

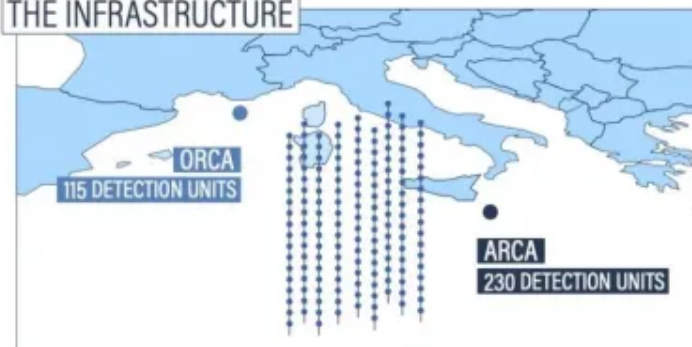


KM3NeT

A GIANT DEEP-SEA NEUTRINO TELESCOPE

KM3NeT, once completed, will be one of the largest astronomical telescopes in the world. Located at the bottom of the Mediterranean Sea, it comprises two detectors: ARCA off the coast of Sicily, in Italy, and ORCA off the coast of Toulon, in southern France. Its main goal is to detect and study neutrinos: extremely light, fast and hard-to-catch elementary particles. The ARCA detector is optimised for the study of high energy cosmic neutrinos, which carry with them valuable information about the most energetic phenomena in the universe. The ORCA detector is optimised to measure the fundamental properties of the neutrino itself using atmospheric neutrinos.

THE INFRASTRUCTURE

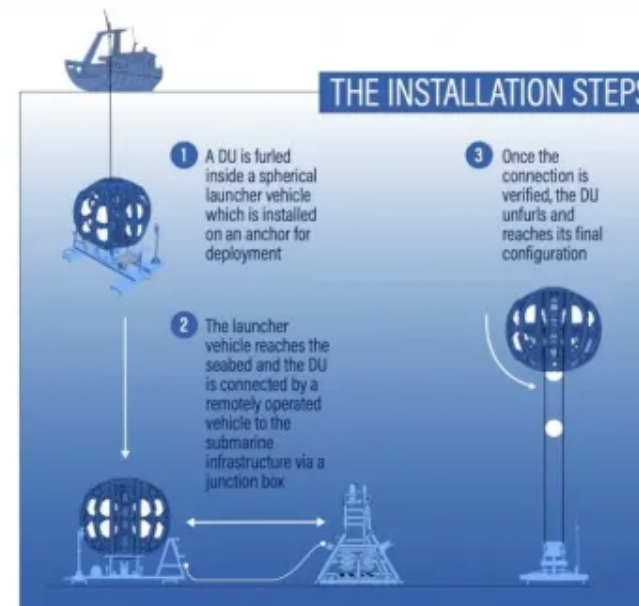


The KM3NeT infrastructure consists of an array of hundreds of detection lines, "detection units", which stand on the sea bottom and are equipped with thousands of hi-tech eyes. Its final configuration will occupy a volume of over 1 km³, hence its name. The detection units are connected to a submarine network of cables and junction boxes. The connection to shore is via a submarine cable of many tens of kilometres long. KM3NeT is also a valuable multidisciplinary laboratory for Earth and Ocean Sciences.



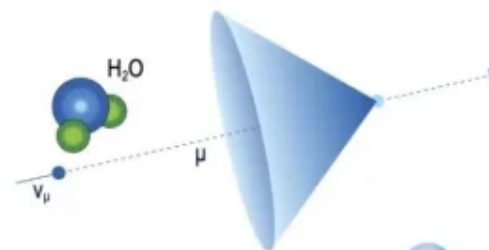
KM3NeT IS A LARGE INTERNATIONAL COLLABORATION THAT INVOLVES OVER 360 SCIENTISTS, ENGINEERS, TECHNICIANS AND STUDENTS OF 68 INSTITUTIONS FROM 21 COUNTRIES.

