laboratories like EGO, CERN or DESY, among others.

The ET-PP requested funds **(3.45M€)** are strategically placed to maximize their impact. However, the ET-PP success relies on the strong commitment from the different institutions participating in the proposal, putting forward very significant in-kind contributions in the form of dedicated personnel and cash. The personnel contracts funded by ET-PP EU funds will have a duration of three years and will count with co-funding from the host institutions, committed to extend the contracts to match the duration of the ET-PP project. As described in Section 3.2, the ET-PP participants are deeply involved in GW experiments and already provided strong support to ET.

As already mentioned, a main objective of ET-PP is to establish the governance of the ET project as a legal entity and to facilitate the formation of a strong Project Directorate structure, leading to a solid technical design and cost estimates (for the infrastructure, detectors and computing), and a timely site selection preparation, presumably resulting into a geographic and financial enlargement of the ET consortium. Figure 2 presents, in the framework of the Project Directorate, details on the positions ET-PP will promote. As anticipated, emphasis will be put in the definition of a strong Project Office and Engineering Department. They will principally be staffed by personnel hired by the participants, as in-kind contributions and/or from support requested in this application. This includes the following positions:

- *Technical Coordinator:* with the primary mission of technical management that focuses on the definition, the configuration, the schedule, the budget, the safety, the logistics, the installation, and the interferences on the worksites.
- *Systems Engineer:* that focuses on how to design, integrate, interface and manage a complex system like ET over its life cycles and will take a leading role in a methodical, multidisciplinary approach for the design, the interfaces, the constraints, the costing, the realization, the technical management, the commissioning, the operation, and final dismantling of the facility.
- *Parameters, Layout and Risk Manager:* in charge who interfaces with the ET Collaboration to collect, process and store the parameters and the requirements to elaborate the layout and the configuration which will be translated into the baseline design of the interferometer. She/he manages change requests, handles non-conformities and is in charge of risk management.
- *Software Engineer:* with quality control competences and experience of a project management environment who will participate to the selection and the procurement, and will take the lead in the installation, the configuration and the commissioning of the project management software suite which will be used for configuration management, project breakdown structures, work break down structures, risk matrices, document workflows, planning, earned value management, etc.
- *Civil Engineer:* expertise internal to the ET project that, in collaboration with national institutes and the ET collaboration, translates user requirements into specifications and interfaces with the companies which will carry out the civil engineering works. She/he will be in charge of the reception of the civil engineering works also resolving non conformities.
- *Integration and Technical Infrastructures Engineer:* with expertise in technical infrastructure systems (ventilation, cooling, electricity distribution, logistics, handling and transport) who will focus on the integration of the technical infrastructures, the detectors and the detector subsystems in the civil engineering works. He/she will interface with the civil engineer to propagate the requirements and the constraints.
- *Vacuum Engineer:* expertise internal to the ET project that, in collaboration with national institutes, CERN and the ET collaboration, translates user requirements into specifications and interfaces with the companies which will be contracted to manufacture, install, commission, and eventually operate and maintain the vacuum systems.

Within ET-PP, a total of **1.5M€** are allocated to facilitate the hiring of five highly qualified young engineers with the required competences. The engineers will be strategically placed in those host centers such that they are surrounded by experienced staff engineers providing the required supervision.

ET-PP will help to address important sustainability and environmental aspects affecting the RI design by hiring experts of those matters, for which **0.3M€** are allocated. In addition, ET-PP will be instrumental in resolving financial and legal aspects, in establishing the relation with industry, and in validating the cost and the socio-economic impact of the new infrastructure. For this purpose, ET-PP will support the creation of the Financial Manager and Industrial Liaison positions with a total of about **0.35M€**. Finally, ET-PP will allocate **0.26M€** for the preparation of legal documents and **0.2M€** for professional consulting expenses related to civil engineering costs and socio-economic impacts.

For the success of the ET project, a close cooperation of the Project Office under the leadership of the Project Directorate with the ET Collaboration is necessary. This is particularly relevant for the ET vacuum system, which constitutes a significant fraction of the total cost of the RI and will be directly managed by the Project Office. The cost of the vacuum system would be about 500 M€ if the same technology as for Virgo were to be used. Therefore, robust development is required to find the best compromise between cost and performance; for that purpose, material selection, manufacturing techniques and pumping technologies will be investigated in close collaboration with the European industry and the collaborating institutes. Given the importance of the ET vacuum system and the cost, its design will be outsourced to professionals from the CERN vacuum department providing the corresponding TDR. The anticipated CERN service costs (about 1M€ in three years) will be covered by own funds from the participants. The first 0.3M€ 1-year cost has been already secured by INFN and NIKHEF contributions.

The design of a valid and scalable computing and data access model for ET, due by the end of the ET-PP period, is put in the hands of experts on distributed computing from different European centers and experts on high-performance computing from supercomputing centers within PRACE, with experience on data management

and CPU/GPU-intensive computation tasks for GW physics. They play a central role in the current GW experiments and have long experience on WLCG computing for the LHC at CERN. Despite the fact ET counts with a strong community related to computing aspects, it is somehow dispersed in many projects. ET-PP will play an important role in focusing existing efforts and reaching the objectives by promoting the creation of a fully committed computing engineer position acting as coordinator. For this purpose, a total amount of about **0.23M€** is allocated.

A proper management of the ET-PP project, to maintain strong links and a fluid transfer of information across WPs over the duration of the project, and to prepare reports to the EC and the corresponding financial execution, requires a reinforced E-PP administration and secretariat at the coordinating institution. For this purpose, a total of about **0.27M€** is allocated. As pointed out, ET-PP includes a WP devoted to increasing the social awareness of the project and returning the society investment in the form of education and training programs. A strong community of experts on outreach and communication is already in place in the framework of the LIGO/Virgo experiments and ET will profit from it. Nethertheless, global coordination should be reinforced and the production of high-quality contents for media communication, including the maintenance of a website, requires professional support. For this purpose ET-PP plans to devote a total of **0.14M€** to these activities. Finally, a total of about **0.2M€** are devoted to cover travel costs and the organization of workshops across different WPs.

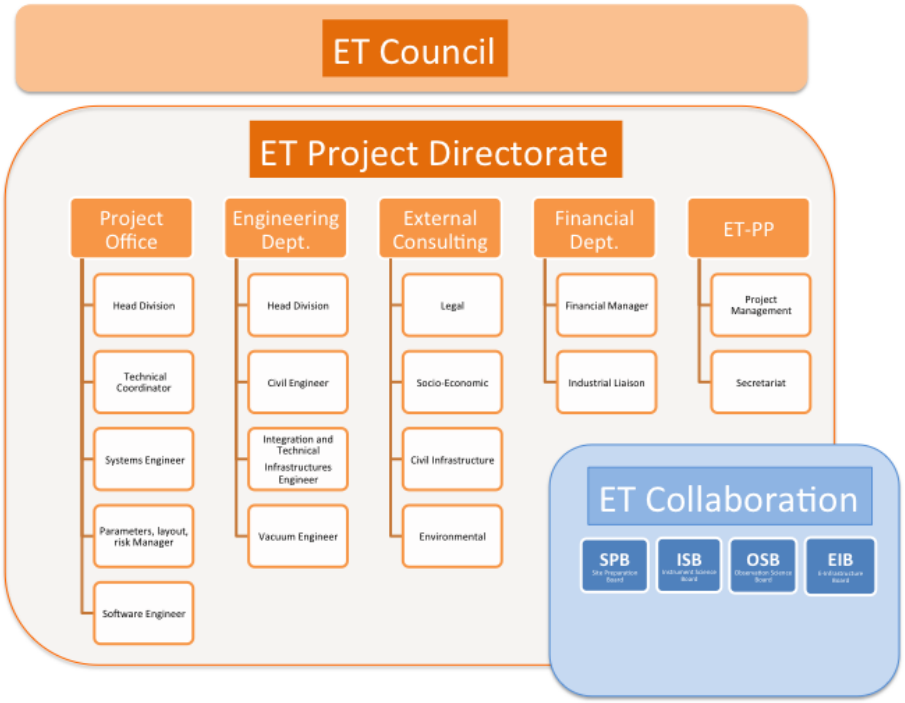


Figure 2. Positions promoted by the ET-PP actions directly related to the Project Directorate. The activities directly related to the ET Collaboration in ET-PP are funnelled via WP6.

2.2 Measures to maximise impact - Dissemination, exploitation and communication

A proper communication and dissemination of information across WPs and with representatives from the different funding agencies is mandatory for the success of the ET-PP project. As already mentioned, a clear and well-defined structure of WPs has been established, where the intimate relation with the existing ET Collaboration internal organization has been preserved, while bringing new key players with the necessary skills. During the execution of ET-PP, regular meetings will be organized by each of the WPs co-coordinators, complemented by monthly WP-coordinators meetings chaired by the ET-PP coordinator.

Similarly, a close and continuous interaction with the BSR and BGR boards is anticipated for all the aspects related to governance, financial architecture, legal framework and site selection preparation. Following high standards in other large research infrastructures, governing boards meetings will be formalized and a solid system of documentation and reporting will be established to guarantee a transparent access to all the relevant information by all the interested parties. ET-PP will result in the preparation of legal form and governance model documents based

on consensus requirements, the financial items of a signature-ready contract to commonly fund and build ET, and a business plan will be set up for the operation phase.

The geographical enlargement of the ET consortium will be a priority in ET-PP for which the ET Project Directorate will proactively maintain conversations with new European countries expressing interest in joining ET. As pointed out, ET is framed within IGWN in order to define a worldwide common roadmap for 3G experiments. During ET-PP the international coordination with the USA, Asia and Oceania will be reinforced via bilateral and multilateral dedicated workshops.

