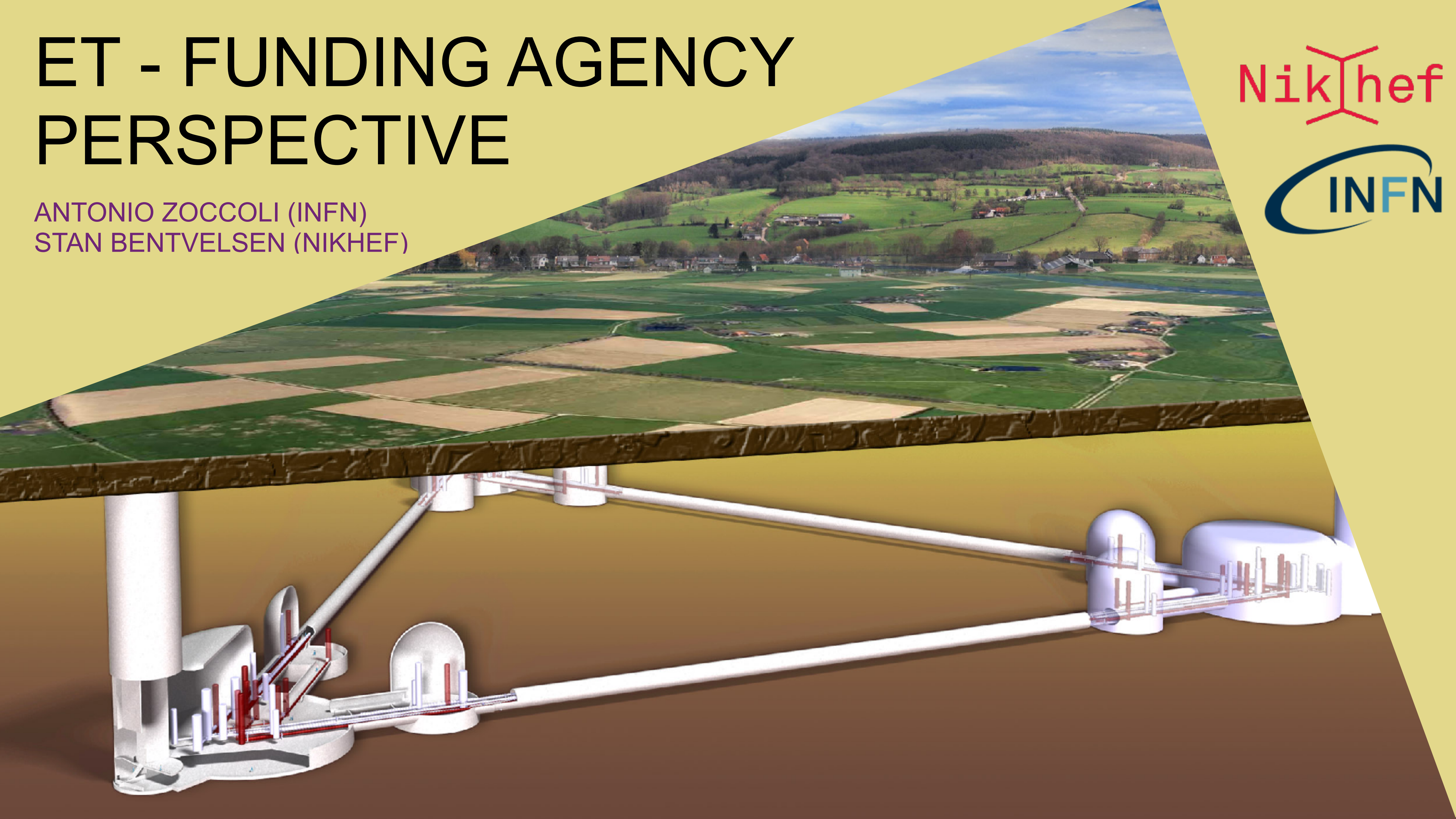


ET - FUNDING AGENCY PERSPECTIVE

ANTONIO ZOCCOLI (INFN)
STAN BENTVELSEN (NIKHEF)