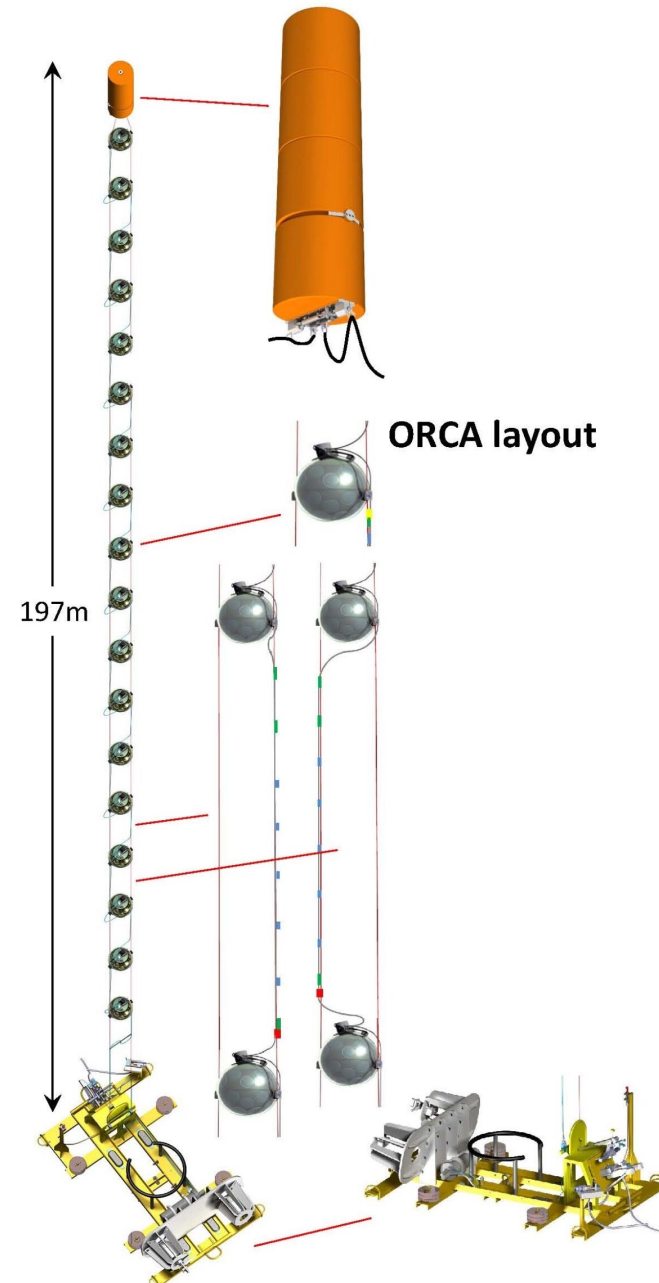
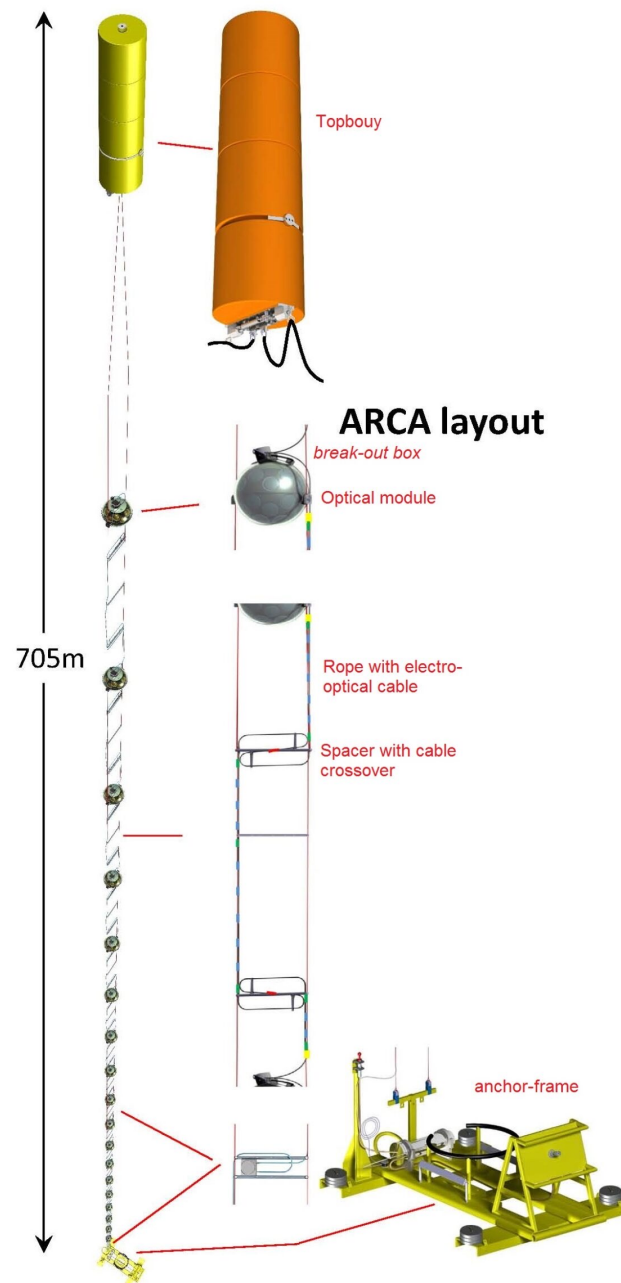
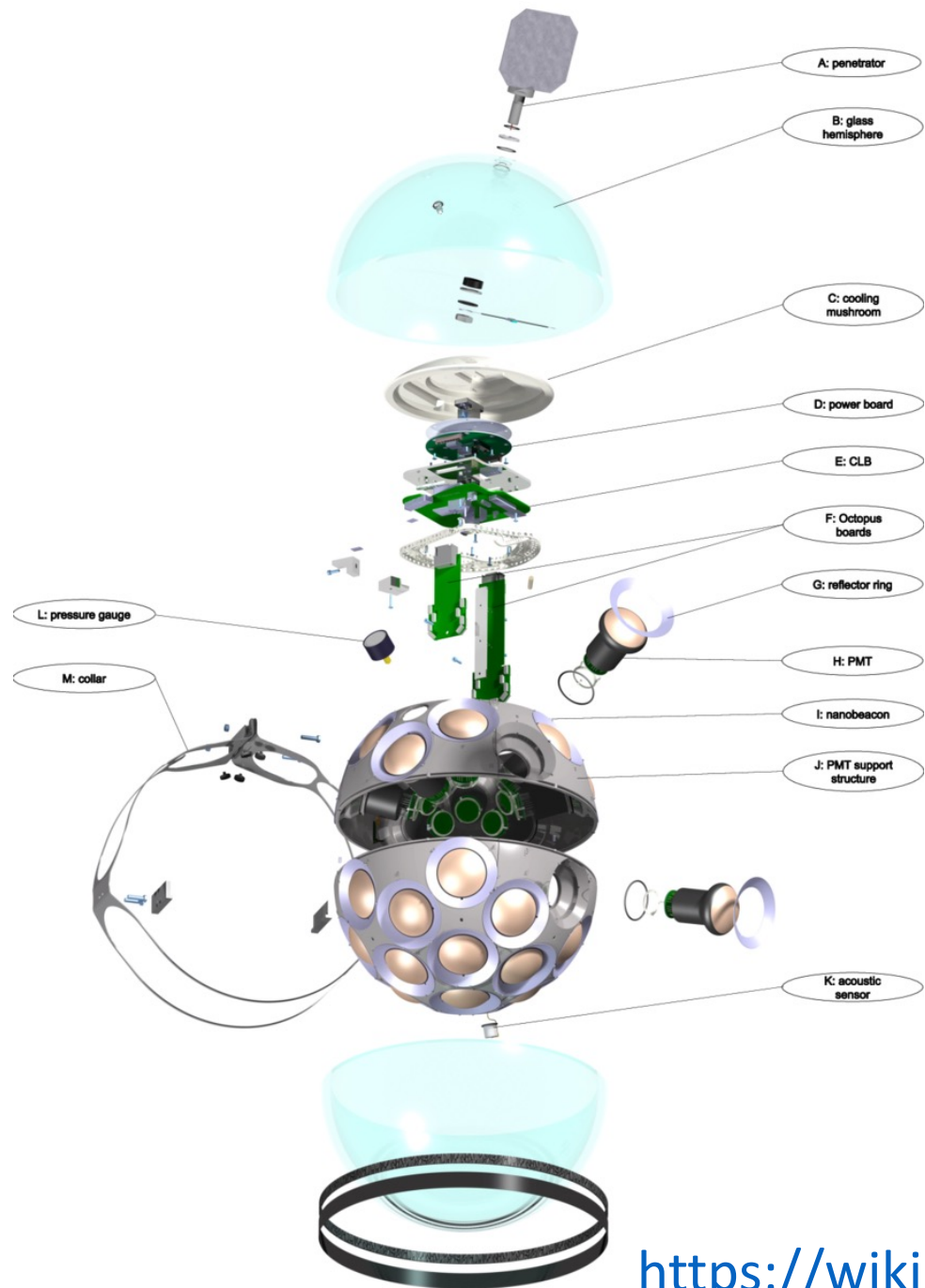
THE INSTALLATION STEPS