One of the ET-PP missions is the delivery of updated TDRs. This requires a significant R&D effort in aspects related to mirrors, coating, quantum and cryogenic technologies, vibration isolation, vacuum technology, environmental monitoring and control, and civil infrastructure technologies. Detailed studies that will result in a number of scientific and technical publications and in some cases they might translate into patents.

A major milestone of ET-PP is the selection of the ET location by 2025. This will be the result of a complex process, involving several factors, that should be carefully and adiabatically driven during ET-PP and that requires transparency and exquisite communication among parties. In addition to promoting a fluid and transparent communication with funding agencies, measures will be put in place to pave the path towards a site selection process that preserves the political convergence, including comprehensive internal and external reviews, the organization of town meetings, workshops at different stages of the selection process, as well as topical workshops for different technical inputs relevant for the decision, where the harmonization and proper scrutiny of the information provided by the sites will be guaranteed. As a result, a number of technical documents will be publicly delivered including all the information relevant from each site like, for example, legal procedures, permitting and land acquisitions i.e. the steps to be taken prior to starting excavations; updated socio-economic impact studies; reports on accessibility, quality of life etc; a complete quantification of all the aspects impacting ET performance for each site; 3D geology, hydrology, etc. model with detailed localisation of the RI; and a robust and complete cost and schedule estimates of the excavations.

As pointed out, an early involvement of industry is fundamental. In order to attract the interest of industry, the existing liaisons with the industrial capabilities in each of the countries will be fully exploited and industrial sessions will be organized. A clear and consistent view of the ET project finances and costs, and a fair share policy in the industrial returns in each country contributing to the construction and operation costs of ET, will be needed to raise the necessary construction funds and to maintain a strong commitment of the different funding agencies over time. A functional Financial Board during ET-PP providing information to the participants of the ET consortium in a comprehensive, transparent and consistent manner will be instrumental to achieve those goals. This includes a report on industry engagement plan execution, a model for pursuing in ET a balanced industrial return, and a report on Technology Transfer (TT) and Intellectual Property management in ET.

An intense campaign of outreach and communication in social media, of utmost importance to create the necessary atmosphere for raising the interest of the society on the ET project and its recognition at local, national and international levels, will be performed. As pointed out, the ET community counts with an experienced network of outreach officials in the different countries. ET-PP will facilitate that the activities are carried out in a centralized and coordinated manner. Actions will include the design, development and maintenance of a dedicated ET Consortium website and social media platforms, and the commissioning and production of high-quality outreach materials. Such materials will be used on the ET Consortium website and social media, in professional outreach and political engagement, at science centres, science festivals and exhibitions and within formal education and citizen science programmes. The goal of these materials will be to create an established, professional brand for ET, emphasising its game-changing scientific potential for astronomy, cosmology and fundamental physics. Materials will span all aspects of ET Consortium instrument and observational science and technology, including multi-messenger and multi-band gravitational-wave astronomy synergies, and all materials will be translated into the languages of all ET Consortium partner institutions. In addition to the science and technology content, materials will also showcase ET as a conduit for STEM careers - emphasising the importance of diversity and promoting under-represented groups - and as a driver for industrial innovation. Moreover, the materials will emphasise the pan-European nature of the ET Consortium as an international community of scientists, engineers and other professionals and a unifying project that strengthens pathways for cultural exchange amongst EU countries and their people.

Finally, ET-PP will develop a strategy for delivering a comprehensive, sustainable mentorship and training programme for early-career researchers (ECRs) across the ET Consortium with special attention to gender balance issues. The structure of the programme will combine delivery of formal workshops and training sessions with establishing an annual ECR "excellence awards" scheme and an informal mentoring and support network that pairs ECRs with established ET Consortium researchers. The main goal of the programme will be to establish a pipeline for identifying and supporting the development of future ET Consortium leaders (on the mid-2030s timescale of ET operations) from amongst the current ECR cohort.

2.3 Summary

KEY ELEMENT OF THE IMPACT SECTION

SPECIFIC NEEDS	D & E & C MEASURES	EXPECTED RESULTS
What are the specific needs that triggered this project? 1. The enlargement of the ET consortium, and the definition of the legal framework, governance schemes, and financial regulations under which the RI will be constructed and operated. 2. The revisited technical design and costing of the observatory. 3. The timely selection of the site where ET will be deployed, detailing and cost-estimation of the required site infrastructure, and its socio-economic and environmental impacts. 4. To determine the schemes for technology transfer, procurement and industry involvement in the technical design and construction of ET. 5. The required linking with relevant science communities regarding the detailed definition of the science program, and to determine the user services and the computing and data access model.	What dissemination, exploitation and communication measures will you apply to the results? *Dissemination.* 1. Scientific and Technical publications on the ET science case, the infrastructure and the experiment. 2. Documents internal to ET Council describing the governance and financial model. 3. Legal documents establishing ET as legal entity. 4. Documents internal to ET Council describing the site selection process. 5. Scientific Workshops and Meetings with Industrial partners *Exploitation.* 1. Patenting R&D results. 2. Transfer of Technology to Industry for ET construction. *Communication.* 1. Outreach and news on social media to explain the ET project. 2. Presentations at science centres, science festivals and exhibitions of ET science targeted to the general public.	What do you expect to generate by the end of the project? 1. ET established as a legal entity. 2. Complete financial plan and financial scenario analysis. 3. Complete characterization of sites including socio-economic impact and environmental studies, and a robust and complete cost and schedule estimates of the excavations. 4. Site selection 5. Operational Project Office and Engineering Department. 6. Updated Technical Design Reports for the infrastructure and the experiment. 7. Data Management Plan and data access policy. 8. Reports on industry engagement plan execution and on Technology Transfer and Intellectual property management in ET. 9. A model for pursuing in ET a balanced industrial return. 10. Definition of the computing and data model of ET. 11. A sustainable mentorship and training programme for early career researchers and an increased gender balance. 12. An increased social awareness of the ET project.

TARGET GROUPS	OUTCOMES	IMPACTS
Who will use or further up-take the results of the project? Who will benefit from the results of the project? 1. The funding agencies supporting ET who are receiving the necessary documentation. 2. The ET project as a whole, becoming a legal entity with a functional governing model and a well-structured project office and engineering department in place. 3. The scientific community interested in the ET mission, including GW observatories and other experiments planning to exploit a multi-messenger approach using ET data. 4. The industry in the participating countries engaged in the R&D and the construction of ET. 5. The general public targeted with dedicated outreach and educational activities related to GW physics and the understanding of the cosmos.	*What change do you expect to see after successful dissemination and exploitation of project results to the target group(s)?* 1. Increasing interest and recognition in society on the ET project. 2. The enlargement of the ET Consortium with the required funding for ET construction and operations. 3. A timely selection process preserving the political convergence, followed by the start of the construction phase.	*What are the expected wider scientific, economic and societal effects of the project contributing to the expected impacts outlined in the respective destination in the work programme?* 1. The start of a new era in the exploration of the universe using gravitational waves. 2. Significant industrial and technological returns to society during R&D and construction phase. 3. The participation of ET on global sustainable goals becoming an interdisciplinary and technological hub open to a variety of collaborations with geoscientists, electromagnetic and data science experts and contributing to the studies on natural hazards and climate changes.

3. Quality and efficiency of the implementation

3.1 Work plan and resources

Figures 3 to 5 present Gantt diagrams with the project planning details, including milestones. As discussed in Section 3.2, the ET consortium, strategically complemented with this ET-PP action, has the necessary resources and the competences to carry out the objectives in due time.

3.2 Capacity of participants and consortium as a whole

The ET-PP proposal is supported by the full ET Collaboration, which is directly represented in the WP structure of the project. Here, the pan-european interest in ET is represented by 13 main participants from 12 countries, including major funding agencies and worldwide recognized leading research institutions in the field of GWs in Europe. The list of partners (and affiliated institutions) includes:

The Centre National de la Recherche Scientifique (National Centre for Scientific Research): a government-funded research organization, under the administrative authority of France's Ministry of Research. CNRS's annual budget represents a quarter of French public spending on civilian research. As the largest fundamental research organization in Europe, CNRS carries out research in all fields of knowledge, through its seven Institutes and three national Institutes. Among them, IN2P3 (Institut National de Physique Nucléaire et de Physique des Particules) coordinates French research and development activities in the fields of nuclear, particle and astroparticle physics on behalf of the CNRS and universities. IN2P3 is responsible for running several major

national facilities including particle accelerators and also supports international research facilities (e.g., CERN, EGO, EGI). The core of the French teams involved in this EU proposal corresponds to the scientists who contributed to the construction of Virgo, AdVirgo, AdVirgo+, to the first gravitational waves detections and to the genesis of the ET project. Two essential IN2P3 structures essential for this program are: LMA in Lyon as a unique technological French platform dedicated to provide large and very low loss mirrors for frontier optical experiments, and CC-IN2P3 which provides resources and services to experiments supported by IN2P3. A copy of all Virgo data is stored at CCIN2P3. CNRS participates in the AHEAD2020 research infrastructure integration activity aiming to develop multi-messenger astronomy scenarios with gravitational waves, neutrinos and high energy gamma ray detection. CNRS is also coordinating the ESCAPE H2020-INFRAEOSC project which aims to address the Open Science challenges shared by ESFRI facilities as well as other pan-European research infrastructures in astronomy and high energy physics. The laboratories participating in this European project are: APC – IN2P3 : AstroParticule et Cosmologie, Paris; ARTEMIS : Astrophysique Relativiste, Théories, Expériences, Métrologie, Instrumentation, Signaux, Nice; CC-IN2P3 : Centre de Calcul de l'IN2P3, Lyon; IJCLab – IN2P3 : Laboratoire Irène Joliot-Curie, Orsay; IPHC – IN2P3 : Institut Pluridisciplinaire Hubert Curien, Strasbourg; IP2I – IN2P3 : Institut de Physique des 2 Infinis de Lyon; LAPP – IN2P3 : Laboratoire d'Annecy de Physique des Particules; LKB : Laboratoire Kastler Brossel, Paris; and LPCC – IN2P3 : Laboratoire de Physique Corpusculaire de Caen.

