



ET-France: Introduction

Réunion ET-France – IP2I Lyon

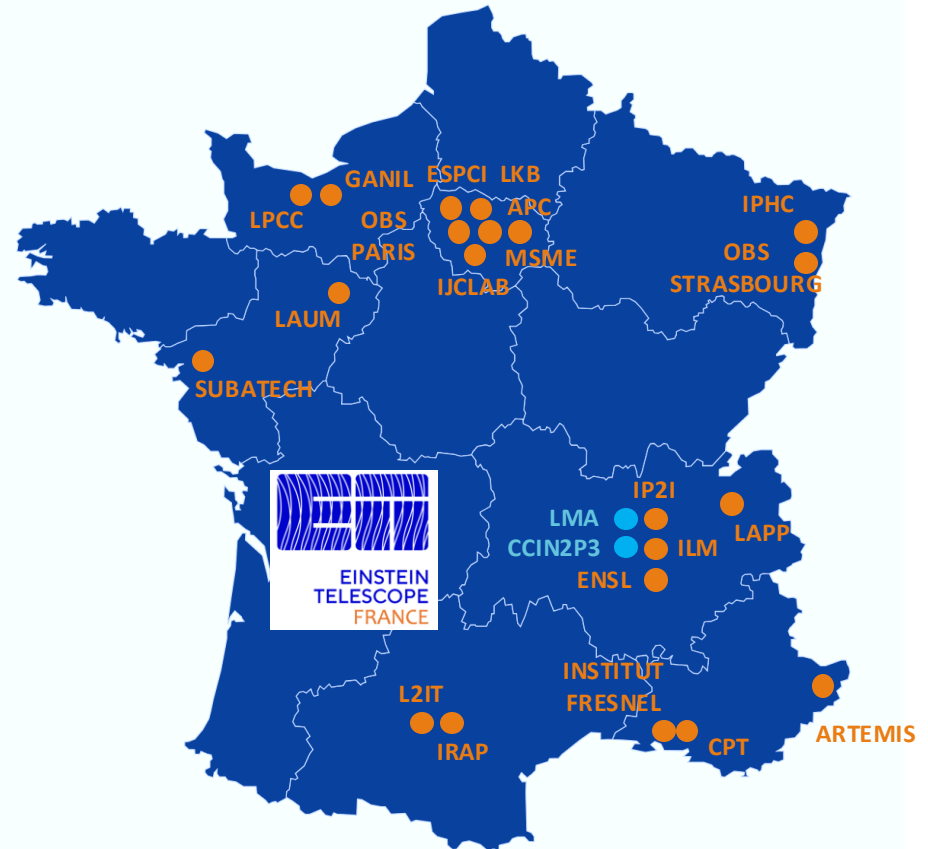
October 8th, 2025
patrice.verdier@in2p3.fr