NEUTRINO DETECTION

KM3NeT uses sea water as interaction medium. Neutrino interactions generate charged particles that propagate at a speed higher than the speed of light in sea water, producing a faint bluish glow called "Cherenkov light". The Cherenkov radiation is emitted at a characteristic angle with respect to the trajectory of the particle. This glow is detected by KM3NeT's hi-tech eyes. Analysis of these signals provides fundamental information on the neutrinos direction, energy and nature.





<https://wiki.km3net.de/index.php/Glossary>

aanet	KM3NeT software mainly designed to do high level analysis [git documentation]
ACS	Acoustic subsystem of the Central Logic Board
ADC	Analog to Digital Convertor
aDF	acoustic DataFilter (also see DF) - the process for filtering the acoustic data stream and reconstructing the 'Time Of Arrival' of the emitted pulses by the 'Long BaseLine beacon'.
ADP	Acceptance Data Package
ADQL	Astronomical Data Query Language
AGN	Active Galactic Nucleus
AHRS	Attitude and Heading Reference System - system of orientation sensors providing heading, pitch and yaw angles for a vehicle or a device (the DOM, in our case)
AJAX	Asynchronous JavaScript and XML
AISBL	International Association of the European Heritage Network
AMADEUS	ANTARES Modules for the Acoustic Detection Under the Sea - the acoustic neutrino detection test system of ANTARES
AMON	Astrophysical Multimessenger Observatory Network
ANTARES	<u>A</u> stronomy with a <u>N</u> eutrino <u>T</u> elescope and <u>A</u> bys environmental <u>R</u> E <u>S</u> earch - The first neutrino telescope in the Mediterranean Sea, residing 2.5 km under the sea level, 50 km off the coast of Toulon, France. The data taking of ANTARES was finished in February 2022, after 16 years of continuous operation.
API	Application Programming Interface
APPEC	Astroparticle Physics European Consortium
ARCA	Astronarticle Research with Cosmics in the Abyss – Located in the Italian site

etc.

France

- Centre de Physique des Particules de Marseille, Aix-Marseille Université, CNRS
- Institut Pluridisciplinaire Hubert Curien, Université de Strasbourg, CNRS
- Laboratoire Astroparticules et Cosmologie, CNRS, Université Paris Cité
- Laboratoire d'Astrophysique de Marseille, AMU, CNES, CNRS
- Laboratoire de Physique Corpusculaire de Caen, CNRS, Université de Caen
- Laboratoire Univers et Particules de Montpellier, CNRS, Université de Montpellier
- Institut Méditerranéen d'Océanologie, amU, CNRS, IRD, Marseille
- Université de Toulon, Chaire IA ADSIL, CIAN, CNRS
- Subatech, CNRS, IMT Atlantique, Nantes Université

United Kingdom

- University of Hull

The Netherlands

- NIOZ, Texel
- NWO-I, Nikhef, Amsterdam
- TNO, Technical Sciences, Delft
- Universiteit van Amsterdam
- Universiteit Leiden

Germany

- Friedrich-Alexander-Universität Erlangen-Nürnberg
- Max-Planck-Institut für Radioastronomie, Bonn
- Technische Universität München
- Universität Erlangen, Remeis Sternwarte, Bamberg
- Universität Münster
- Universität Würzburg

Italy

- INFN Laboratori Nazionali del Sud
- INFN Sezione di Bari and Politecnico di Bari
- INFN Sezione di Bologna, Università di Bologna
- INFN Sezione di Catania, Università di Catania
- INFN Sezione di Firenze, Università di Firenze
- INFN Sezione di Genova, Università di Genova
- INFN Sezione di Napoli, Università di Napoli Federico II
- INFN Sezione di Padova, Università di Padova
- INFN Sezione di Roma, Sapienza Università di Roma
- Università della Campania L. Vanvitelli
- Università degli Studi di Salerno and INFN Gruppo Collegato di Salerno

Norway

- Norwegian University of Science and Technology in Trondheim

Poland

- AGH University of Krakow
- NCBJ - National Centre for Nuclear Research, Warsaw
- Nicolaus Copernicus Astronomical Center, Particle Astrophysics Science and Technology Centre, Warsaw