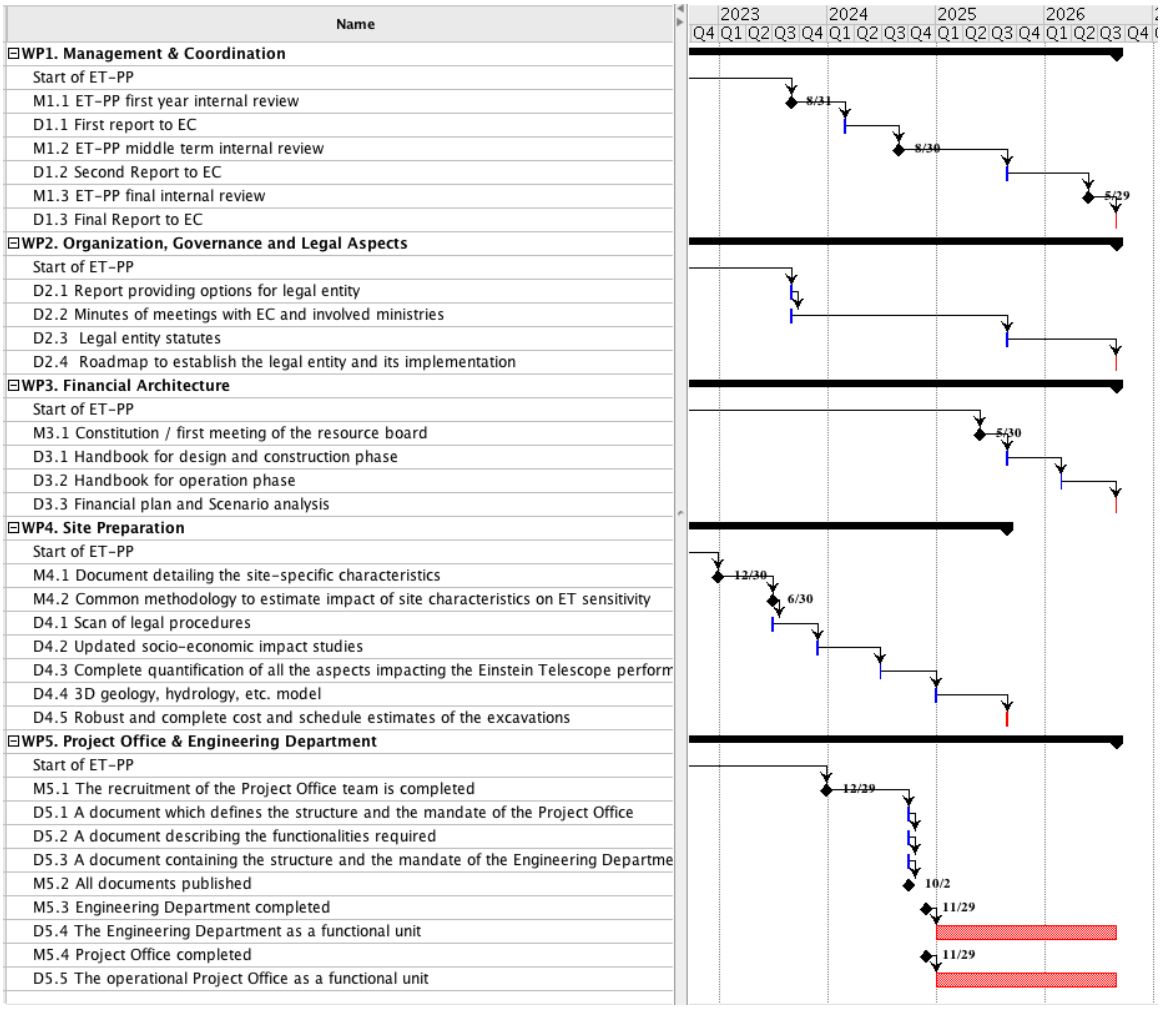


Figure 3: Gantt chart corresponding to the WP1-WP5. The starting date is assumed to be 1-Sept-2022.

Deutsches Elektronen-Synchrotron (DESY) is a world known large national research centre performing physics and astrophysics related research at two locations, Hamburg and Zeuthen near Berlin, and belongs to the Helmholtz Association of German research centres. DESY has a long tradition in planning, constructing and running large scale research infrastructure with expertise in many technological fields required to build ET. In astrophysics DESY is following a multi-messenger approach including gravitational waves physics. This application also includes contributions as third parties from scientists at the Max Planck Institute for Gravitational Physics (AEI),

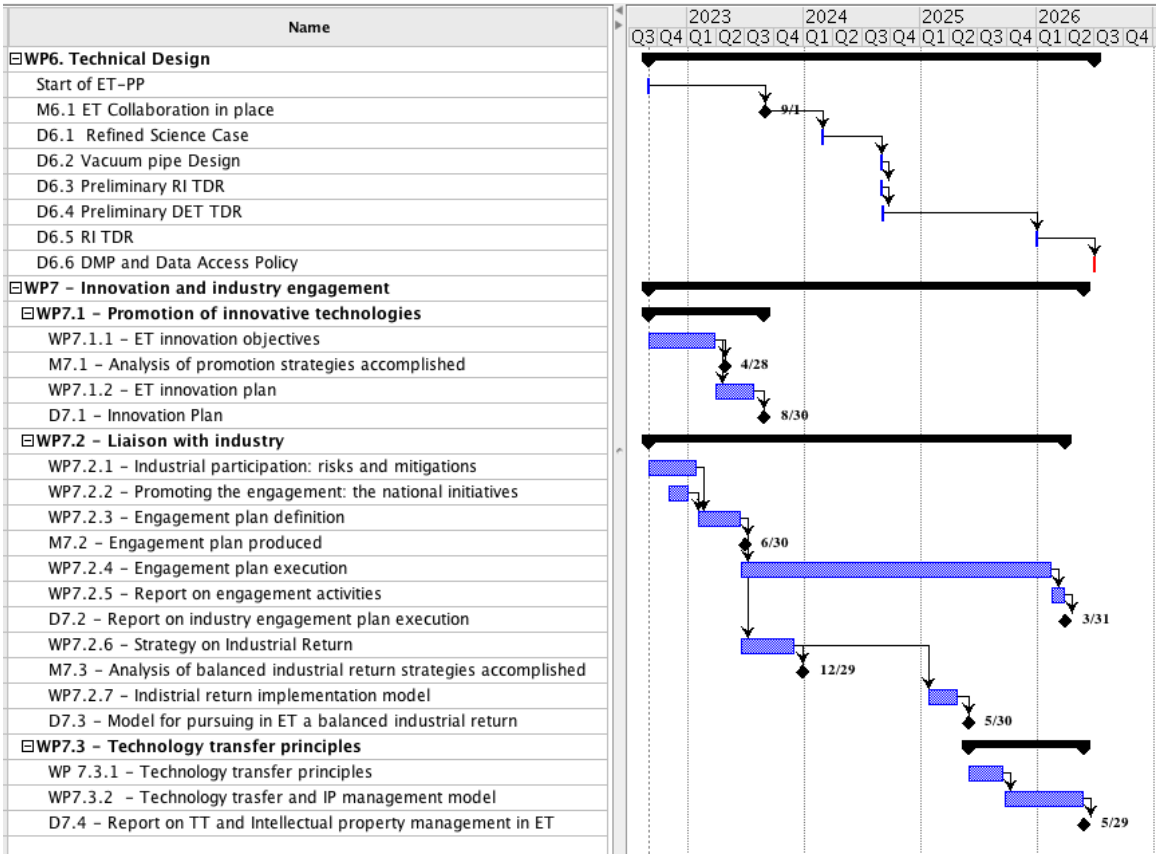


Figure 4: Gantt chart corresponding to the WP6-WP7. The starting date is assumed to be 1-Sept-2022.