Nikhef

INFN



APPEC: ASTROPARTICLE PHYSICS EU CONSORTIUM

APPEC is responsible for coordinating and funding national research efforts in astroparticle physics

- Consortium of 19 funding agencies, national government institutions, and institutes from 17 European countries - see <https://www.appec.org/>

Roadmap 2017 - 2026

- “APPEC strongly supports further actions strengthening the collaboration between gravitational-wave laboratories”
- “Strongly supports Europe’s next-generation ground-based interferometer, the Einstein Telescope (ET) project, in developing the required technology and acquiring ESFRI status”
- “In the field of space-based interferometry, APPEC strongly supports the European LISA proposal”

Roadmap update currently ongoing

- “Town Meeting” later this week in Berlin, 9 and 10 June 2022



2020 ESPPU

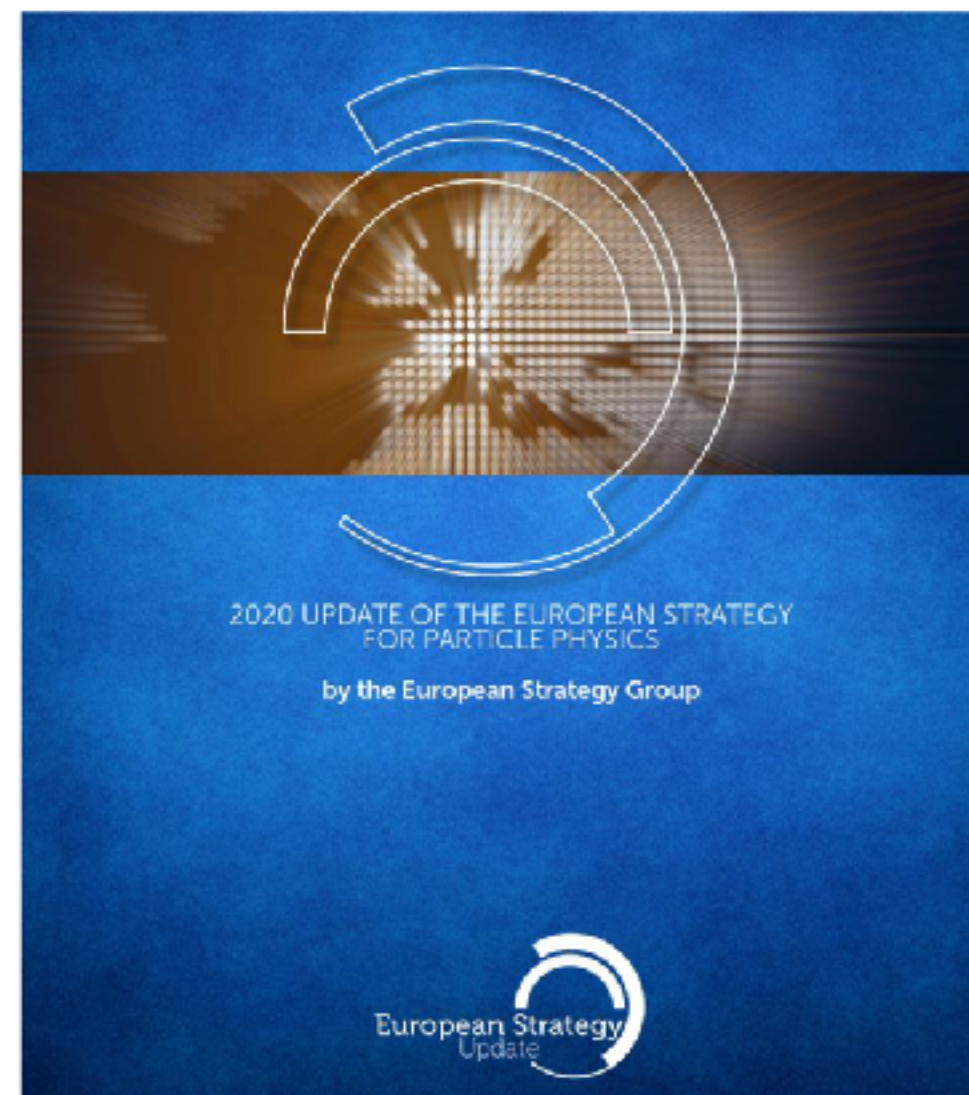
2020 Update of the European Strategy for Particle Physics