Romania

- Institute of Space Science - INFLPR Subsidiary, Magurele

Slovakia

- Univerzita Komenského v Bratislave
- Slovenská akadémia vied, Kosice

Greece

- Institute of Nuclear and Particle Physics, NCSR Demokritos, Athens
- National and Kapodistrian University of Athens

Spain

- Centro Oceanográfico de Murcia (IEO-CSIC)
- Instituto de Ciencias del Mar, CSIC, Barcelona
- Instituto de Física Corpuscular, Universitat de València, CSIC
- Laboratori d'Aplicacions Bioacústiques, Universitat Politècnica de Catalunya, Vilanova i la Geltrú
- Universitat Politècnica de València, IGIC, Gandia, València
- Universidad de Granada

United States of America

- Princeton University
- Drexel University, Philadelphia
- Harvard University, Cambridge

Brazil

- São Paulo State University - UNESP

Algeria

- Center of Research in Astronomy, Astrophysics, and Geophysics, Bouzaréah
- Mohamed Boudiaf University, M'sila
- Université Badji Mokhtar, Annaba
- University of Constantine

Morocco

- Cadi Ayyad University, Marrakesh
- Mohammed VI Polytechnic University, Ben Guerir
- University Mohammed Ier, Oujda
- University Mohammed V, Rabat

■ Full members

■ Observer members

KM3NeT Collaboration
5 continents, 23 countries,
70 institutes



South Africa

- North-West University, Potchefstroom
- University of Johannesburg
- University of the Witwatersrand, Johannesburg

India

- Indian Institute of Technology in Mumbai

United Arab Emirates

- Khalifa University of Science and Technology, Abu Dhabi
- University of Sharjah

Georgia

- Tbilisi State University
- University of Georgia, Tbilisi

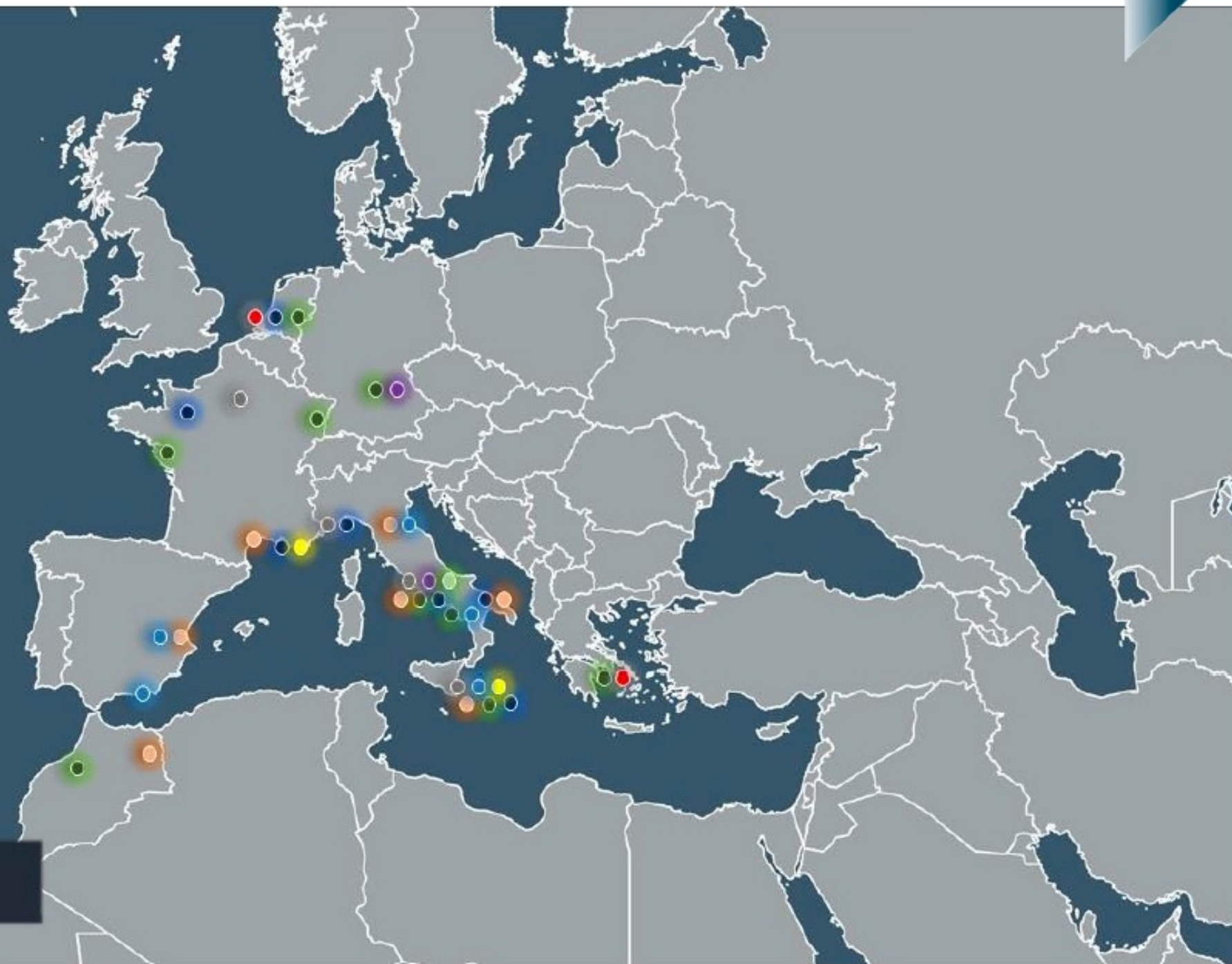
China

- Sun Yat-Sen University, Zhuhai

Australia

- Western Sydney University

- Detection Units
- Digital Optical Modules
- Base Modules
- Calibration Units
- Photomultipliers
- Electronics & DAQ
- Nodes & junction boxes
- Pressure tests
- European Central Storage