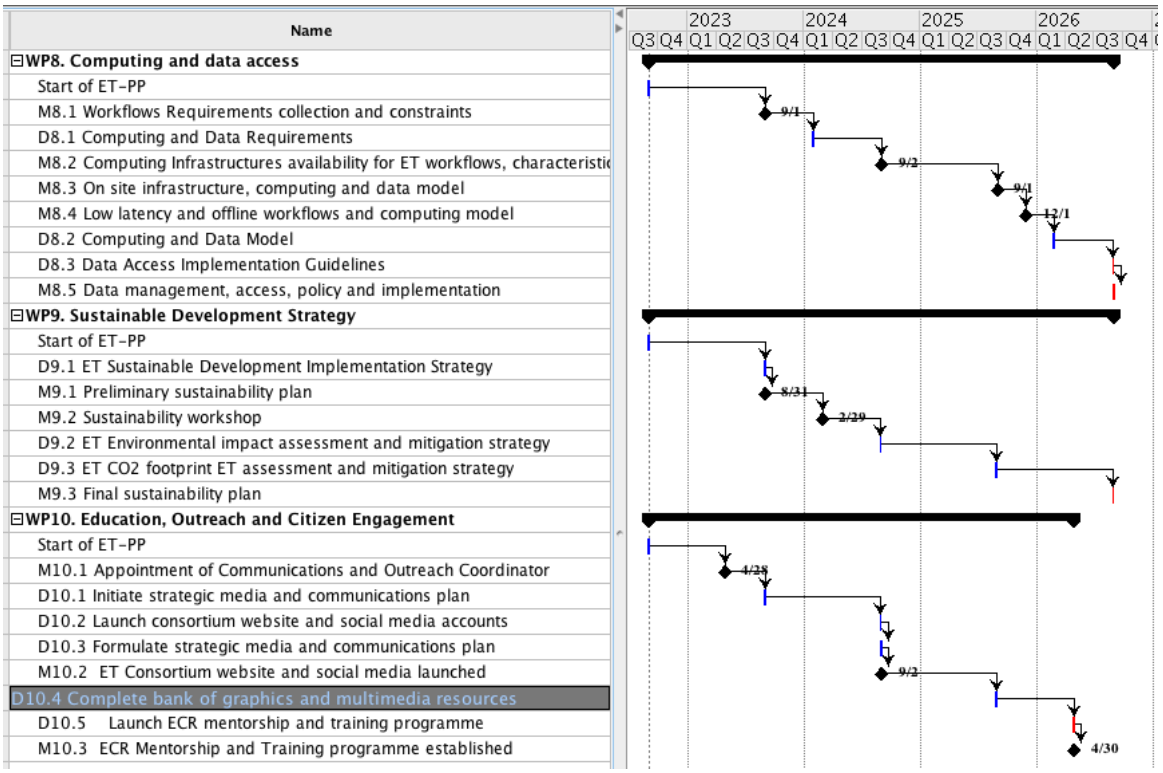


Figure 5: Gantt chart corresponding to the WP8-WP10. The starting date is assumed to be 1-Sept-2022.

Aachen University (RWTH) and the Institute for Gravitational Physics at Leibniz Universität Hannover (LUH). The "Zentrum für Gravitationsphysik" in Hannover, a close collaboration of AEI and LUH has focussed on research on gravitational waves for several decades now. In addition to the numerical analysis of gravitational wave detector data, its particular strengths lie in interferometry, laser physics, and the use of squeezed light states to reduce quantum noise. In addition to the GEO600 gravitational wave detector, the institution operates a 10m

interferometer prototype facility with an elaborate seismic isolation system researching new technologies for the third generation of gravitational wave detectors.

EGO is a scientific consortium founded in Dec. 2020 by two national public research bodies: the CNRS (FR) and the INFN (IT). Since 2021, the NIKHEF Laboratory (NL) also joined as a member, after 14 years of observer status. EGO has an annual budget of 10 M€ and 75 personnel, and supports the VIRGO collaboration, which counts more than 750 members from several EU and non-EU countries. It ensures the functioning of the VIRGO antenna, its maintenance, its operation and the improvements to be made; the maintenance of the related infrastructures, including a computer center and promotes an open co-operation in R&D and the maintenance of the site. EGO carries out any other research in the field of gravitation of common interest for the Members and promotes cooperation in the field of experimental and theoretical gravitational waves research in Europe. This includes support towards progress for the next-generation of gravitational wave detectors.

The University of Geneva, through the departments of Astronomy (represented here by Profs. Fragkos and Meynet) and Particle Physics (represented here by Profs. Schramm and Sanchez Nieto), has strong competencies in the development of computing, data processing & analysis, and data archiving & public access infrastructures, through the involvement in multiple space- and ground- based observatories, and large particle-physics experiments, such as the INTEGRAL, GAIA, CHEOPS, EUCLID, and ATHENA astronomical satellites, the ATLAS experiment, and the CTA observatory. Notable are also the activities of the Department of Theoretical Physics (represented here by Profs. Maggiore and Riotto) in the ET Collaboration, with leadership roles in the steering committee and the Observing Science Board. Finally, the University of Geneva maintains close ties with the Swiss National Supercomputing Center (CSCS) and the Swiss Data Science Center (SDSC), which possess valuable expertise related to this project. The University of Geneva is currently not eligible for receiving EU funding but is essential to successfully carry out the project. Funding will be provided by the State Secretariat of Education, Research and Innovation (SERI).

The Instituto de Física de Altas Energías (IFAE) in Barcelona conducts research, both theoretical and **experimental**, on the frontier of fundamental physics: high-energy physics (ATLAS, T2K/HyperK), astrophysics (MAGIC, CTA), cosmology (DES, DESI, PAU, LSST), and GWs (Virgo, ET) and also in various areas of applied physics, such as medical imaging and quantum computing. IFAE contributes to the hardware upgrades of Virgo and participates actively in ET and the ET-pathfinder developments. In 2003, IFAE and CIEMAT founded the Port d'Informació Científica (PIC) in Barcelona, one of 13 LHC Tier-1 data centers in the world. PIC contributes significantly to LIGO/Virgo distributed computing efforts. In this proposal IFAE represents the Spanish ET consortium including also contributions from the Barcelona Supercomputing Center (BSC), specialised in high performance computing (HPC) with Marenostrum, one of the most powerful supercomputers in Europe, where ET became an strategic line, and CDTI, the Spanish public business entity under the Ministry of Science and Innovation and the ILO for the most relevant research infrastructures in the ESFRI domain of Physical Sciences and Engineering in which Spain is involved (CERN, ESO, ESRF, ESS, European XFEL, F4E, ILL and SKA). Other Spanish Institutions involved in GW physics with LIGO/Virgo, signatories of the ET MoU, and contributing to ET-PP phase via contributions made in the framework of the ET working groups include: the Institute of Cosmos Sciences (ICCUB), the Universitat de les Illes Balears (UIB), and the Universitat de València (UV).

INFN - Istituto Nazionale di Fisica Nucleare. The Italian support to the ET project is realised through a multiple-action scheme. The Italian Ministry for the University and the Research (MUR) supports directly the Sardinian candidature to host the ET observatory since 2018 with a special grant of 17M€, provided to INFN in three annual tranches. This support is addressed both to the candidature of the site and to the development of new technology. The site candidature is also supported by the regional government of Sardinia through a grant of 3.5M€. Furthermore a special support of about 4M€ for the development of the cryogenic technologies for ET has been provided by MUR to the "La Sapienza" University in Rome, allowing the realisation of the Amaldi research centre. Finally, four competitive grants have been attributed to ET related projects by the MUR within the PRIN programme (Progetti di Rilevanza Nazionale) in the last three years for a total of more than 2.5M€. These projects are addressed to the site characterisation, to the development of technologies for ET and to the improvement of the science case of ET with special focus on the multi-messenger astronomy.

The University of Louvain (UCL) physics research is carried out at the Research Institute in Mathematics and Physics and more particularly at the Cosmology, Particle Physics and Phenomenology (CP3) center. Presently the

CP3 center counts 10 academic staff members, 7 permanent research scientists and about 50 postdoctoral researchers and PhD students. Physicists at the CP3 center are active in a number of international experimental Collaborations, and in particular in the gravitational wave physics experiment VIRGO at the European Gravitational Observatory EGO. The UCL gravitational wave group is involved in two EU FEDER INTERREG projects, "Einstein Telescope EMR Site & Technology (ETEST)" and "ETPathfinder", assigned to a consortium of German, Dutch and Belgian universities for the development of technologies for ET.

Montanuniversität Leoben (MUL) is a university in Austria known for its research focused on the "added value chain", concerning the extraction of raw materials and their processing, material & product development, production processes, manufacturing, building components/plants up to recycling and landfill. The Chair of Subsurface Engineering at Montanuniversität Leoben (MUL-SE) is part of the Department "Mineral Resources Engineering". A broad variety of research in the fields of geotechnics and underground engineering is carried out by the laboratory's civil, mining and tunneling engineers, usually in close collaboration with industry. The fields of experience cover tunnel design strategies, tunneling methodologies, safety in tunnels during construction and operation as well as the refurbishment of tunnels. MUL's international leadership in subsurface engineering serves the optimisation of the collider design with respect to feasibility, schedule and cost optimisation. It helps to reduce the quantity and optimises the types of excavated materials based on the selection of the tunneling technology. MUL's activities of comparing and evolving regulatory and legal frameworks for subsurface engineering projects at an international level serve the development of a suitable plan for the management and use of excavated materials.

NIKHEF – National Institute for Subatomic Physics. Within The Netherlands, gravitational-waves research and in particular the ET project is strongly supported. The Dutch Royal Academy lists ET as one of its 13 'must have' facilities; the National Science Agenda includes ET as a 'game changer'; and ET is part of both the 2016 and 2021 editions of the National Roadmap for Large-Scale Research Facilities. Recently, the Dutch Ministry of Education, Culture and Science submitted an application to secure the anticipated Dutch contributions towards the realization of ET in the Euregio Meuse-Rhin (EMR). Together with Italy, The Netherlands are the coordinators (NIKHEF and INFN) of the ET-ESFRI project. More concretely, often in collaboration with Belgian and German partners, various subsidies have been granted in the past years. For example, a 14,5 M€ capital investment subsidy to realize the ETpathfinder laser interferometer R&D laboratory in Maastricht focused on key ET technology innovations such as the use of cryogenically cooled silicon mirrors. Furthermore a 15 M€ subsidy (E-TEST) for instrumentation development and geological characterizations of the EMR site. And a number of national and regional subsidies (ET2SME, ETT-OpZuid, etc.) totaling more than 5 M€ to stimulate industrial collaboration on ET-related technologies. These subsidies typically are supported by national ministries, provinces and Interreg. Within The Netherlands, gravitational-waves research receives substantial funding from the Dutch Research Council and NIKHEF. As a result the group has tripled in size over the past five years and includes –besides gravitational-wave scientists– experts in for example cryogenics, computing, controls, geology and seismology. This application also included contributions as third parties from Vrije Universiteit Amsterdam (VU) and Maastricht University (UM).