- CERN has taken responsibility for technical coordination and design of one of the most expensive components in 3G observatories: the ultra-high vacuum system for the beam pipes

CERN collaboration with GW community

- MOU Nikhef-INFN-CERN for Einstein Telescope
- CE with support from NSF

ET is now a 'recognized' experiment at CERN



5 | 

Synergies with neighbouring fields

A. A variety of research lines at the boundary between particle and nuclear physics require dedicated experiments and facilities. Europe has a vibrant nuclear physics programme at CERN, including the heavy-ion programme, and at other European facilities. In the global context, a new electron-ion collider, EIC, is foreseen in the United States to study the partonic structure of the proton and nuclei, in which there is interest among European researchers. **Europe should maintain its capability to perform innovative experiments at the boundary between particle and nuclear physics, and CERN should continue to coordinate with NuPECC on topics of mutual interest.**

B. Astroparticle physics, coordinated by APPEC in Europe, also addresses questions about the fundamental physics of particles and their interactions. The groundbreaking discovery of gravitational waves has occurred since the last Strategy update, and this has contributed to burgeoning multi-messenger observations of the universe. **Synergies between particle and astroparticle physics should be strengthened through scientific exchanges and technological cooperation in areas of common interest and mutual benefit.**

ESFRI AND EINSTEIN TELESCOPE

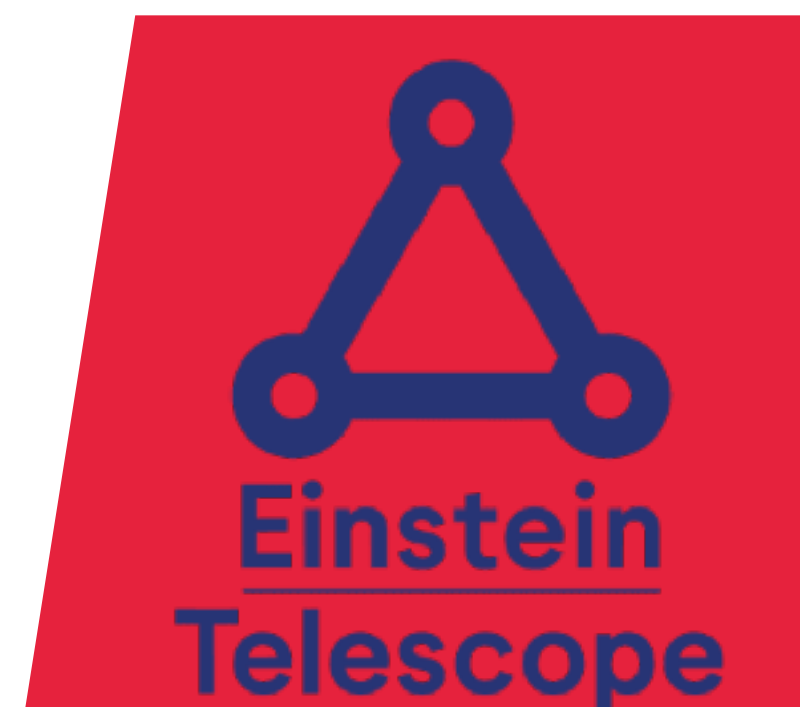
The European Strategy Forum on Research Infrastructures (ESFRI)

- Key role in policy-making on Research Infrastructures in Europe.
- See <https://www.esfri.eu/>

Einstein Telescope appeared on the 2021 ESFRI Roadmap

- Composed of 36 EU countries and countries associated with Horizon 2020.
- On December 7th, 2021, ESFRI presented the 2021 ESFRI Roadmap on Large Scale Research Infrastructures; see <https://roadmap2021.esfri.eu/>