Integration sites



Oversight

Governance

Executive Management

Resource Review Board

Chair: V. Poireau

Ethics Committee

Chair: TBD

Financial Resource Manager

A. van Rijn

Scientific and Technical Advisory Committee

Chair: C. Timmermans

Institute Board

Chair: A. Kouchner

GNN Liaison Officer: TBD

EU Liaison Officer: M. de Jong

Early Career scientists: S. Peña Martinez,
A. Bariego Quintana

Publication Committee: A. Margiotta, E. Tzamariudaki

Conference Committee: C. Markou

Outreach Committee: M. Circella, R. Muller

Open Science Committee: J. Schnabel

Management Team

Spokesperson/Chair: P. de Jong

Deputy Spokesperson: D. Dornic

Technical Project Manager: A. D'Amico

Physics & Software Manager: R. Coniglione

Site Manager KM3NeT-Fr: N. Lumb

Site Manager KM3NeT-It: S. Biagi

Site Manager KM3NeT-Gr: C. Markou

Equality, Diversity, Inclusion Committee

V. Van Elewyck, E. Tzamariudaki

Science Steering Committee

Chair: R. Coniglione

Astronomy: G. Illuminati, M. Lamoureux, A. Marinelli

Calibration: V. Pestel

Cosmic Rays: R. Bruijn, A. Romanov

Dark Matter/Exotics: A. García-Soto, S. Gozzini

Oscillations: J. Brunner, V. Carretero Cuenca

Processing/Data-Quality: F. Badaracco, F. Filippini, C. Lastoria

Simulations: C. Distefano, L. Fusco

Software/computing: L. Aphetche,

R. Bruno, J. Schnabel

Project Office

Chair: A. D'Amico

Project Control Officer: TBC

Procurement Manager: M. Circella

Procurement Officer: S. Lancelin

QA/QC Manager: C. Vêrilhac

QA/QC Officer: L. Morales Gallegos

R.A.M.S Manager: S. Colonges

R.A.M.S Software: F. Filippini

System Engineer: E-J. Buis, S. Henry,

M. Lindsey Clark

Technical Steering Committee

Chair: P. de Jong/A. D'Amico

Calibration Hardware: D. Vivolo

DAQ: E. Giorgio, F. Benfenati*

Det. operations: A. Enzenhöfer, P. Piattelli

Electronics: D. Real, D. Calvo*

Mechanics: A. Ilioni, E. Berbee*

Optics: J-W. Schmelling, S. Pulvirenti*

PMT: A. Simonelli

Power: R. Cocimano, C. Nicolau*

Software/computing: L. Aphetche,

R. Bruno, J. Schnabel *deputy coordinator 01/10/2025

BM integration: I. Sgura

DOM integration: E. Leonora, TBD*

DU integration: A. Marini, C. Mollo



AISBL Council
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DOM integration: *E. Leonora, TBD**
DU integration: *A. Marini, C. Mollo*



Antonio

Technical Coordination



Edward

Mechanics coordination



Jan Willem

Optics coordination



Arjen

Nikhef institute manager

Committees

Publication Committee: guide the publication process and the reviewing of collaboration paper drafts

Conference Committee: assign speakers to represent KM3NeT at conferences

Open Science Committee: prepare/guide the process of making KM3NeT data publicly available

Outreach Committee: collect outreach materials, make news items, manage social media, Masterclass
<https://wiki.km3net.de/index.php/OC: Outreach Committee>

Early Career Scientists: advise the MT on matters important for early career scientists.
https://wiki.km3net.de/index.php/Early_career_scientists

An Early Career Scientist is any member of the KM3NeT collaboration who does not hold a permanent position yet. An Early Career Scientist who can be elected as representative in the KM3NeT collaboration, is a PhD student who has been part of the collaboration for at least 2 years, or a postdoc.

Equality, Diversity and Inclusion (EDI) Committee: inclusion and diversity policy, code-of-conduct
[https://wiki.km3net.de/index.php/Equality_Diversity_and_Inclusion_\(EDI\)_committee](https://wiki.km3net.de/index.php/Equality_Diversity_and_Inclusion_(EDI)_committee)

Scientific and Technical Advisory Committee (STAC): external experts advising the AISBL Council and the MT

Meetings

Collaboration meetings: Valencia, January 26-30, 2026. Preceeded by Bootcamp in Granada the week before.
Bratislava, June 8-12, 2026.
Fall meeting to be confirmed. (CERN? Syracuse?)
2027: interest from Bari and Krakow

Monthly Collaboration Call: every 1st Tuesday of the month, next December 2, 10 am

Working group meetings: Computing and Software: Open Hour Mo 9-10, WG meetings every two weeks
DAQ: Open Hour Mo 11-12
Calibration: Thursday 15:00 every two weeks
Data processing, simulations: Wednesday 15:00 (alternating)

Astronomy: Friday 9:30 weekly

Oscillations, Cosmic Rays: Tuesday 15:00 (alternating)

DM&Exotics: roughly Monthly but irregular

+ technical meetings:

Project Office, Review Boards,

Non-Conformance Review Boards,...

Face-to-face meetings (of a working group): occasionally

Meetings with other experiments (MANTS, KM3NeT-IceCube-JUNO NMO combination, ...)