4 CNRS Institutes: IN2P3, INP, INS2I, INSU

ET-France web site: <https://et-france.in2p3.fr>

154 French collaborators officially joined
the ET Collaboration
(~2/3 are also members of Virgo)

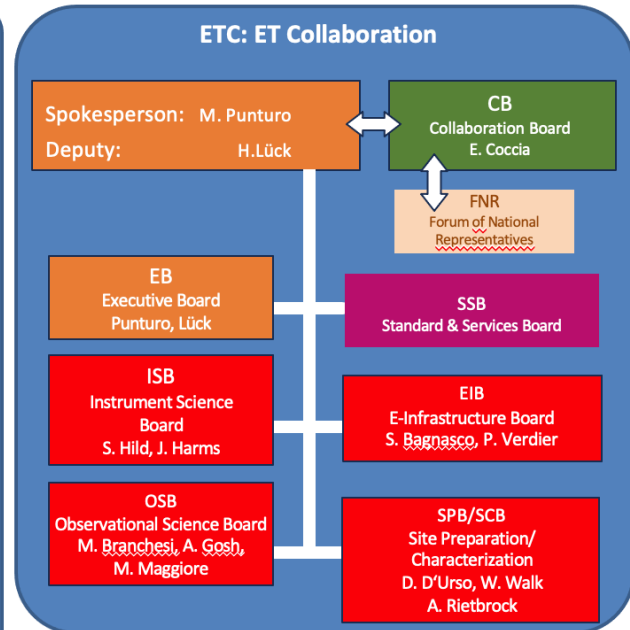
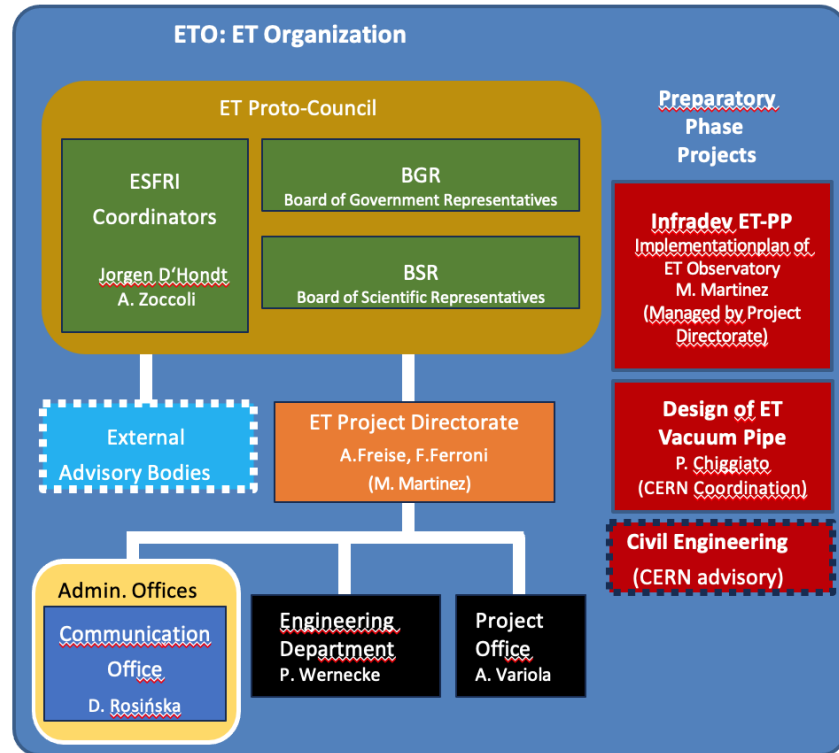
Organized in **8 Research Units** :
FTE threshold to get 1 voting voice at
the ET Collaboration Board



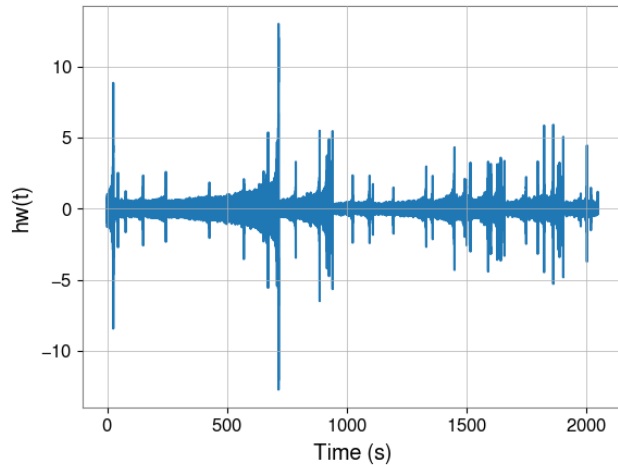
The EU supports the creation of the ET infrastructure (ETO) through the financing of an Infradev project:

Einstein Telescope Preparatory Phase (ET-PP)
2023-2026

The Einstein Telescope Collaboration:
1900 scientists from
271 institutions



Since the summer of 2022, the ET structures are being put in place
French scientists have important responsibilities in ETC



Regimbau, Suresh arXiv:2506.12237

- $O(10^5)$ BBH detections per year
- $O(10^4)$ BNS detections per year among which ~ 100 with EM counterparts
- Early universe : up to $z=100$
- High SNR events
- Very long signals (up to minutes or hours): early warning alerts
- Overlapping events

Mock-Data-Challenges

arXiv > gr-qc > arXiv:2503.12263

General Relativity and Quantum Cosmology

[Submitted on 15 Mar 2025]