The University of Warsaw is a leading educational and research institution in Poland. The Astronomical Observatory of the University is the host of the OGLE and ASAS projects, and also plays important part in Gaia, Virgo, HESS, CTA, Planck and ET. It coordinates the ET related efforts in Poland through the Polish ET Consortium. The principal members of the Polish ET Consortium are the University of Warsaw (UW), Nicolaus Copernicus Astronomical Center Polish Academy of Science (CAMK), Institute of Mathematics Polish Academy of Science (IMPAN) as well as National Center for Nuclear Research (NCBJ), University of Bialystok, and Cyfronet AGH. Members of the Consortium play important roles in the ET and VIRGO as members of the ET and Virgo Steering Committees, ET Board of Scientific Representatives and as coordinators of several ET activities. University of Warsaw and CAMK are also specializing in hardware development for gravitational wave detection which included parts of vacuum systems for Virgo, electronics for Virgo, and development and installation of the seismic Newtonian noise system, and infra-sound monitoring of the Virgo site. Additionally the group has been active in long term seismic characterizations of several ET candidate sites for the last 8 years. These activities were supported with grants with the total value above 4M€ over the past 5 years.

UKRI- The UK has a long history of pioneering the technology and data analysis techniques essential for gravitational wave astrophysics and on the overall understanding of planning and operation of large-scale international infrastructures. This includes: the design, development and implementation of sophisticated ultra-low noise suspensions and interferometric techniques in the UK-German GEO600 GW interferometer; financial and

intellectual partnership in the 'Advanced LIGO' observatories located in the US; working in close collaboration with colleagues in the Virgo collaboration; leading work packages of the initial design studies for ET and holding significant positions on the executive committee, oversight committee, and working groups of the LIGO Scientific collaboration. The UK participation includes as affiliated partners scientists from Cardiff University and the University of Glasgow.

The UAntwerpen Particle Physics group studies the most fundamental building blocks of the universe and their interactions. We do this by performing: experimental research at the highest-energy particle colliders; exploiting other experimental opportunities, such as the search for sterile neutrino's produced in nuclear reactors; theoretical and phenomenological research in particle physics; and experimental research in gravitational wave physics. The gravitational wave subgroup in Antwerpen consists of 11 members that take part in GW data analysis, theoretical modeling of early universe cosmological GW signals, and instrumentation development. The data analysis part focuses mainly on the search for a stochastic GW background with the LIGO-Virgo-Kagra detector network and investigates the potential for 3G detectors such as ET. The theoretical part involves particle physics inspired models of first order phase transitions, domain walls, and related early universe cosmology. Finally, the instrumentation part entails the participation as lead partner in the ETpathfinder R&D platform.

Wigner Research Centre for Physics (Wigner RCP; https://wigner.hu/en) is one of the research excellence flagship organisation recognised by the Hungarian Academy of Sciences and a key participant both in the national innovation system and European research cooperation. The Central Research Institute for Physics (KFKI), founded in 1950, was the predecessor of the research centre. The WIGNER RCP was founded in January 2012 merging the previous KFKI Research Institute for Particle and Nuclear Physics and the Institute for Solid State Physics and Optics. Today it is the largest research institute for scientists in physics in Hungary.

Tables for section 3.1

Table 3.1a: List of work packages

Work package No	Work Package Title	Lead Participant No	Lead Participant Short Name	Person-Months	Start Month	End month
1	Management & Coordination	**1**	**IFAE**	**52,8 + 36 (EC)**	**1**	**48**
2	Organization, Governance and Legal Aspects	**6**	**NIKHEF**	**24,8 + 15 (EC)**	**1**	**48**
3	Financial Architecture	**7**	**UCL**	**48 + 32 (EC)**	**1**	**48**
4	Site Preparation	**6**	**NIKHEF**	**70,2**	**1**	**36**
5	Project Office & Engineering Dpt.	**5**	**CNRS**	**425+180 (EC)**	**1**	**48**
6	Technical Design	**3**	**INFN**	**123**	**1**	**48**
7	Innovation and Industrial Engagement	**3**	**INFN**	**87+21 (EC)**	**1**	**48**
8	Computing and Data Access	**2**	**BSC**	**69 + 36 (EC)**	**1**	**48**
9	Sustainable Development Strategy	**9**	**EGO**	**68,8 + 48 (EC)**	**1**	**48**
10	Education, Outreach and Citizen Engagement	**4**	**UW**	**139 + 24 (EC)**	**1**	**48**
				Total person-months: **1038,6 + 302 (EC)**		

Table 3.1b: Work package description

Work package number	**1**	**Lead beneficiary**				**IFAE**	
Work package title	Management & Coordination						
Participant number	1						
Short name of participant	**IFAE**						
Person months per participant:	**52,8 + 36 (EC)**						
Start month	**1**			**End month**	**48**		

Objectives
Global coordination of the ET-PP activities across the different WPs. Reports to EC.

Description of work
Management and Coordination - will be responsible for the global management and coordination of the WP activities. WP1 will be responsible for the ET-PP administrative activities including regular scientific and financial reports to EC, and will contribute globally to increase the social awareness of the project.

Deliverables
D1.1 First Report to EC (M18); **D1.2** Second Report to EC (M36); **D1.3** Final Report to EC (M48)

Work package number	**2**	**Lead beneficiary**				**NIKHEF**	
Work package title	Organization, Governance and Legal Aspects						
Participant number	**3**	**6**	**14**				
Short name of participant	**INFN**	**NIKHEF**	**UKRI**				
Person months per participant:	**10**	**10 +15 (EC)**	**4,8**				
Start month	**1**			**End month**	**48**		

Objectives
This work package focuses on issues related to organization, governance and legal aspects. The activity tries to reconcile international, national and regional political and financial priorities.

Description of work
The main goal of this work package is to provide all necessary input for the political processes related to site selection, legal entity and governance. The main deliverables include the preparation of the required legal forms and these include the governance model documents. Here the main principle will be that structure follows function and this requires close cooperation between scientific, technical, legal and financial experts in order to allow a stable and fruitful long term operation of the facility. The activity includes the development of options on scientific and user related legal form requirements, development of options on scientific and user related governance model requirements. The preparation of legal form and governance model documents based on consensus requirements. Moreover the activity will align as temporal funding profiles in Europe and perform financial engineering for the construction phase. Finally a business plan will be set up for the operation phase.

Deliverables

D2.1 Report providing options for legal entity (M12); **D2.2** Minutes of meetings with EC and involved ministries (M12); **D2.3** Legal entity statutes (M36); **D2.4** Roadmap to establish the legal entity and its implementation ready for approval by (proto Council) and/or Ministries (M48).

Work package number	**3**	**Lead beneficiary**				**UCL**	
Work package title	Financial Architecture						
Participant number	**10**	**3**	**7**	**12**			
Short name of participant	**DESY**	**INFN**	**UCL**	**Wigner RCP**			
Person months per participant:	**24 + 9 (EC)**	**10 + 14 (EC)**	**8 + 9 (EC)**	**6**			
Start month	**1**			**End month**	**48**		

Objectives

To prepare the financial items of a signature-ready contract to commonly fund and build ET.

Description of work

Investigate all aspects of the funding architecture required to ensure the construction, operation, and eventual decommissioning of the ET even with different alternatives in construction and legal settings; to identify risks (price, time, technological, legal, etc.); to define guidelines with a fair sharing of costs and scientific, industrial and socio-economic returns among all participating parties in the ET collaboration; and to set a strong financial model and a common tool for all financial data.

Deliverables

D3.1 Handbook for design and construction phase (M36); **D3.2** Handbook for operation phase (M42); **D3.3** Financial plan and Scenario analysis (M48)

Work package number	**4**	**Lead beneficiary**				**NIKHEF**	
Work package title	Site Preparation						
Participant number	**3**	**6**	**4**	**12**			
Short name of participant	**INFN**	**NIKHEF**	**UW**	**Wigner RCP**			
Person months per participant:	**10**	**10**	**43**	**7,2**			
Start month	**1**			**End month**	**36**		

Objectives

Facilitate the site selection process by collecting –and wherever possible quantifying – all relevant site-specific aspects entering the ET site selection process. This will be done for all sites that aspire to submit a bid book to host the ET infrastructure.

Description of work

Collect and treat in a transparent manner the information from the sites and provide comprehensive documentation to facilitate the site selection process. Relevant aspects for site characterization range from issues directly impacting the sensitivity/performance i.e. discovery potential of ET like seismic noise, seismic activity and duty cycle, to aspects that impact the construction/operation costs such as rock stability and sub-surface hydrology to 'softer' aspects such socio-economic impact, accessibility and quality of life. For many of the aspects the actual work will not be done within the WP4 itself, but will be provided by the ET Collaboration and/or will be outsourced to a professional organisation.

Deliverables

D4.1 Scan of legal procedures, permitting and land acquisitions i.e. the steps to be taken prior to starting excavations (M10); **D4.2** Updated socio-economic impact studies. Scan of accessibility, quality of life etc. (M15); **D4.3** Complete quantification of all the aspects impacting the ET performance for each site (M22); **D4.4** 3D geology, hydrology, etc. model with detailed localisation of the ET infrastructure (M27); **D4.5** Robust and complete cost and schedule estimates of the excavations. Including, if necessary: instrumentation for Newtonian Noise cancellation; costs of debris removal; costs of land acquisition, permitting, etc. (M36).