FOLLOW THE

MONEY

-
1. Infrastructure: sea-floor network, detection units, DOMs
 2. Operation: the common fund
 3. Exploitation: permanent staff, postdocs, PhD students

1. Infrastructure

From national funding agencies, or from regions (Sicily, Provence-Cote d'Azur, Normandy)
Mostly Italy, France, Netherlands

Since ~2016:

Netherlands, NWO roadmap KM3NeT2.0: 10.3 M€

Italy, 'IDMAR': 30.2 M€

France, 'MEUST-NUMerEnv': 7.8 M€

Italy, 'PACK': 16.4 M€

France, 'NEUMED': 8.2 M€

Italy: 'Itineris': 1.5 M€

Horizon-Infradev2: 1.5 M€

Italy, 'KM3NeT4RR': 56.5 M€

France, 'Neptune': 0.76 M€

Netherlands, NWO roadmap 'KM3NeT++': 8.8 M€

In total since the start: ~ 150 M

2. Operation: common fund

Cash expenses pertaining to 2024	cash 2024		In kind expenses		budget	
IT hosting*	€	-	€	-	€	30.000
shore station consumables*	€	-	€	-	€	600.000
MECMA and cable storage*	€	-	€	-	€	259.500
Quality control, including penetrator testing	€	-			€	70.000
Dissemination	€	-			€	6.000
Review of the project: STAC and support	€	3.446,73			€	6.000
Transport	€	30.227,38			€	30.000
Shore station managers*	€	45.000,00	€	-	€	90.000
Spares and repairs	€	27.543,80	€	-	€	100.000
Centralized procurement officer	€	64.130,00			€	71.000
QA/QC managers	€	125.500,00			€	125.500
total	€	295.847,91	€	-	€	1.388.000

Preliminary request for CF 2025: breakdown

Item	Breakdown	Expected expenses	2025 Total (Request RRB July 2024)
IT hosting		€33,000	€33,000
Shore station consumables*			€573,000
	Electricity ORCA	€123,000	
	Electricity ARCA	€313,000	
	ARCA building maintenance (surveillance, conditioning, UPS, motor generator)	€25,000	
	ARCA building cleaning	€10,000	
	ARCA FPE Maintenance	€20,000	
	ARCA CED Maintenance	€2,000	
	ORCA IMP ckening, telesurveillance, UPS maintenance..	€80,000	
MECMA and cable storage			€365,000
	MECMA ORCA	€80,000	
	MECMA ARCA	€170,000	
	Cable storage ORCA (rental hangar)	€35,000	
	Cable storage ARCA	€80,000	
Quality control			€65,000
	Penetrator testing in Athens	€54,000	
	Qualification campaigns	€9,000	
	Quality checks of elec. boards and components	€3,000	
Dissemination			€20,000

Included costs of Foselev and Le Castellet hangars



	paper	€20,000	
Review of the project: STAC and other support			€14,000
	STAC meeting	€7,000	
	PRR and reviews	€7,000	
Transportation			€45,000
	Transportation	€0	
	Data loggers for transportation+other consumables	€10,000	
	New boxes	€35,000	
Shore station managers			€90,000
	ORCA shore station manager	€45,000	
	ARCA shore station manager	€45,000	
Spares and repairs			€100,000
	Miscellaneous	€100,000	
Centralized Logistic officer (2FTE)			€80,000
	salary	€80,000	
QAQC			€42,000
	QA/QC Manager (Hensoldt consulting)	€42,000	
	QA/QC Officer (APC)	€0	
Outreach			€40,000
	web site & movies	€40,000	
TOTAL			€1,468,000

Country	Author 2024 (CF 2025)	%	Authors 2023 (CF 2024)	%	Authors 2022 (CF 2023)	%
France	41	22,2	40	22,5	35	20,1
Italy	79	42,7	70	39,3	73	42,0
Germany	7	3,8	10	5,6	9	5,2
The Netherland	13	7,0	14	7,9	17	9,8
Greece	3	1,6	3	1,7	5	2,9
Spain	15	8,1	19	10,7	19	10,9
Romania	2	1,1	2	1,1	2	1,1
Poland	1	0,5	0	0,0	1	0,6
Morocco	5	2,7	5	2,8	5	2,9
Slovakia	2	1,1	3	1,7		
South Africa	4	2,2	4	2,2	5	2,9
Georgia	2	1,1	2	1,1	1	0,6
Australia	1	0,5	1	0,6	2	1,1
United Kingdom	2	1,1	2	1,1		
United Arab Emirates	1	0,5	1	0,6		
Czech Republic	4	2,2	2	1,1		
Belgium	3	1,6				
	185		178		174	