The Science of the Einstein Telescope

Adrian Abac, Raul Abramo, Simone Albanesi, Angelica Albertini, Alessandro Agapito, Michalis Agathos, Conrado Albertus, Nils Andersson, Tomás Andrade, Igor Andreoni, Federico Angeloni, Marco Antonelli, John Antoniadis, Fabio Antonini, Manuel Arca Sedda, M. Celeste Artale, Stefano Ascenzi, Pierre Auclair, Matteo Bachetti, Charles Badger, Biswajit Banerjee, David Barba-González, Daniel Barta, Nicola Bartolo, Andreas Bauswein, Andrea Bognoni, Freija Beirnaert, Michal Bejger, Enis Belgacem, Nicola Bellomo, Laura Bernard, Maria Grazia Bernardini, Sebastiano Bernuzzi, Christopher P. L. Berry, Emanuele Berti, Gianfranco Bertone, Dario Bettoni, Miguel Bezares, Swetha Bhagwat, Sofia Bisero, Marie Anne Bizouard, Jose J. Blanco-Pillado, Simone Biasi, Alice Bonino, Alice Borghese, Nicola Borghi, Ssohrab Borhanian, Elisa Bortolas, Maria Teresa Botticella, Marica Branchesi, Matteo Breschi, Richard Brito, Enzo Brocato, Floor S. Broekgaarden, Tomasz Bulik, Alessandra Buonanno, Fiorella Burgio, Adam Burrows, Gianluca Calcagni, Sofia Canevarolo, Enrico Cappellaro, Giulia Capurri, Carmelita Carbone, Roberto Casadio, Ramiro Cayuso, Pablo Cerdá-Durán, Prasanta Char, Sylvain Chaty, Tommaso Chiarusi, Martyna Chruslinska, Francesco Cireddu, Philippa Cole, Alberto Colombo, Monica Colpi, Geoffrey Compère, Carlo Contaldi, Maxence Cormier, Francesco Crescimbeni, Sergio Cristallo, Elena Cuoco, Giulia Cusin, Tito Dal Canton, Gergely Dálya, Paolo D'Avanzo, Nazanin Davari, Valerio De Luca, Viola De Renzi, Massimo Della Valle, Walter Del Pozzo, Federico De Santi, Alessio Ludovico De Santis, Tim Dietrich, Ema Dimastrogiovanni, Guillem Domenech, Daniela Doneva, Marco Drago, Ulyana Dupletsa, Hannah Duval, Irina Dvorkin, Nancy Elias-Rosa et al. (385 additional authors not shown)

Einstein Telescope (ET) is the European project for a gravitational-wave (GW) observatory of third-generation. In this paper we present a comprehensive discussion of its science objectives, providing state-of-the-art predictions for the capabilities of ET in both geometries currently under consideration, a single-site triangular configuration or two L-shaped detectors. We discuss the impact that ET will have on domains as broad and diverse as fundamental physics, cosmology, early Universe, astrophysics of compact objects, physics of matter in extreme conditions, and dynamics of stellar collapse. We discuss how the study of extreme astrophysical events will be enhanced by multi-messenger observations. We highlight the ET synergies with ground based and space-borne GW observatories, including multi-band investigations of the same sources, improved parameter estimation, and complementary information on astrophysical or cosmological mechanisms obtained combining observations from different frequency bands. We present advancements in waveform modeling dedicated to third-generation observatories, along with open tools developed within the ET Collaboration for assessing the scientific potentials of different detector configurations. We finally discuss the data analysis challenges posed by third-generation observatories, which will enable access to large populations of sources and provide unprecedented precision.

Comments: 880 pages, 203 figures
 Subjects: General Relativity and Quantum Cosmology (gr-qc); Cosmology and Nongalactic Astrophysics (astro-ph.CO); High Energy Astrophysical Phenomena (astro-ph.HE); Instrumentation and Methods for Astrophysics (astro-ph.IM); Nuclear Theory (nucl-th)
 Report number: ET-0036C-25
 Cite as: arXiv:2503.12263 [gr-qc]
 (or arXiv:2503.12263v1 [gr-qc] for this version)
<https://doi.org/10.48550/arXiv.2503.12263>

March 2025: ET blue book publication
<https://arxiv.org/abs/2503.12263>
 Accepted by JCAP
 880 pages document

Note: the named people present the current ETO Management Team

ETO Directorate

- Fernando Ferroni – ETO Director
- Andreas Freise – ETO Director
- Daniela Trani – ETO Associate Director
- TBD
- Mario Martinez – ET-PP Coordinator



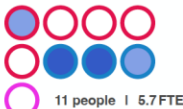
Project Office

- Alessandro Variola – Head Of Department
- Fiodor Sorrentino – Technical Coordinator



Engineering Department

- Patrick Werneke – Head Of Department
- Maria Marsella – Lead Civil Engineering



Communication Office

- Martine Oudenhoven – Head Of Department



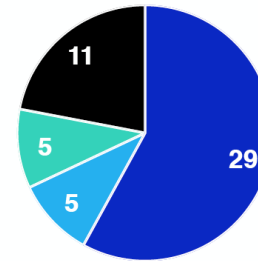
Currently, only the costs defined in the CERN agreements (total value: €7.2M) are accounted for

- ET partners cover around €6.4M
- CERN provides the remaining €0.8M as in-kind contributions, as specified in the agreements