Work package number	**5**	**Lead beneficiary**				**CNRS**	
Work package title	Project Office & Engineering Department						
Participant number	**5**	**3**	**6**	**1**	**8**		
Short name of participant	**CNRS**	**INFN**	**NIKHEF**	**IFAE**	**ANTW**		
Person months per participant:	**121 +108 (EC)**	**141 + 36 (EC)**	**124 +10 (VU) +36 (EC)**	**24**	**5**		
Start month	**1**			**End month**	**48**		

Objectives

To set-up a Project Management environment and the Engineering Department for the ET RI construction project.

Description of work

Establish the ET project office and the corresponding engineering department. The role of this WP is to set-up a project management environment for the ET RI construction project. This environment will be supported by consultative and executive bodies equipped with means to monitor, control, coordinate and report on the technical design, the engineering, the technical specifications, the risks, the budget and the schedule.

Deliverables

D5.1 A document which defines the structure and the mandate of the Project Office. (M25)
D5.2 A document describing the functionalities required from the tools in support of the project management activity used across all the project units. (M25)
D5.3 A document containing the structure and the mandate of the Engineering Department. (M25)
D5.4 The Engineering Department as a functional unit complete with key figures operational, mission statement and budget. (M28)
D5.5 The operational Project Office as a functional unit complete with manpower, mission and budget. (M28)

Work package number	**6**	**Lead beneficiary**				**INFN**		
Work package title	Technical Design							
Participant number	**13**	**8**	**3**	**6**	**10**	**5**	**1**	**4**
Short name of participant	**UniGE**	**ANTW**	**INFN**	**NIKHEF**	**DESY**	**CNRS**	**IFAE**	**UW**
Person months per participant:	**2**	**29**	**20**	**2.5 + 5 (VU) +2.5 (UM)**	**0 +10 (LHU)**	**28**	**10**	**14**

Start month	**1**	**End month**	**48**	

The person-months numbers are indicative since they include mostly coordination positions within the ET organization chart.

Objectives

Delivering of the technical design of both the research infrastructure and the hosted detectors of ET. Delivering the science case in a global context. Delivering, in collaboration with WP2 and WP8, the Data Management Plan and the Data Access Policy for ET.

Description of work

This WP will act as a bridge between ET-PP and the ET collaboration. In fact, the ET collaboration is already well organised in specific boards targeting the objectives of this WP6. The activities indicated in this work package are carried out by a larger community (currently more than 400 scientists) that is only rudimentarily represented by the person-months indicated in the WP6 table. There are many more institutions and universities (more than 80 in December 2021) involved in this activity than indicated in the current WP6 table; as it is impossible to list them all, we provide a link to a public list here: https://apps.et-gw.eu/tds/ql/?c=16183 . The overall structure of the ET collaboration producing the deliverables is presented in Figure 2. Finally, as indicated by the deliverables, WP6 will provide the Technical Design Report both for the research infrastructure and for the detectors, as developed by the collaboration. Furthermore, the Data Management Plan and the Data Access policy will be defined together with WP2 and WP8.

Deliverables

D6.1 Refined Science Case. Describe the science targets of ET in the updated global scenario (M18); **D6.2** Vacuum pipe Design. Vacuum pipe is one of the most expensive components of the ET facility and it needs a specific design process (M24); **D6.3** Preliminary RI TDR. The ET civil infrastructures will be realised in an iterative process and a preliminary design is expected in M24; **D6.4** Preliminary DET TDR. In parallel to the civil infrastructure design, the hosted detectors need to be designed in an iterative process (M24); **D6.5** RI TDR. Final TDR of the civil infrastructures (M40); **D6.6** DMP and Data Access Policy. The policy for accessing data in ET will be defined in synergy with WP2 and WP8 (M46).

Work package number	**7**	**Lead beneficiary**				**INFN**	
Work package title	Innovation and Industrial Engagement						
Participant number	**6**	**3**	**1**	**4**			
Short name of participant	**NIKHEF**	**INFN**	**IFAE**	**UW**	**ANTW**		
Person months per participant:	**12 +2 (EC)**	**+ 12 + 12 (EC)**	**12 + 8 (CDTI) + 7 (EC)**	**19**	**24**		
Start month	**1**			**End month**	**48**		

Objectives

The objective of this WP is to address all connections between ET and industry. These are: Contact with industry to do R&D for innovation (new technologies and products) and place orders. This is divided into making sure we know the appropriate companies, that they can produce what we need, that they are interested in our innovation and possible spin-off and that they will generate financial return to the participating countries. In-kind contributions of 8 person-months from the Spanish CDTI third party, relevant for task 2, are also listed under IFAE.

Description of work

Task 1. Promotion of innovative technologies
SWOT Analysis of promotion strategies on experiences and best practices in similar Big Science projects. [MS in M8]
Define appropriate objectives that ET could establish to support and enhance the development of innovative technologies and incorporation of new ventures in the implementation of the ET project. Develop plan of action to be executed in C&O phase of ET. [D in M12]
Task 2. Liaison with industry

Risk analysis on maturity of technologies and industry capabilities needed in the C&O phase.
Mapping of engagement initiatives already in place in partner countries, both for ET and other RIs. Address gaps from Risk analysis and extend activities into an Engagement plan for national and international activities. [MS in M10].
Execute this plan and report on activities at the end of the project [D in M42].
Study the options for a balanced industrial return in tendering procedures from other RI [MS in M15].
Create a model and strategy for pursuing in ET a balanced industrial return [D in M33].
Task 3. Technology transfer (Intellectual property)
Define the principles that have to shape the ET approach to the management of the Technology Transfer processes and, specifically, the management of the Intellectual property [D in M44].

Deliverables

D7.1 Innovation Plan (M12); **D7.2** Report on industry engagement plan execution (M42); **D7.3** Model for pursuing in ET a balanced industrial return (M33); **D7.4** Report on TT and Intellectual property management in ET (M44)

Work package number	**8**	**Lead beneficiary:**			**BSC**		
Work package title	Computing and Data Access						
Participant number	**2**	**10**	**5**	**13**	**3**		
Short name of participant	**BSC**	**DESY**	**CNRS**	**UNIGE**	**INFN**		
Person months per participant:	**9 +36 (EC)**	**0 +6 (RWTH)**	**3**	**12+36 (SERI)**	**3**		
Start month	**1**		**End month**		**48**		

Objectives

Definition of the computing and data model of ET, including the definition of the workflow, estimate of the resources.
Data Access – technical guidelines and principles for implementing the data access policies defined in WP6 and WP2.

Description of work

Task 8.1: “T0 data center” / coordinator CNRS: Conceptual design of the center in close collaboration with the instrument science board. Definition of the services provided by the center, delimitation against services realized with distributed computing.
Task 8.2: “Computing and Data Model” / coordinator UNIGE: Development of the computing and data model in close cooperation with the instrument science board and observational science board of ET. Definition of the workflow from the instrument to the publication.
Task 8.3: “Resources” / coordinator INFN: Estimate of the computing resources (computing power and data storage), the personnel, and the operational cost required for all aspects of ET computing. The potential for mitigation must be addressed.
Task 8.4: “Data Access Implementation” / coordinator BSC: guidelines for the data policy compliance, relevant to the data storage, access, process and distribution, on all relevant time scales, respecting the EU policies on open data.
The coordinators of the WP and the tasks will be assisted by a computing engineer financed through the EU budget. The ET collaboration will support the work with the expertise of a number of specialists from France (CNRS, including CCIN2P3), Hungary (WIGNER, BME-MIT), Italy (INFN, including CNAF), the Netherlands (NIKHEF), Poland (Cyfronet,CAMK,IMPAN,UW), Spain (IFAE, ICCUB, UIB), Switzerland (UNIGE), and others adding up to approx. 5 FTE (not included in table 3.1b, which shows only the coordinated or financed effort). Of special importance, is the contribution of the group from the University of Geneva coordinating task 8.2 and supporting it with their own personnel and financial contribution from the State Secretariat for Education Research and Innovation (SERI).

Deliverables

D8.1: Computing and Data Requirements (M18): Documentation of the inputs on the computing and data requirements received during the process; **D8.2**: Computing and Data Model (M42): Final version of 8.1; **D8.3**: Data Access Implementation Guidelines (M48): A document describing how to implement the policy for the storage and the access to the ET data, according to the data model.

Work package number	9	Lead beneficiary				EGO
Work package title	Sustainable Development Strategy					
Participant number	9	3	5	12		
Short name of participant	EGO	INFN	CNRS	MUL		
Person months per participant:	12,6 + 18 (EC)	39,2 + 18 (EC)	13	4 + 12 (EC)		
Start month	1			End month	48	

Objectives

1. Study and minimize the carbon footprint of ET, including computing and travel.
2. Evaluate and minimize the landscape and environmental impact.
3. Evaluate the contributions of the infrastructure to the UN sustainable goals.

Description of work

Task 9.1 ET Carbon footprint assessment and mitigation (CNRS, EGO, INFN)

9.1.1 ET carbon budget.

9.1.2 ET Energy consumption optimization.

Task 9.2 Landscape, environmental and societal impact (INFN, EGO, CNRS, MUL)

9.2.1: Assessing and minimizing the ET impact on its environment.

9.2.2 Environmental management approach.

9.2.3 Analyse and define an overall strategy for the reclamation, reuse and recycling of the excavated materials.

Deliverables

D9.1 ET Sustainable Development Implementation Strategy (M12); **D9.2** ET Environmental impact assessment and mitigation strategy (M24); **D9.3** ET CO2 footprint ET assessment and mitigation strategy (M36).