3. Exploitation

Staff members: Nikhef/NWO-i, Universiteit van Amsterdam, Universiteit Leiden

Postdocs and PhD students: Nikhef/NWO-i and grants

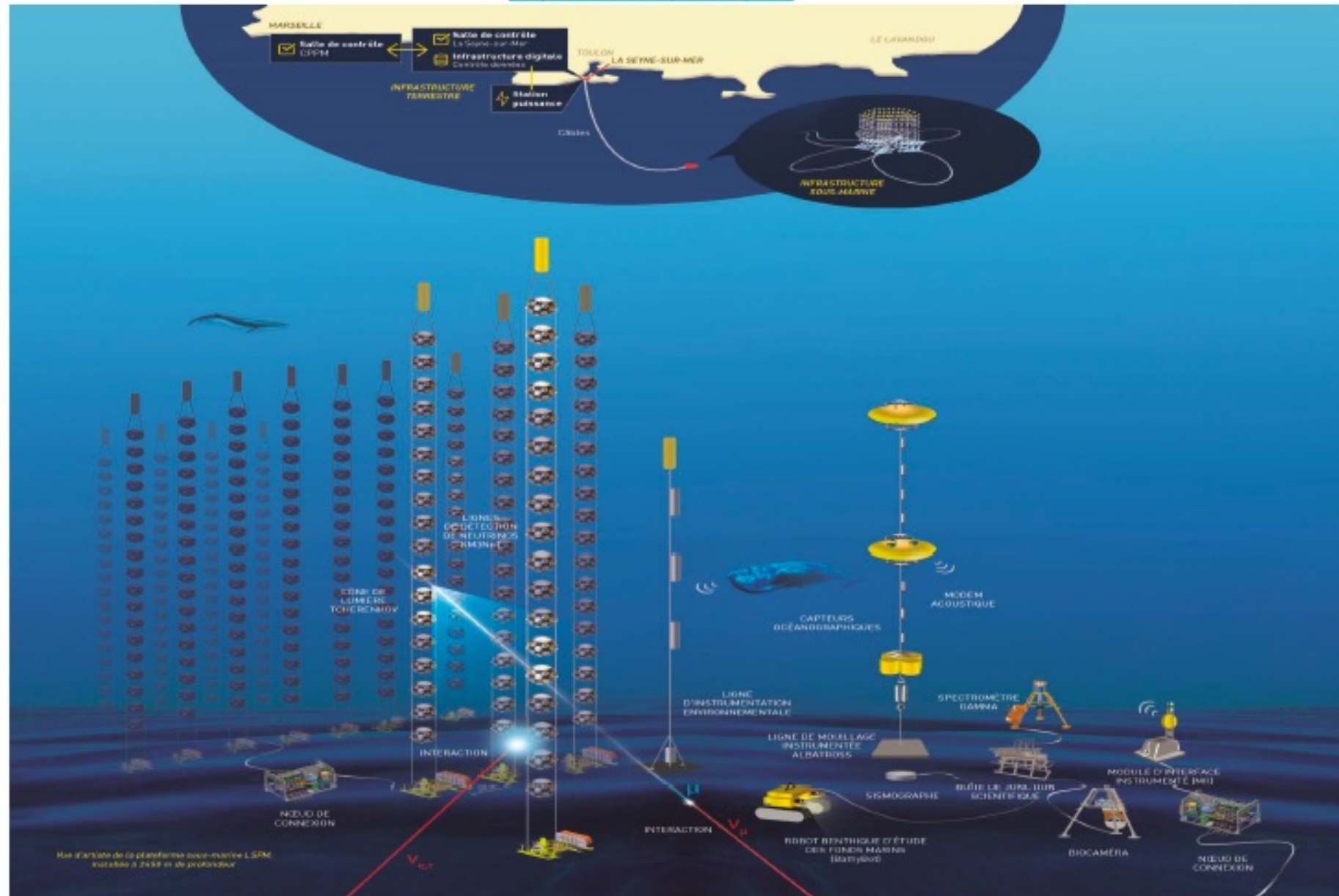
NWO Vrije Programma “Hidden Universe of Weakly Interacting Particles”. (ending)
scheme has evolved into NWO ENW-XL, new proposal submitted