Agreement	Start Date	End Date	Financed by ETO Fund?	Total Value [k€]	ET Share [k€]
Collaboration On Vacuum Systems	01/08/2022	31/07/2025	No	1.749	1.189
Civil Engineering Study	01/10/2023	31/12/2026	No	353	353
Commitments Before ETO Fund Setup				2.102	1.542
Extension of Vacuum Collaboration	01/03/2025	20/12/2027	Yes	2.040	1.759
Safety and Engineering Study	01/04/2025	31/03/2028	Yes	3.055	3.055
Commitments Since ETO Fund Setup				5.095	4.814
Grant Total				7.196	6.357

@ Andreas Freise

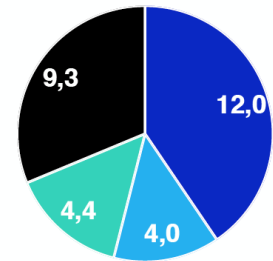
Headcount



Staff

Dedicated Hires

FTEs



ET-PP Funded

Employed Through CERN

In preparation

- Strengthening the role of ETO: Mandate update in preparation (nextBGR)
- Coordinated the next Infradev project for the implementation phase : ET-COMPASS. ET-France not there

Huge work done with the EC officer but RP2 review is finally closed !

RI and detector TDR:

Preliminary det TDR for 2026 ?

RI TDR maybe not within ET-PP time

#	Details	WP	Due by (originally)	Comment
D11	D4.2: Updated socio-economic impact studies	4	Nov 2023	Resubmitted — Approved
D30	D8.1: Computing and Data Requirements	8	Feb 2024	Resubmitted — Approved
D38	D10.3: Formulate strategic media and communications plan	10	Aug 2024	Resubmitted — Approved
M2	Document detailing the site-specific characteristics that impact ET sensitivity and its duty cycle.	4	Nov 2022	Resubmitted — Approved
M3	Common methodology to estimate impact of site characteristics on ET sensitivity and operation	4	June 2023	Resubmitted — Approved
M17	Preliminary sustainability plan	9	Jul 2023	Resubmitted — Approved

CNRS involved in WP5 and WP9 (withdraw from WP9)

Update of the Grant in progress

@ Mario Martinez

WP5 — ETO - Project office / Engineering Dept.

More than 40% of the ET-PP funds devoted to this WP as seed money

Mission accomplished — ETO now with a solid operating team beyond ET-PP target

#	Details	WP	Status	Due by	Delivered	Comment
D15	D5.1: Structure and mandate of the Project Office	5	Approved by EC	Sept 2024	Sept 2024	Done
D16	D5.2: Functionalities required from the tools in support of the project management	5	Approved by EC	Done		Done
D17	D5.3: Structure and mandate of the Engineering Department	5	Approved by EC	Sept 2024	Sept 2024	Done
D18	D5.4: Functional Engineering Department	5		Dec 2024	March 2025	Submitted to EC
D19	D5.5: Functional Project Office	5		Dec 2024	March 2025	Submitted to EC
M4	The recruitment of the Project Office team is completed	5		Nov 2023	Nov 2023	Done
M5	All three documents (WPs-D5.1, D5.2 and D5.3) are published	5		Sept 2024	Sept 2024	Done
M6	The Engineering Department as a functional unit complete	5		Nov 2024	March 2025	Submitted to EC
M7	The Project Office as a functional unit complete	5		Nov 2024	March 2025	Submitted to EC

WP7 — Transfer of Technology / WP8 — Computing Model

#	Details	WP	Status	Due by	Delivered	Comment
D26	D7.1: Innovation plan	7	EC approved	Done		
D27	D7.2: Report on industry engagement plan execution	7		Feb 2026		Expected to be on track
D28	D7.3: Model for pursuing in ET a balanced industrial return	7	Submitted	May 2025	July 2025	
D29	D7.4: Report on TT and Intellectual property management in ET	7		April 2026		Expected to be on track
D30	D8.1: Computing and Data Requirements	8	Submitted to EC	Feb 2024	Feb 2024	Revision requested
D31	D8.2: Computing and Data Model	8		Feb 2026		Expected to be on track
D32	D8.3: Data Access Implementation Guidelines	8		Jul 2026		Expected to be on track
M9	Analysis of promotion strategies accomplished	7		April 2023	April 2023	Done
M10	Engagement plan produced	7		June 2023	Oct 2023	Done
M11	Analysis of balanced industrial return strategies accomplished	7		Nov 2023	Oct 2024	Done
M12	Workflows Requirements collection and constraints: computing and data	8		July 2023	July 2023	Done
13	Computing Infrastructures availability for ET workflows, characteristics	8		Aug 2024	Jul 2024	Done
14	On site infrastructure, computing and data model	8		Aug 2025		Expected to be on track
15	Low latency and offline workflows and computing model	8		Dec 2025		Expected to be on track
16	Data management, access, policy and implementation	8		Jun 2026		Expected to be on track