“The Einstein Telescope (ET) responds to the desire from a broad scientific community to observe signals from across the cosmos to understand the very origins of our Universe. Despite their success, in terms of distances explored, the current reach of 2G observatories such as LIGO and Virgo is limited to a region that, on cosmological scales, is still our local neighbourhood, leaving much of the curiosity of scientists unquenched”



EINSTEIN TELESCOPE - ESFRI

ESFRI proposal

- Submitted by: *Italy, Belgium, Netherlands, Poland and Spain*
- Project and collaboration also include agencies and institutions belonging to *Austria, France, Germany, Hungary, Switzerland and UK*

Coordination

- Consortium (currently) coordinated by INFN and Nikhef

Funds

- Preparatory funds available in some countries (IT, NL, ...)
- EU INFRA-DEV proposal approved with a grant of 3.45 M€ (*see talk M Martinez*)
- EU INFRA-TECH proposal just submitted

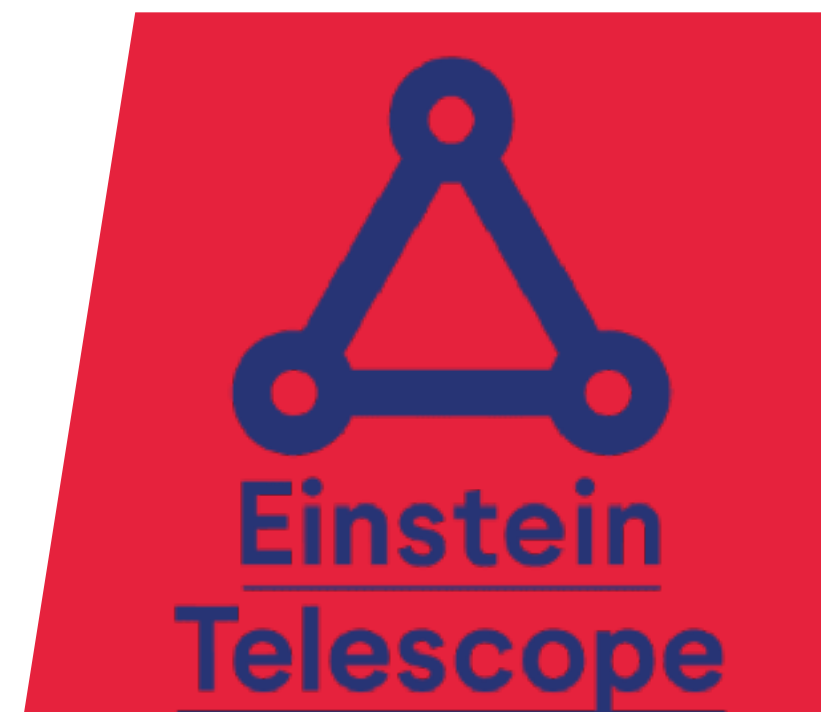
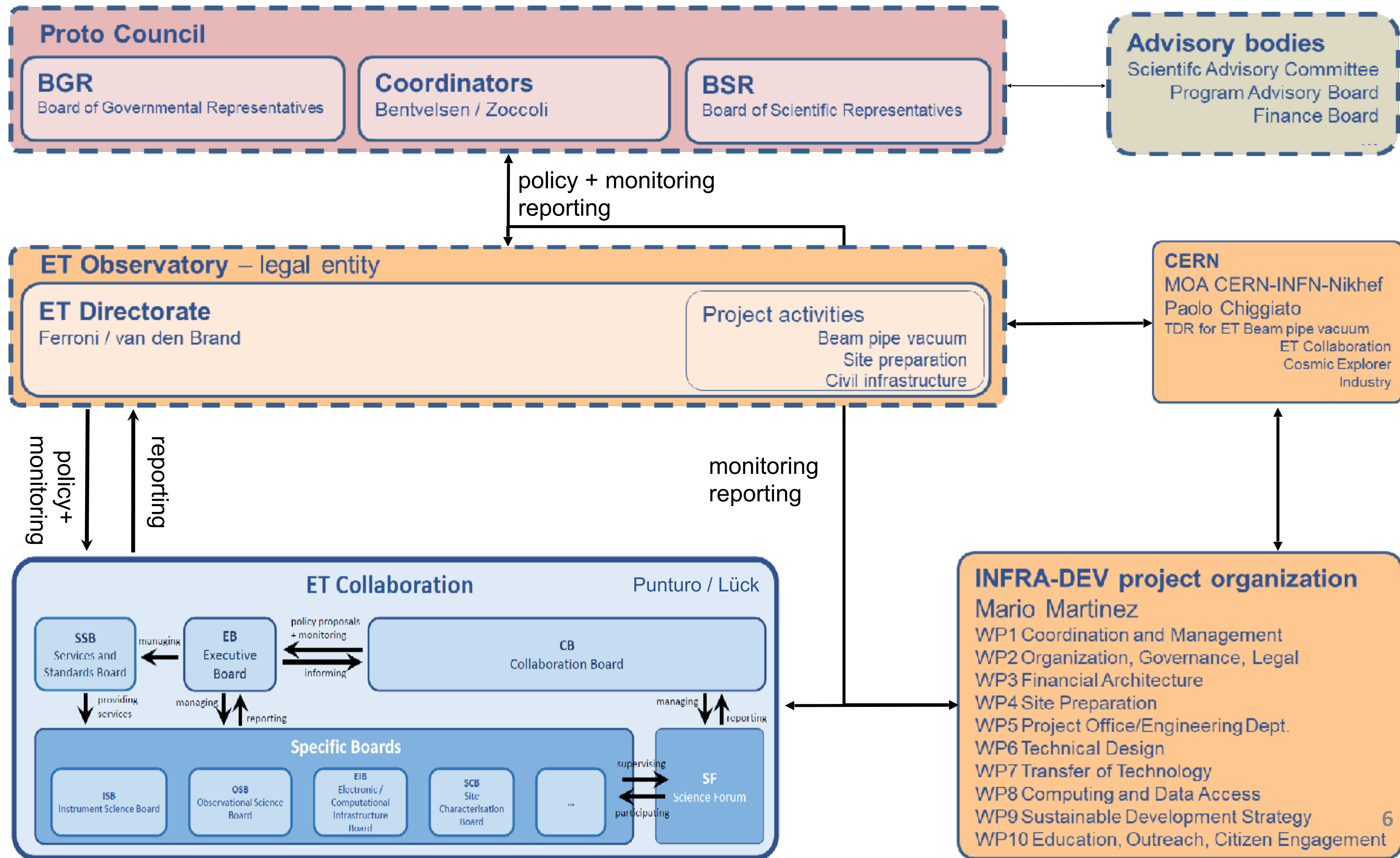
Site candidates

