EU activities on the Einstein Telescope

This year will be rather decisive for the ET in Europe. Whereas final site-selection will officially be in Q2/2027, the preparation is crucial:

1 Geometry comparison between the triangle and the 2L

- Process initiated by ETO on request of BGR
  - Aim to have a recommendation with written documents by September 2026
- ETO has contacted the sites on status and plans
  - We had a first coordination meeting on December 10 with ETO, ETC and the Host Consortia, where the plans of ETO were presented. Follow-up on February 23

2 Site Selection Criteria: process initiated by BGR

- What are the criteria on which the selection of the site should be based?
- Aim to have a written report in June 2026

1 Geometry comparison: process initiated by ETO on request of BGR

Mandate

ETO must :

- To coordinate the execution and delivery of specific work elements required for decision-making by the BGR and other governance bodies, with particular emphasis to those elements which may be relevant for the decision on geometry and site(s) and can be delivered withing the phase 1 timeframe.
- To set up the project organization necessary to successfully design, plan, structure and manage the ET project.

- Key application fields (with detailed responsibilities):

1) Project Management and planning
2) Detector TDR (in shared context with ETC)
3) Civil and Technical Infrastructures
4) Cost estimate and Financial Strategy
5) Site Independent Geometry Comparison Report
6) Legal Affairs
7) Stakeholders Interface Management
8) Development of ETO
9) Communication, External Relations and Public Affairs

Project

Organization

Project & Organization

1 Geometry comparison: process initiated by ETO on request of BGR

The Project framework

The project framework is the glue of the two documents, identifying as priority activities, in the medium term of the workplan, the project baselining for detector and infrastructures, the cost estimate and the risk assessment.

At the same time, following the BGR time schedule, ETO is asked to work also in a very short timeframe, providing for September 2026 a report on the geometry comparison, considering site independent drivers (is it really possible?). This report is based on five main topics:

1) The scientific added value
2) The cost estimate
3) The risks assessment
4) The governance
5) The socio-economic impact

Given the multidisciplinary nature and the inherent difficulties associated with the topics to be addressed and the short deadline required, it is clear that this activity becomes ETO's priority.

1 Geometry comparison: process initiated by ETO on request of BGR

The Geometry Comparison Report

- Timeframe too short and requirements too complex to provide a pragmatic WBS based management.
- We have to work together in urgent mode starting from the present project snapshot (PBS) and the existing documents.
- This means that for all the required field we have to set up mixed working teams coordinated at a higher level
- The activities shall follow the general plan provided by the ETO proposal
- The possibility of working in a coordinated manner within a complex organizational framework is provided by clearly defining expectations with regard to the activities defined and the responsibilities assumed.

1 Geometry comparison: process initiated by ETO on request of BGR

POD takes responsibility in organising expertise from the project office on the five dimensions. Contact persons are (POD):

- The scientific added value (SB);
- The Costs estimate and risk assessment (Arjen van Rijn);
- Governance (Achim Stahl);
- Socio-economic impact (Olivier Granville);
- Coordination in PO and towards ETO (Martijn Rumpen).

We have a next meeting with ETO and HC on January 23

From ETO, the scientific added value will be coordinated by Jurgen van Gorp

2 Site Selection: process initiated by BGR

Advice BGR on the procedure to decide on the site: draft execution plan. The SiSeC will not be involved in the execution of that plan.

Chair is Andrew Harrison

Scope (BGR)

- Its purpose is, among others, to reach an agreement on the procedure to select the host country for the ET, including what kind of information will be needed for the selection procedure.
- The Working Group on Site Selection Criteria has been set up to 'provide the BGR with a draft execution plan on the site selection procedure for the ET'.