CNRS took important responsibilities in the ET-Preparatory Phase project (Infradev 2023-2026)

<https://etpp.ifae.es/>

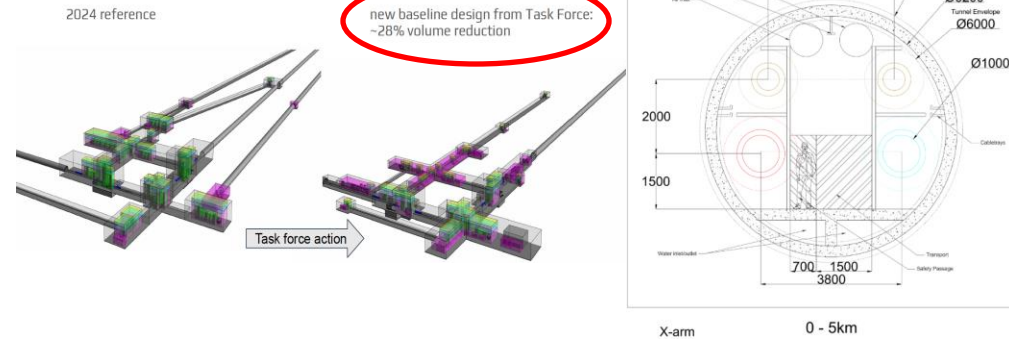
- Setting up the Project Office: Risk management, PBS database, schedule & configuration management
- Vacuum pipe design with CERN
- ET-LF Tower Design

CNRS in-kind contribution ~250 person months (1.7 M€)

ETO has signed a INFN-Nikhef-CERN MOU and is paying CERN for :

- Vacuum pipe TDR (delivered in 2025)
- Civil Engineering
- Technical Infrastructure: HVAC, Electricity, Access & Alarms
- Safety
- Integration

Detector layout - 2L



O(100) towers with heights from 13 to 18 m



Image: CERN

120 km of 1m diameter vacuum pipes

- Sardinia:

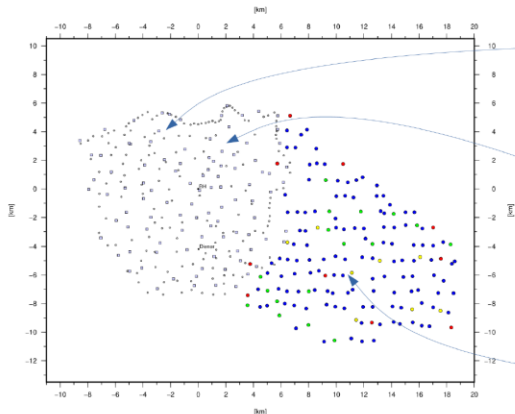
<https://indico.ifae.es/event/2183/contributions/9744/attachments/2964/4630/0250721-TETI%20Status%20at%20the%20ET-PP%20Annual%20Meeting.pptx>

- EMR:

<https://indico.ifae.es/event/2183/contributions/9745/attachments/2960/4631/20250722-WP4-summary-EMR2.pdf>

- Saxony:

https://indico.ifae.es/event/2183/contributions/9746/attachments/2959/4625/Lausitz_ET-PP_250722.pdf



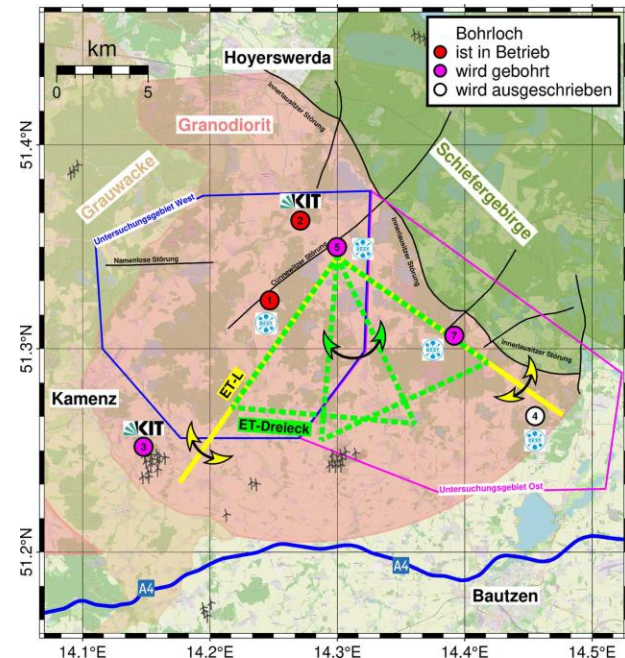
Short-Term deployment
5 weeks; March/April 2024
209 stations
200 with 1C geophones
9 with TC

Backbone deployment
~ 1 year; Dec. 2024 – Dec. 2025
209 stations
200 with 1C geophones
9 with TC

East-extension deployment
~ 5 weeks; ~June 2025
156 stations
121 with 1C geophones
rest with TC, 3C-geophones

Important funding for ET in Germany
following their RI prioritization exercise in 2025

Possible layout in Lusatia



ET will use a **distributed computing infrastructure** in Europe, based largely on existing infrastructures such as CC-IN2P3 in France : ET = $\sim 10\%$ of an LHC exp. at CERN.