- Studies ongoing in Sardinia in Italy, B-G-NL border region, and Saxony



GOVERNANCE - IN EVOLUTION

Solid boxes: instantiated
Dashed boxes: work in progress



BOARD OF GOVERNMENTAL REPRESENTATIVES

B/NL/P/S/UK/AU/D/IT/CH

Terms of Reference - scope

- Established as strategic forum to discuss and agree on the progress and process of realizing ET
- Prepare, discuss, negotiate, and approve the documents needed for the setting up of the ET legal entity
- Aim to reach consensus on:
 - the procedure to select the host country for the ET
 - the legal model, governance structure and founding documents;
 - the financial plan and the draft internal financial rules;
 - policy papers
 - ...

Valid until the ET BGR terminates and any other interim or final ET governance boards, under the approved ET legal model, are set up

ETIC – ET INFRASTRUCTURE CONSORTIUM

Next Generation EU investment proposed of 100 M€ focused on ET enabling technology and Sardinian site candidature support

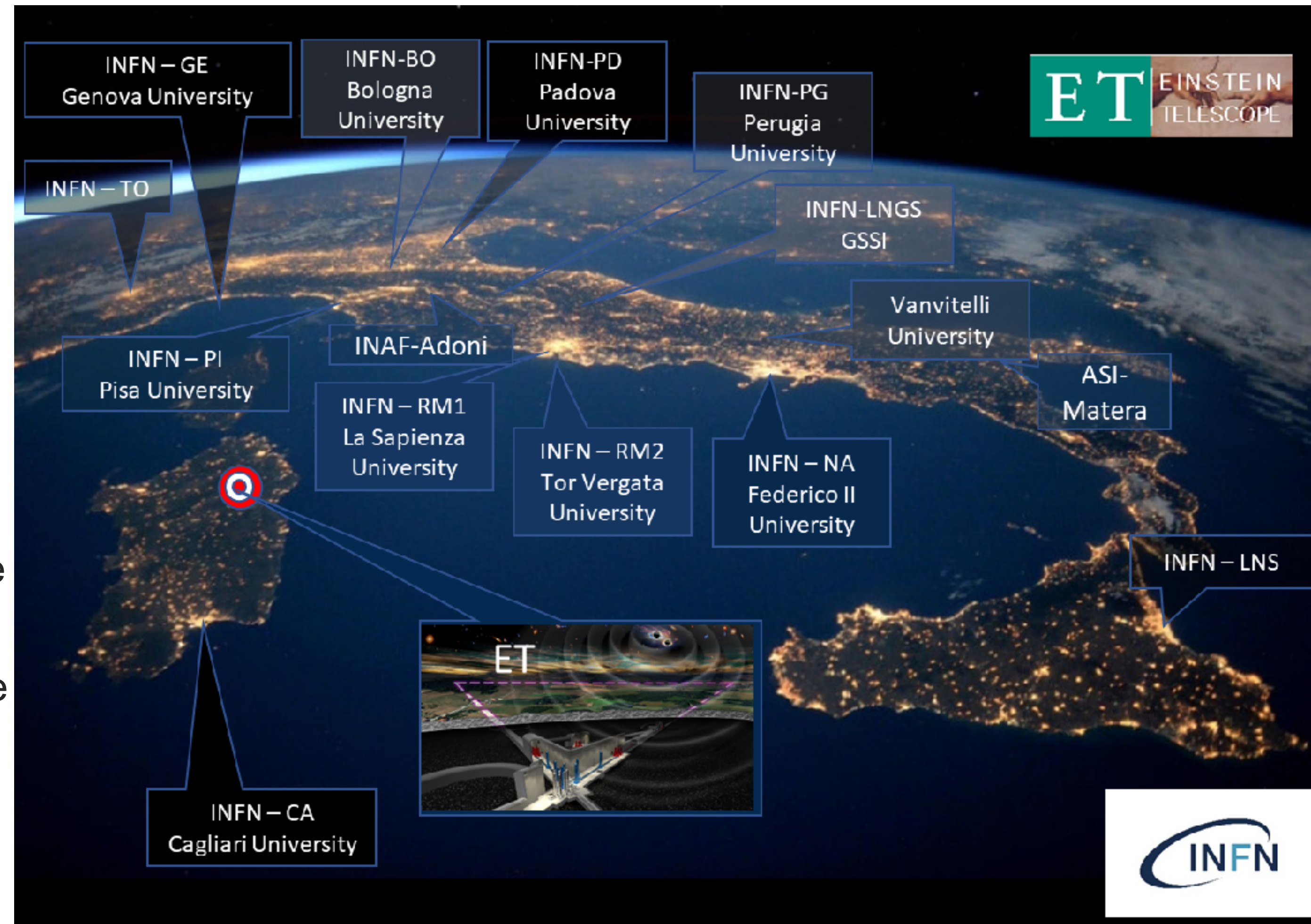
Support for

- 8% Human resources
- 30% Scientific apparatuses
- 12% Distributed infrastructures
- 28% ET design
- 12% Training

Additional 5 M€ funding on the same framework for the site characterization

Feedback expected in June 2022

Discussion ongoing on an Italian share toward ET realization



ET IN EUREGIO MEUSE-RHINE (EMR)