Work package number	10	Lead beneficiary				UW
Work package title						
Participant number	4	14	9	12	1	3	6
Short name of participant	UW	UKRI (CU, UG)	EGO	Wigner RCP	IFAE	INFN	NIKHEF
Person months per participant:	38 + 24 (EC)	9,6	28,4	6	3 + 29 (UV,ICCUB, UIB)	5	10 +10 (UM)
Start month	1			End month	48		

Objectives

1. Establish coordination procedures for trans-national ET Consortium outreach and communications.
2. Create, disseminate and curate ET Consortium communications and outreach materials.
3. Design educational resources on ET Consortium science and technology.
4. Develop a mentorship and training programme for ET Consortium early career researchers.

Description of work

Task 10.1 Establish a network of communications and outreach points of contact, with robust procedures for gathering and disseminating news updates and outreach materials.
Task 10.2 Develop and maintain ET Consortium website and social media platforms, supported by high-quality multimedia materials.
Task 10.3 Develop strategic plan for ET Consortium engagement with the scientific community, funding agencies, politicians and other key stakeholders.
Task 10.4 Develop and deliver a comprehensive, sustainable mentorship and training programme for ET Consortium early-career researchers.

Deliverables

D10.1 Initiate strategic media and communications plan (M12); **D10.2** Launch consortium website and social media accounts (M24); **D10.3** Formulate strategic media and communications plan (M24); **D10.4** Complete bank of graphics, multimedia resources (M36); **D10.5** Launch ECR mentorship and training programme (M44).

Table 3.1c: List of Deliverables

Deliverable (number)	Deliverable name	Work package number	Short name of lead participant	Type	Dissemination level	Delivery date (in months)
D1.1	Report to EC	WP1	IFAE	R	PU	M18
D1.2	Report to EC	WP1	IFAE	R	PU	M36
D1.3	Report to EC	WP1	IFAE	R	PU	M48
D2.1	Report providing options for legal entity	WP2	NIKHEF	R	PU	M12
D2.2	Minutes of meetings with EC and involved ministries	WP2	NIKHEF	R	PU	M12
D2.3	Legal entity statutes	WP2	NIKHEF	R	PU	M36
D2.4	Roadmap to establish the legal entity and its implementation.	WP2	NIKHEF	R	PU	M48
D3.1	Handbook for design and construction phase	WP3	UCL	R	PU	M36
D3.2	Handbook for operating phase	WP3	UCL	R	PU	M42
D3.3	Financial plan and Scenario analysis	WP3	UCL	R, O	PU	M48
D4.1	Scan of legal procedures, permitting and land acquisitions i.e. the steps to be taken prior to starting excavations.	WP4	NIKHEF	R	PU	M10
D4.2	Updated socio-economic impact studies	WP4	INFN	R	PU	M15
D4.3	Complete quantification of all the aspects impacting the ET performance.	WP4	UW	R	PU	M22
D4.4	3D geology, hydrology, etc. model with detailed localisation of the ET infrastructure.	WP4	INFN	R	PU	M27
D4.5	Robust and complete cost and schedule estimates of the excavations.	WP4	NIKHEF	R	PU	M36
D5.1	Structure and mandate of the Project Office	WP5	CNRS	R	PU	M25
D5.2	Functionalities required from the tools in support of the project management	WP5	CNRS	R	PU	M25
D5.3	Structure and mandate of the Engineering Department	WP5	CNRS	R	PU	M25
D5.4	Funcional Engineering	WP5	NIKHEF	R	PU	M28

	Department					
D5.5	Funcional Project Office	WP5	INFN	R	PU	M28
D6.1	Refined Science Case	WP6	UNIGE	R	PU	M18
D6.2	Vacuum pipe Design	WP6	ANTW	R	PU	M24
D6.3	Preliminary RI TDR	WP6	INFN	R	PU	M24
D6.4	Preliminary DET TDR	WP6	NIKHEF	R	PU	M24
D6.5	RI TDR	WP6	INFN	R	PU	M40
D6.6	DMP and Data Access Policy	WP6	DESY	R	PU	M46
D7.1	Innovation plan	WP7	IFAE	R	PU	M12
D7.2	Report on industry engagement plan execution	WP7	NIKHEF	R	PU	M42
D7.3	Model for pursuing in ET a balanced industrial return	WP7	INFN	R	PU	M33
D7.4	Report on TT and Intellectual property management in ET	WP7	INFN	R	PU	M44
D8.1	Computing and Data Requirements	WP8	UNIGE	R	PU	M18
D8.2	Computing and Data Model	WP8	UNIGE	R	PU	M42
D8.3	Data Access Implementation Guidelines	WP8	BSC	R	PU	M48
D9.1	ET Sustainable Development Implementation Strategy	WP9	CNRS	R	PU	12
D9.2	ET Environmental impact assessment and mitigation strategy	WP9	INFN	R	PU	24
D9.3	ET CO2 footprint ET assessment and mitigation strategy	WP9	EGO	R	PU	36
D10.1	Initiate strategic media and communications plan	WP10	UW	R	PU	12
D10.2	Launch consortium website and social media accounts	WP10	EGO	Web	Global	24
D10.3	Formulate strategic media and communications plan	WP10	NIKHEF	R	PU	24
D10.4	Complete bank of graphics and multimedia resources	WP10	IFAE	R	Global	36
D10.5	Launch ECR mentorship and training programme	WP10	UKRI	R	PU	44

Table 3.1d: List of milestones

Milestone number	**Milestone name**	**Related work package(s)**	**Due date (in month)**	**Means of verification**
M1.1	ET-PP first year internal review	WP1	M12	Workshop
M1.2	ET-PP middle term internal review	WP1	M24	Workshop
M1.3	ET-PP final internal review	WP1	M45	Workshop
M3.1	Constitution / first meeting of the resource board	WP3	M33	Workshop
M4.1	Document detailing the site-specific characteristics that impact ET sensitivity and its duty cycle.	WP4	M3	Report
M4.2	Common methodology to estimate impact of site characteristics on ET sensitivity and operation and, if required, a scheme to compensate it.	WP4	M10	Report
M5.1	The recruitment of the Project Office team is completed.	WP5	M15	Report
M5.2	All three documents (WP5-D1, D2 and D3) are published.	WP5	M25	Report
M5.3	The Engineering Department as a	WP5	M27	Report

	functional unit complete			
M5.4	The Project Office as a functional unit complete	WP5	M27	Report
M6.1	ET Collaboration in place	WP6	M12	ET Symposium
M7.1	Analysis of promotion strategies accomplished	WP7	M8	Report
M7.2	Engagement plan produced	WP7	M10	Report
M7.3	Analysis of balanced industrial return strategies accomplished		M15	Report
M8.1	Workflows Requirements collection and constraints: computing and data	WP8	M12	Workshop (+D8.1)
M8.2	Computing Infrastructures availability for ET workflows, characteristics	WP8, WP9	M24	Workshop (+ D8.1)
M8.3	On site infrastructure, computing and data model	WP8, WP6	M36	Workshop (+D8.2)
M8.4	Low latency and offline workflows and computing model	WP8, WP6	M40	Workshop (+D8.2)
M8.5	Data management, access, policy and implementation	WP8, WP6, WP2	M46	Workshop (+D8.3)
M9.1	Preliminary sustainability plan	WP9	M12	Report
M9.2	ET Sustainability Workshop	WP9	M18	Workshop+Report
M9.3	Final sustainability plan	WP9	M48	Report
M10.1	Appointment of Communications and Outreach Coordinator	WP10	M8	Appointment contract
M10.2	ET Consortium website and social media launched	WP10	M24	Public launch
M10.3	ECR Mentorship and Training programme established	WP10	M44	Report

Table 3.1e: Critical risks for implementation

Description of risk (indicate level of (i) likelihood, and (ii) severity: Low/Medium/High)	**Work package(s) involved**	**Proposed risk-mitigation measures**
R5.1 Delay in completing hiring process for new full-time engineering positions (low, medium)	WP5	Assign existing part-time personal from partner institutes to assist in the start-up phase.
R5.2 Difficulties to find personnel in the participant institutions for the leadership and the collaborator positions required for the Project Office and the Engineering Department (low, medium)	WP5	Provide temporary support from the collaboration and invite experts from external institutes.
R6.1 Delays in producing the RI TDR (i) Medium (ii) High	WP6,WP5	Involve external engineering companies in order to speed-up the process
R6.2 Delays in producing the Detector TDR (i) Medium (ii) Medium	WP6,WP5	Define a staged installation strategy and prioritise design of first stage
R7.1 Limited interest on the part of industry in the preparatory phase of the ET (likelihood medium, severity medium)	WP7	Monitor industry implication and enforce industry engagement plan if needed.
R7.2 Low level of industrial capabilities identified in certain areas of the project (likelihood medium, severity medium)	WP7	Implement measures in industry engagement plan to involve industry in R&D projects with key institutes
R8.1 Difficulties to find full time personnel adequately in	ALL	Dedicate part of the time of more than one

time, with the skills needed for the project (i) Medium (ii) Medium		person of the Collaboration to cover the needs, and complement with personnel in-kind contribution.
R8.2 Scientists are not able to provide sufficiently detailed information to elaborate the computing and data model (i) Low (ii) (Medium-Low)	WP8	The computing and data model will be generic and realistic to satisfy the given requirements.
R8.3 The pandemic delays the organization and limit the participation to workshops planned to receive input and feedback from the stakeholders (i) Low (ii) Medium	ALL	Online planned workshops and webinars, adjust timing, offline surveys...
R9.1 Delays in technical designs (i) Medium (ii) Medium	WP9	Adoption of a reference scenario
R9.2 Evolution of the national energy policies (i) Low (ii) Low	WP9	Consultation with national institution
R10.1 Delay in appointment of outreach officer. (i) M; (ii) M	WP10	Temporary use of in-kind contributions from WP10 team to coordinate activities
R10.2 Delay in design of Consortium website. (i) M; (ii) M	WP10	Use simpler template to ensure a minimal website can be launched
R10.3 General failure by task coordinators to complete deliverables. (i) L (ii) H	WP10	Establish, as a first, key deliverable (within 6M) robust internal procedures for sign-off on C&O materials