Increasing use of **high-performance parallel computing** (HPC) vs HTC computing.

ET active in EuCAIFCon -- European Coalition for AI in Fundamental Physics

Use of tools and services developed in the framework of the **European Open Science Cloud** and European projects such as ESCAPE for **multi-messenger physics**

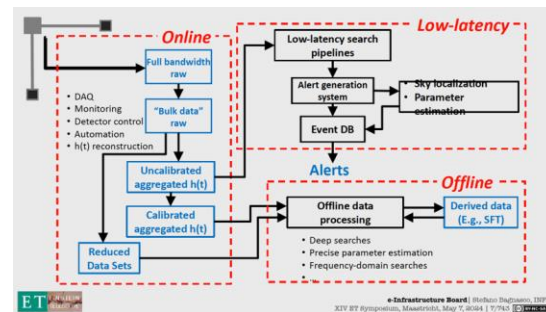
ET joined the ESCAPE consortium in 2023 : 2 OSCARs project funded !

=> *OSCAR2 in preparation*

Mock-Data-Challenge in progress



CC-IN2P3



ET-PP Deliverables in February 2026

- Computing model
- Data Access Policy
- Sustainability plan



Fostering the uptake of Open Science in Europe

In response to the EU call on EOSC HORIZON-INFRA-2023-EOSC-01-01

€ 16 MILLIONS
IN OPEN CALLS FOR
OPEN SCIENCE
PROJECT AND SERVICES

First meeting organized in March 2023 with MESR to present ET to the French industries interested by this project

=> About 30 companies were present and have shown interest to works with us, either through dedicated/joint R&D program, either as manufacturer of components

Follow-up in Sept. 2023 with a network of French companies (PIGES) involved in Big Sciences

We are following and contributing to ET-PP WP7 dedicated to industrial partnerships => Big Science Business Forum at Trieste in Oct. 2024:

ET was very well represented

Preparing an ET + Industry meeting on Computing (Spring 2026)

Contact: patrice.verdier@in2p3.fr



<https://www.piges.eu>

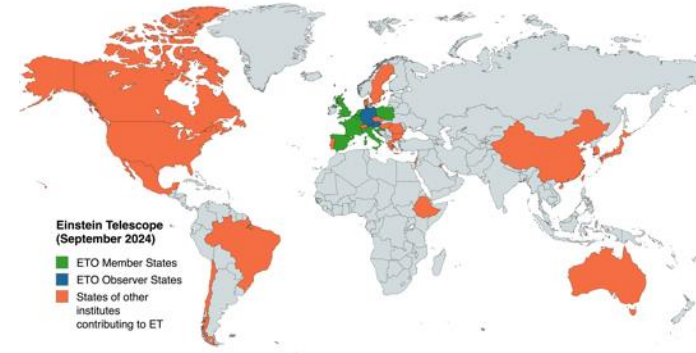
<https://indico.in2p3.fr/event/28704>



<https://www.bsf2024.org>

ET Board of Governmental Representatives:

- **Members:** Belgium, Croatia, France, Italy, Netherlands, Poland, Spain, United Kingdom
- **Observers:** Austria, Germany
- **Chairs:** Roberto Cimino (Italy) & Lodewijk Smoor (NL)
- **Secretaries:** Maria Nocera (Italy) & Jérôme Pourbaix (Belgium)



Next BGR in Lyon in October 21-22 : main agenda topics

- ✓ ET project timeline : geometry and site decision in 2026-2027
- ✓ Extending the ETO mandate : proposal
- ✓ Proposal for for detailed ETO work-plan
- ✓ Geometry comparison report : proposed schedule
- ✓ ET-COMPASS (Infradev for the implementation phase)
- ✓ ET legal entity: need for intermediate legal entity
- ✓ Update from the SiSe WG (Site selection Criteria Committee)

HORIZON-INFRA-2025-01-DEV-02:

Early phase implementation of ESFRI Projects that entered the ESFRI Roadmap in 2021

Submitted the 17th of Septembre 2025

ET-COMPASS

Budget : 1.5M€

COordination, Management, Planning And Strategic Support

- **WP1 ET-COMPASS Grant Management** - Ensuring effective coordination, management and administrative compliance with EC requirement, as well as with ETO.
- **WP2 Establishing a Functional and Effective ET Organisation** - Contributing to development of management and organisational structures, in-kind contributions frameworks, costing procedures and operational capacity of ETO.
- **WP3 Membership Enlargement and Partnership Engagement** - Strengthening membership in and international funding commitments to ETO, and reinforcing ET's strategic positioning at European and global level.