Sub-groups

- Sub Group 1 *Scientific and technical requirements of the detector*
- Sub Group 2 *Civil works and environment.*
- Sub Group 3 *Contextual factors: ecosystem, community and connectivity*
- Sub Group 4 *Costing and Finances*

Report ready for deliberation in June BGR

Ken Haenen	Belgium	nat. rep.
Vernesa Smolčić	Croatia	nat. rep.
Reynald Pain	France	nat. rep.
Guido Müller	Germany	nat. rep.
Giovanni Bisoffi	Italy	nat. rep.
Hans Chang	Netherlands	nat. rep.
Tomasz Bulik	Poland	nat. rep.
Rafael Rebolo	Spain	nat. rep.
Sheila Rowan	United Kingdom	nat. rep.
Frédéric Nguyen	Belgium	nat. subst.
Vibor Jelić	Croatia	nat. subst.
Vincent Poireau	France	nat. subst.
Harald Lück	Germany	nat. subst.
Marco Pallavicini	Italy	nat. subst.
Stan Bentvelsen	Netherlands	nat. subst.
Stephen Fairhurst	United Kingdom	nat. subst.

2 Site Selection: process initiated by BGR

SG1 on *Scientific and technical requirements of the detector* should:

- Identify the scientific performance parameters of ET that depend on site characteristics;
- Translate these parameters into measurable requirements for the instrument

Noise contributions

- For each relevant contribution, maximum admissible levels shall have to be defined, both individually and in aggregate, in order to ensure compliance with ET sensitivity requirements.
- Where appropriate, quantitative thresholds or ranges shall have to be proposed

E-Infrastructure

- The scope of ‘E-infrastructure’ should at least include infrastructure for low-latency data processing on or near the site of the detector and also for connections with later-stage data analysis.

Vernesa Smolčić	Croatia	nat. rep.
Giovanni Bisoffi	Italy	nat. rep.
Tomasz Bulik	Poland	nat. rep.
Rafael Rebolo	Spain	nat. rep.
Sheila Rowan	United Kingdom	nat. rep.
Frédéric Nguyen	Belgium	nat. subst.
Harald Lück	Germany	nat. subst.
Stan Bentvelsen	Netherlands	nat. subst.
Helle Pedersen	International	int. exp.

2 Site Selection: process initiated by BGR

Setting up our strategy

- We initiated a ‘expert’ group especially for SG1, with experts in the area of seismic, Newtonian Noise (NN) and mitigation strategies.
- For our impact in SG1:
  - 1. mitigate the importance of the Newtonian Noise (NN):
    - a. sensitivity for ET will not depend on NN for many years
    - b. relate to the mitigation potential, active in 20 years from now (e.g. using AI tools)
  - 2. long-livety: guarantee constant performance over the lifetime of the project
    - a. EMR has larger noise attenuation from surface to sub-surface that protects the infrastructure for future changes of the environment.
    - b. The surface at Sardinia is quieter now; but due to hard rock there is almost no attenuation going sub-surface. Hence any new development at surface will have direct impact on ET (e.g. windturbines, mining, or even just extending population).
  - 3. emphasize the benefits of our (complex) geology
    - a. Noise correlation between the corner points of the triangle
  - 4. emphasize the development of the mitigation tools
    - a. show a mitigation of a factor 10 is realistic

Active working group NN - EMR area

NP1: Analytic understanding of NN

- Analytical calculations for simplified geometry and geology

NP2: Validation of the numerical tools

- Compare to analytic calculations, increasing complexity: layered geology and realistic geometries

NP3: (Preparation for) sub-surface measurements

- Understanding of surface and sub-surface measurements
- Development noise model for of NN calculations

NP4: Mitigation strategy and results

- Generation of ideas and development of tools to mitigate NN

NP2: Tools for Newtonian Noise & mitigation

Agreement with ISB and SCB on development of tools for NN and mitigation

- The list of NN and mitigation modeling/design tools has been collected

These tools will have to be reviewed and tested by July 2026

- Other tools might still be added later, but for sure this is an excellent starting point.

Focus on these

1. **Newtonian Noise optimizations** - Francesca Badaracco
2. **NewtonForge-3D** - Tomislav Andric
3. **SeisNN** - Andreas Rietbrock
4. **pySeis1DNN and pySeis3DNN** - Soumen Koley
5. **Prediction of environmental vibration due to anthropogenic sources and computation of Newtonian Noise** - Geert Degrande
6. **FraNC** - Tim Kuhlbusch
7. **ParaArrayOpt** - Johannes Erdmann