NWO VENI, VIDI, VICI

e-Science center

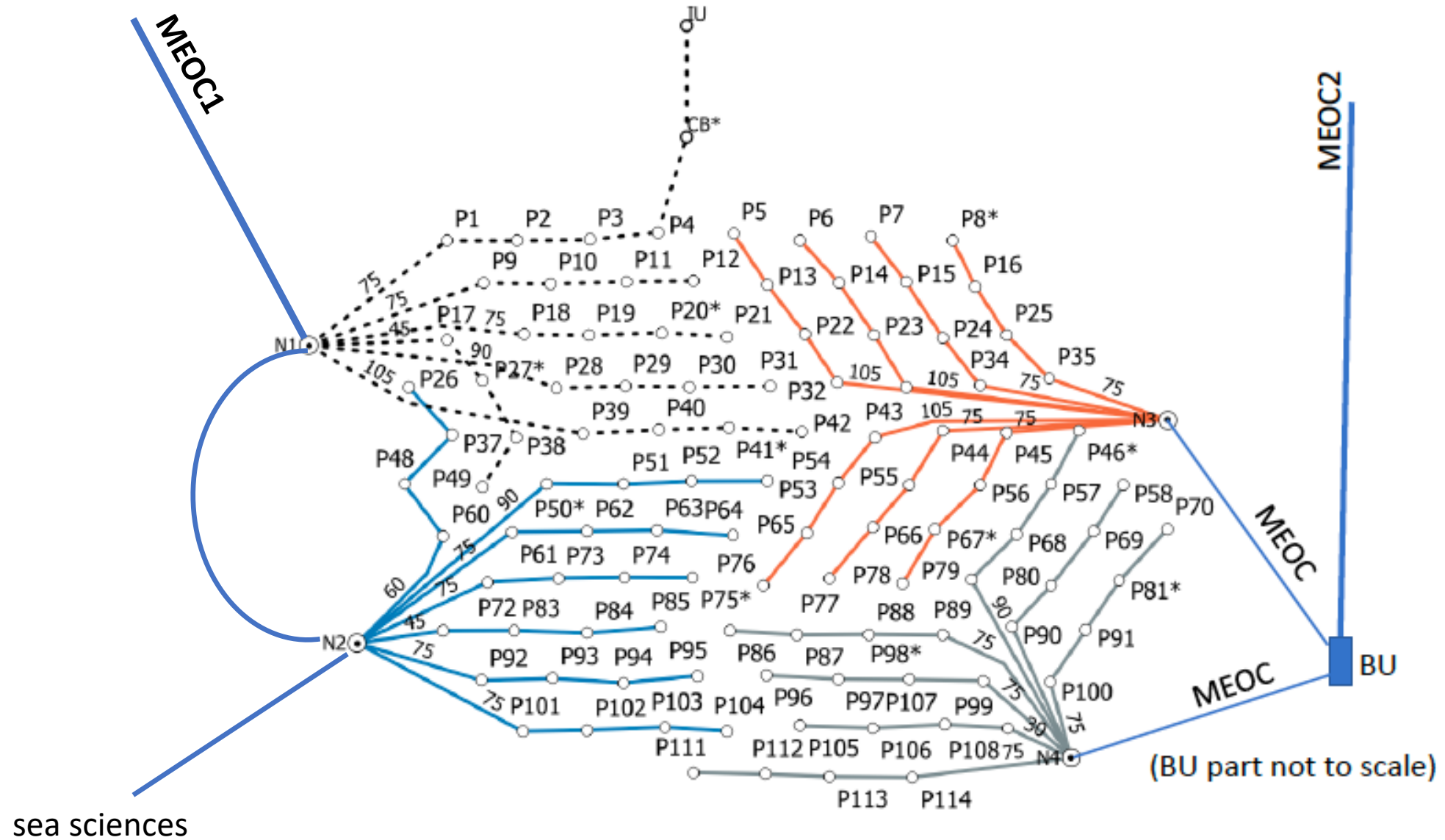
EU: Infradev

(Tried but not yet succeeded: ENW-M, ENW-XS, ERC)



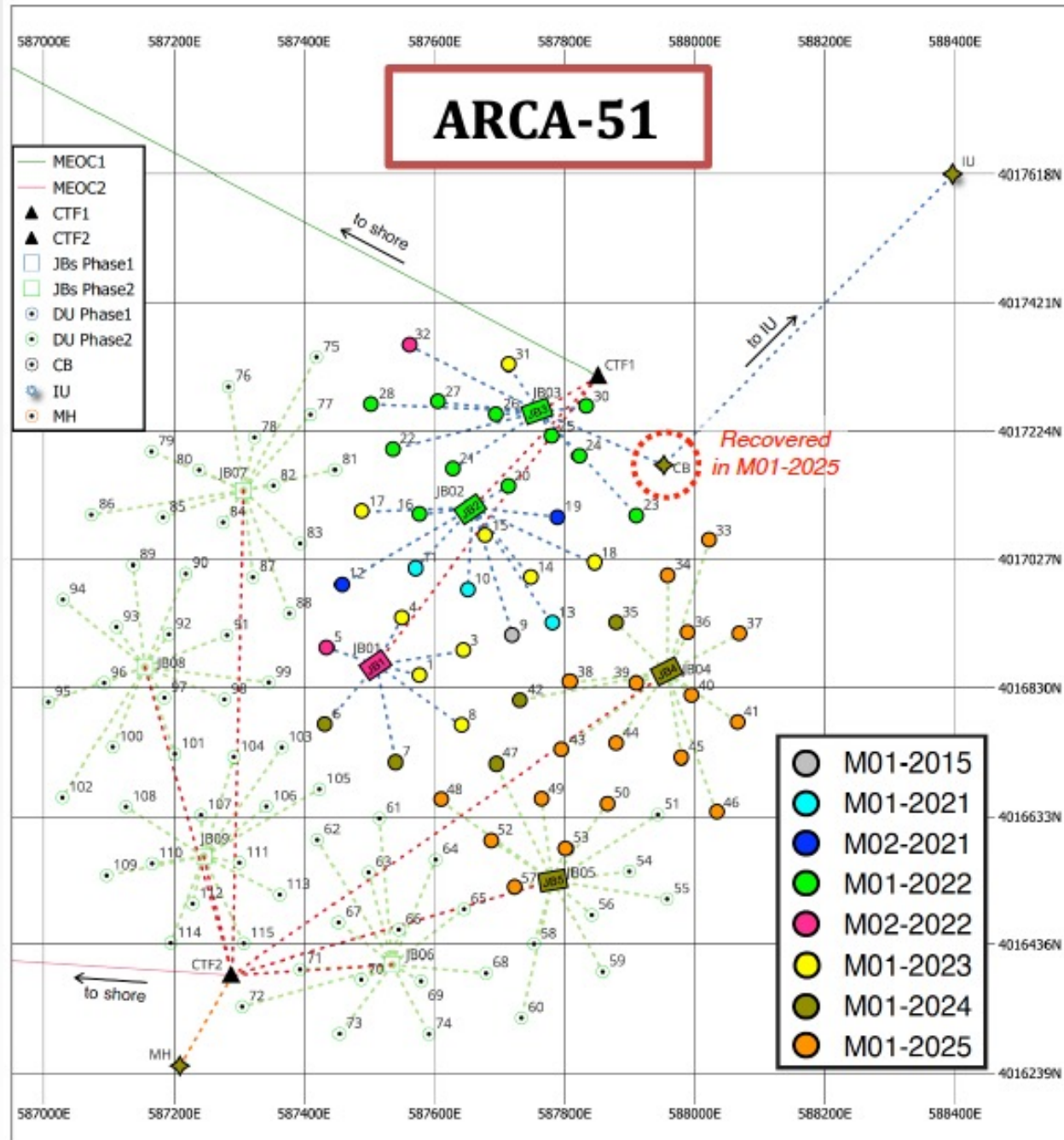
ORCA

$$2 \times 24 + 2 \times 28 = 104 \quad \text{OR} \quad 1 \times 24 + 3 \times 28 = 108$$



ARCA

BB1



Full BB1:

Broadcast: 3 JBs, 30 DUs

WWRS: 6 JBs, 84 DUs

We have been informed that the power-feed equipment in ARCA can support a maximum of 198 DUs.
(to be discussed at next PSC meeting next week)

If BB1 contains 114 DUs, there is supposedly room for 84 DUs more.

How should these be distributed in the detector?

If the current funding requests in Italy succeed, we would have funds for about 140 DUs.
How would we convince INFN to fund 58 more?
What can we do with 198 DUs that we cannot do with 140?
And what if we distribute them differently in BB2?

CTF3 to be placed on the sea-floor early 2026

Cost to completion is still about 70 MEuro (of which about 30 MEuro already requested and under review)

Number of integrated DUs