ETO was asking for contribution from individuals > 50% FTE

France has in-kind contribution to ETO (not in the ETO funders group)

=> **France is not in the ET-COMPASS proposal**

@ Andreas Freise

WP1- ET-COMPASS Management

Task nr	Task Title	Task Leader	Other contributors/beneficiaries	ETO Dept*
1.1	Management of ET-COMPASS project	INFN	Nikhef (in-kind via ETO Directorate)	ETO Directors/Directorate
1.2	ET-COMPASS Communication and Dissemination	IFAE	INFN	
1.3	Development of ET-COMPASS data Management Plan and FAIR-Aligned Guidelines	INFN	N/A	

WP2 - Establishing ETO as a functional and effective organisation

Task nr	Task Title	Task Leader	Co-Leader(s)	Other contributors/beneficiaries	ETO Dept*
2.1	Developing and ET-wide and ETO-led management structure	Nikhef	DZA and UniGlasgow	N/A	ETO Project Office
2.2	Designing and testing an in-kind personnel contribution framework for ETO	KU Leuven	N/A	UniRi	ETO Directorate
2.3	Development of ETO rules and procedures for the preparation of project cost assessment	IFAE	MUL	UniRi, ÔAW	ETO Project Office
2.4	Developing ETO organisational structures and resources towards ETO becoming a functional and effective entity	DZA	Nikhef	N/A	ETO Directorate

WP3 - ETO Membership Enlargement and Partnership Engagement

Task nr	Task Title	Task Leader	Other contributors/beneficiaries	ETO Dept*
3.1	Evolution and strengthening of international funding and commitment to ETO through BGR and ETO	KULeuven	UniRi	ETO Directorate
3.2	Supporting positioning of the ET ESFRI project at European and global level	UniRi	N/A	
3.3	Supporting ETO communication and dissemination activities towards widening participation in and	Astrocent	N/A	ETO Communication



Einstein Telescope is applying to enter this roadmap

- April 2025: eligibility application – **OK**
- July 2025: application to enter as IR = CNRS budget for R&D
- October 2025: audition by the GT PNHE

Demande de 3M€ sur 3 ans (2026-2028)

400k€/an investment for R&D

600k€/an temporary positions (Post-docs, docs, engineers)

Next steps:

End of October 2025 : WG evaluation

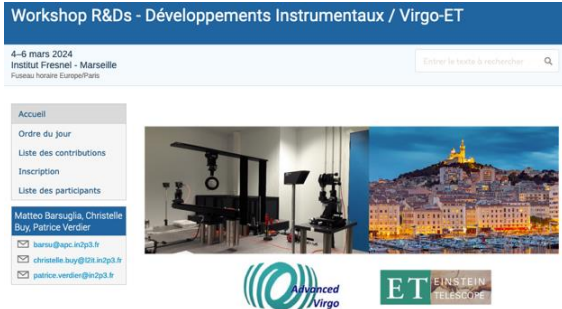
Janvier 2026: decision at MESR

February 2026 : validation of the final list by CD TGIR

Final publication: September 2026

Question from GT PNHE to be answered by the end of the week

- 1) Programme de physique d'intérêt pour la communauté française (au sein du large spectre des possibilités d'ET)
- 2) Complémentarité/concurrence avec Cosmic Explorer
- 3) Pros and cons des différentes géométries et des différents sites : ET France a-t-il une préférence ?
- 4) Détail du planning de construction et analyse du niveau de confiance sur un démarrage en 2040
- 5) Modèle financier envisagé pour la construction ET l'exploitation de l'infrastructure. En particulier, pour un projet de cette ampleur (taille communauté et coût) est-il réaliste que l'Europe soit toute seule ou des partenaires extra-européens sont envisagés ?
- 6) Priorisation des engagements possibles dans la R&D et détail des investissements prévus pour chaque item
- 7) Liste des responsabilités françaises dans les différents boards et perspectives (j'espère à court terme) d'une meilleure (plus formelle) structuration de la communauté française (ET France)
- 8) Impact d'ET sur le CC-IN2P3 en termes de besoins de calcul (CPU/GPU) et stockage



A detailed and exhaustive document about French lab interests in Technology developments for Virgo+ET has been produced at the end of 2024