Table 3.1f: Summary of staff effort
(it does not include third parties contributions)

	WP1	WP2	WP3	WP4	WP5	Total Person-Months per Participant
1 IFAE, 2 BSC	52,8	0	0	0	24	**76,8**
3 INFN	0	10	10	10	141	**171**
4 UW	0	0	0	43	0	**43**
5 CNRS	0	0	0	0	121	**121**
6 NIKHEF	0	10	0	10	124	**144**
7 UCL	0	0	8	0	0	**8**
8 ANTW	0	0	0	0	5	**5**
9 EGO	0	0	0	0	0	**0**
10 DESY	0	0	24	0	0	**24**
11 Wigner RCP	0	0	6	7,2	0	**13,2**
12 MUL	0	0	0	0	0	**0**
13 UNIGE	0	0	0	0	0	**0**
14 UKRI, 13 CU, 14 UG	0	4,8	0	0	0	**4,8**
Total Person Months	**52,8**	**24,8**	**48**	**70,2**	**415**	

	WP6*	WP7	WP8*	WP9	WP10	Total Person-Months per Participant
1 IFAE, 2 BSC	10	12	9	0	3	**34**
3 INFN	20	12	3	39,2	5	**79,2**
4 UW	14	19	0	0	38	**71**
5 CNRS	28	0	3	13	0	**44**
6 NIKHEF	2,5	12	0	0	10	**24,5**
7 UCL	0	0	0	0	0	**0**
8 ANTW	29	24	0	0	0	**53**
9 EGO	0	0	0	12,6	28,4	**41**
10 DESY	0	0	0	0	0	**0**
11 Wigner RCP	0	0	0	0	6	**6**
12 MUL	0	0	0	4	0	**4**
13 UNIGE	2	0	48	0	0	**48**
14 UKRI,13 CU,14 UG	0	0	0	0	9,6	**9,6**
Total Person Months	**105,5**	**79**	**63**	**68,8**	**100**	

* The person-months include only coordination positions.

Table 3.1g: 'Subcontracting costs' items

Participant Number/Short Name IFAE		
	Cost (€)	**Description of tasks and justification**
Subcontracting	22500	Organization of ET-PP internal review meetings (20k€) Legal consultations (2,5k€)

Participant Number/Short Name INFN		
	Cost (€)	**Description of tasks and justification**
Subcontracting	100000	Socio-economic impact studies by professional organization

Participant Number/Short Name UW		
	Cost (€)	**Description of tasks and justification**
Subcontracting	20000	Professional graphics design services (10k€) Professional web design services (10k€)

Participant Number/Short Name NIKHEF		
	Cost (€)	**Description of tasks and justification**
Subcontracting	155000	Review of civil construction costs by professional organization (100k€) Preparation of ET legal documents by professional organization (55k€)

Table 3.1h: 'Purchase costs' items (travel and subsistence, equipment and other goods, works and services)

Participant Number/Short Name IFAE		
	Cost (€)	**Justification**
Travel and subsistence	120000	Covering travel costs for Workshops and Coordinating Meetings during ET-PP
Other goods, works and services	10000	Communication and Outreach materials (5k€) Access to patents DBs (related to using information for evaluating the use of patents for Technology Transfer/Intellectual Property protection) (5k€)
Total	**130000**	

Participant Number/Short Name BSC		
	Cost (€)	**Justification**
Travel and subsistence	11000	Covering travel costs for ET Computing Workshops
Total	**11000**	

Participant Number/Short Name INFN		
	Cost (€)	**Justification**
Travel and subsistence	244500	Covering travel costs for Workshops and Coordinating Meetings during ET-PP
Other goods, works and services	162000	Organization of meetings with industrial partners and costs related to financial audits (12k€); Support of the CERN vacuum activity (150k€)
Total	**406500**	

Participant Number/Short Name UW		
	Cost (€)	**Justification**
Travel and subsistence	147200	Covering travel costs for Workshops and Coordinating Meetings during ET-PP
Other goods, works and services	20000	Communication and Outreach materials
Total	**167200**	

Participant Number/Short Name CNRS		
	Cost (€)	**Justification**
Travel and subsistence	106000	Covering cost for Workshops and Coordination Meetings during ET-PP
Total	**106000**	

Participant Number/Short Name NIKHEF		
	Cost (€)	**Justification**
Travel and subsistence	40000	Covering travel costs for Workshops and Coordination Meetings during ET-PP

Other goods, works and services	179000	Organization of meetings with industrial partners and costs related to financial audits (29k€); Support of the CERN vacuum activity (150k€)
Total	**219000**	

Participant Number/Short Name ANTW		
	Cost (€)	**Justification**
Travel and subsistence	12000	Covering travel costs for attending vacuum discussion relevant for WP5
Total	**12000**	

Participant Number/Short Name EGO		
	Cost (€)	**Justification**
Travel and subsistence	23000	Covering travel cost for Workshops and Coordination Meetings during ET-PP
Total	**23000**	

Participant Number/Short Name DESY		
	Cost (€)	**Justification**
Travel and subsistence	5000	Covering travel costs for ET Computing Workshops
Total	**5000**	

Participant Number/Short Name WIGNER		
	Cost (€)	**Justification**
Travel and subsistence	12000	Covering costs for Outreach and Dissemination Coordination Meetings
Total	**12000**	

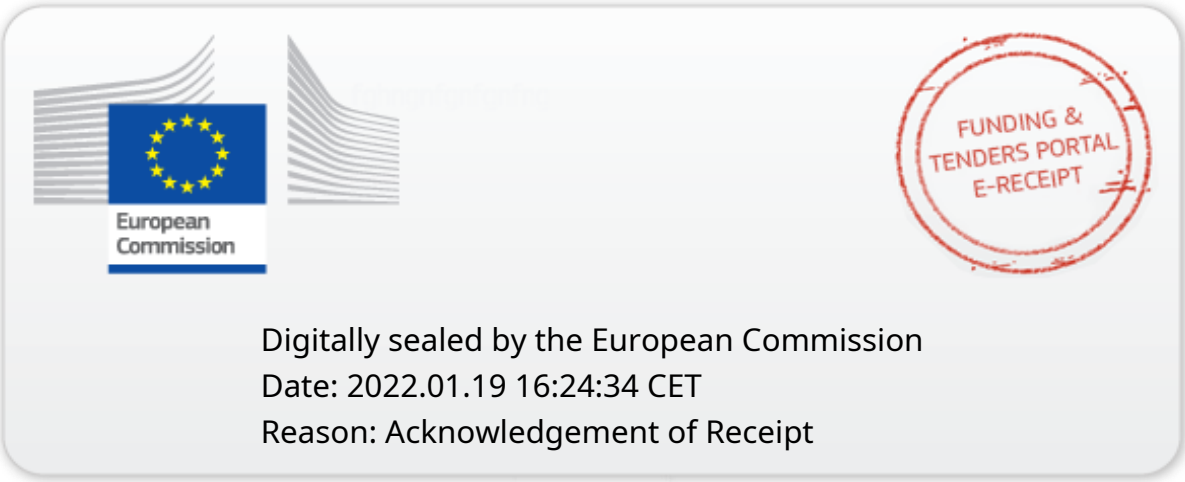
Participant Number/Short Name MUL		
	Cost (€)	**Justification**
Travel and subsistence	6000	Covering cost for Workshops and Coordination Meetings on sustainability
Total	**6000**	

Table 3.1i: ‘Other costs categories’ items (e.g. internally invoiced goods and services)

None

Table 3.1j: ‘In-kind contributions’ provided by third parties

Participant Number/Short Name			
Third party name	**Category**	**Cost (€)**	**Justification**
RWTH	Seconded personnel	60000	Achim Stahl, co-coordination of WP8
CDTI	Seconded personnel Travel & other costs	48000 8000	J. Echavarri, contributing to WP7 task 2 (industrial liaison). Meetings with industrial partners and preparation of ET project brochure.
AEI and LUH	Seconded personnel	50000	Contributions to WP6: 10%FTE H. Lueck (SC Co-chair and WP6 Co-chair); 5% FTE H. Vahlbruch (Co-chair squeezing WG in optics division of ISB); 5% FTE S. Koehlenbeck (Co-chair inter platform motion WG of the ANM division of ISB)
UV	Seconded personnel	35000	I. Cordero, coordination of WP10 task 10.3
UIB	Seconded personnel	42000	A. Sintes contributions to WP8 (data analysis model) and WP10 (dissemination activities)
ICCUB	Seconded personnel	42000	J. Castañeda in WP8 T8.2 (T8.2 (computing and data model) and A. Argudo in WP10 (dissemination activities)
VU	Seconded personnel	209375	Andreas Freise: co-coordination of WP5 and contribution to WP6 (co-chair of the ET Instrument Science Board ISB), Conor Mow-Lowry:contribution to WP6 (co-chair of Active Noise Mitigation Division in ET ISB)
UM	Seconded personnel	125000	Stefan Hild: contribution to WP6 (co-chair of Interferometry Division in ET ISB), Gideon Koekoek: contribution to WP10 (stakeholders relation, press releases, media training)



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