Executive summary sent to CNRS and MESR/DGRI : feeding ET application to the French RI roadmap

EU Infratech proposal **M2TECH** : 2nd submission in preparation by Edwige Tournefier

ET-France needs to strengthen its structuration and coordination

The Einstein Telescope project is progressing quickly on many fronts

2026 will be a critical year for ET : end of ET-PP, towards the decisions on ET geometry and site(s)

3rd generation GW interferometers necessitate strong coordination among partners to support a coordinated R&D program and the design of a very complex Research Infrastructure

***Einstein Telescope* provides the required framework for implementing a structured and coordinated R&D program at European level**

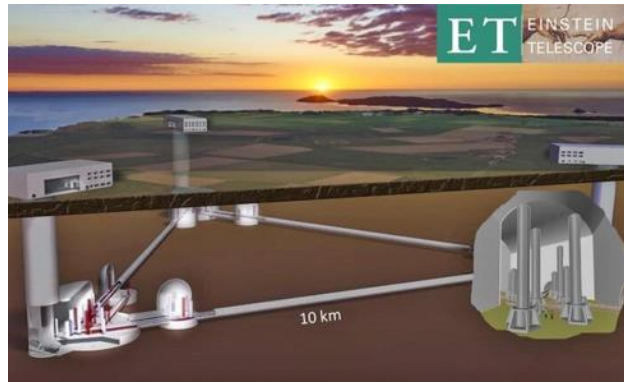
***Einstein Telescope* is providing the recognized flag/label for developing and leveraging a R&D program for 3rd Gen. in instrumentation and computing at national and European levels**

Discussion:

- R&D roadmap(s) : in progress at ET level, also within APPEC, also among FAs
 - French involvements in these exercise ?
- Synergies between Virgo and Einstein Telescope on R&D:
 - Mandatory ! But how ?
- A simplified view on Research Infrastructure for ET R&D:
 - ET-HF => EGO-Virgo ET hub at EGO ?
 - ET-LF => ET-Pathfinder Officialize French participation to ET-Pathfinder (follow-up of Nihef-IN2P3 meeting in 2025)
- GDR OG - October 14 : French position on ET geometry and sites ?

BACKUP

Sardinia – Italy



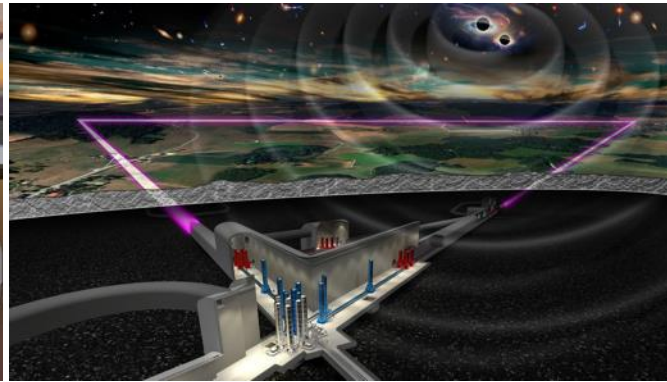
€50 million for R&D and preparatory work

ETIC in Italy

Einstein Telescope Infrastructure Consortium

"Multi-100 M€" financing to support ET's site in Sardinia

Euregio Meuse-Rhin Netherland



€42 million for R&D and preparatory work

ET-Pathfinder in Maastricht

"Multi-100 M€" financing if the ET site is in Euregio Meuse-Rhine

Saxe – Germany

The German Centre for Astrophysics

2 locations for research, technology, digitalisation



New DZA laboratory (2022)
170 M€/year over 10 years

3 pillars: astrophysics, data science, technology



@ Art Institute Of Chicago

EU analysis on RI sustainability

https://www.esfri.eu/sites/default/files/ESFRI_SCRIPTA_SINGLE_PAGE_19102017_0.pdf

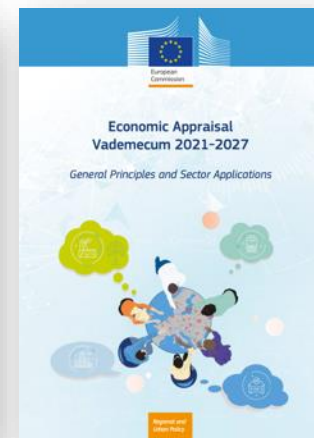
Sustainability studies are supported by EU calls

<https://data.europa.eu/doi/10.2777/76269>

Cost-Benefit analysis:

Research Infrastructure guides foresee this approach

Required by ESFRI



WP9 is in difficulty to achieve its works: new personpower required (=> external company), reorganization mandatory
Anyone interested in your lab ?