Dutch National Growth Fund for ET

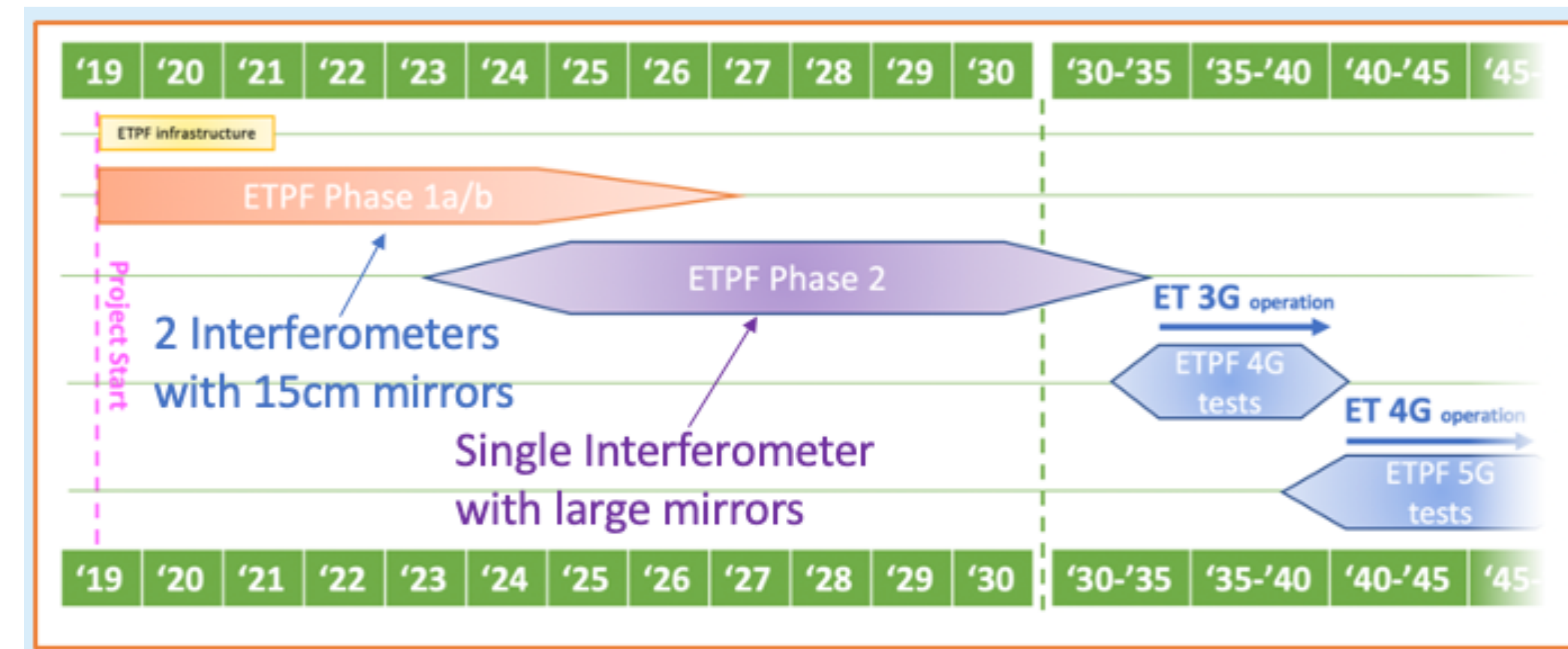
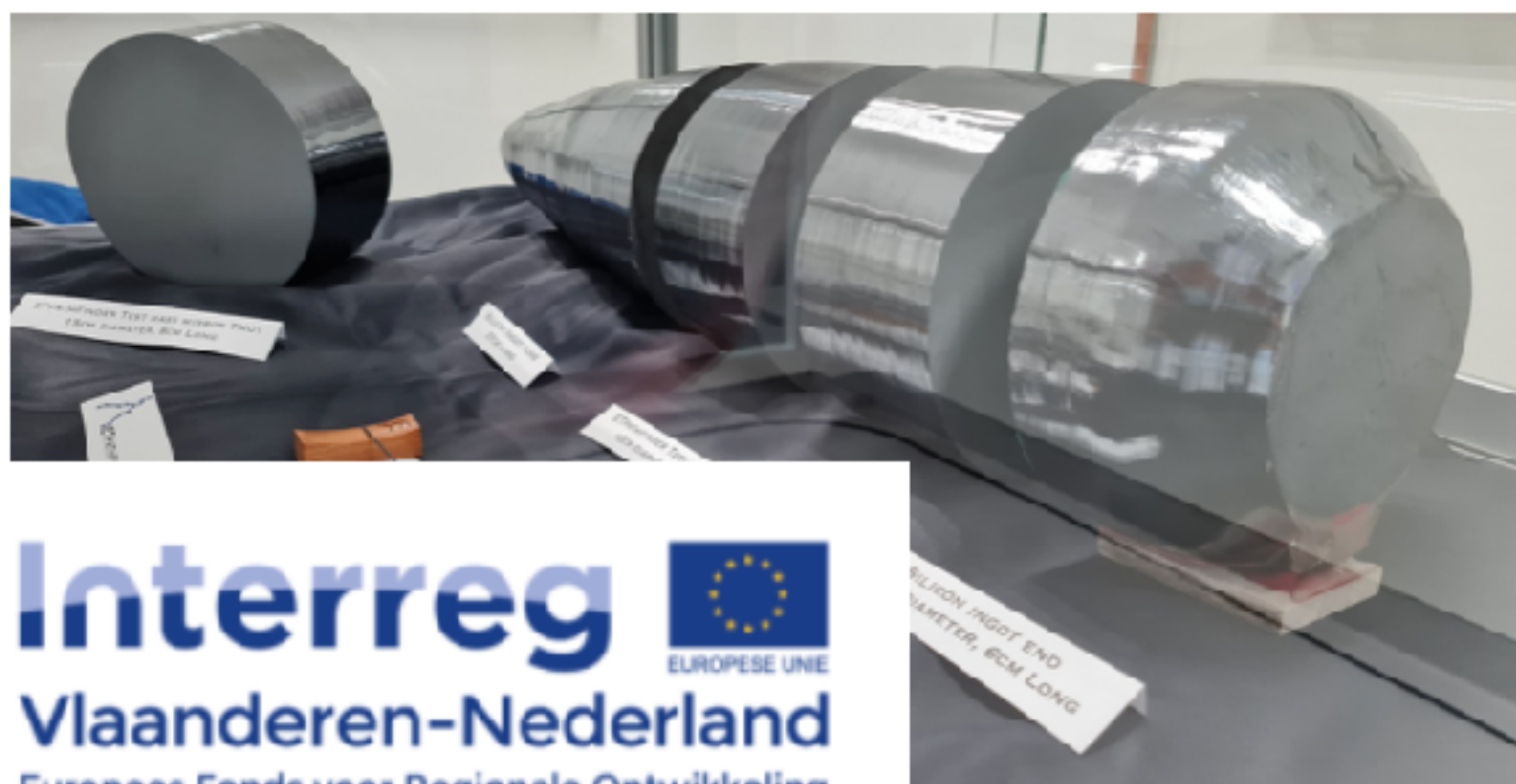
- 42 ME (conditionally) awarded now
 - Money can flow from 2023
- 19 ME: connections to industry for research and innovation: 'the aim of this programme is to optimally position [...] in particular Dutch industry, for R&D and orders related to Einstein Telescope'
- 23 ME: 'for the preparation toward the realisation of the underground infrastructure [...]', project organisation and management
- 870 ME have been reserved for the construction of the ET infrastructure
 - If the EMR site is selected as the location for ET



ETPATHFINDER

ETpathfinder as a new R&D infrastructure - Maastricht (NL)

- testing innovative concepts and technologies for future gravitational wave observatories. Open for everyone interested to join. See <https://www.etpathfinder.eu>
- full interferometer setup for testing 'n+1' technologies
 - silicon mirrors, cryogenics, new wavelengths, coatings,...
- start with 2 FPMI: 120K and 15K
- 20 partners from NL/B/G/FR/SP/UK
- Initial capital funding of 14.5 ME



GRAVITATIONAL WAVES

Large world-wide intellectual activity to understand gravity

- Theoretical: combining GR + QFT, cosmology, ...
- Experimental: astronomy (CMB,..), particle physics (LHC), DM searches (Xenon1T), ...

Gravitational waves entered the scene with high impact

- Ideal information carrier; weak signals, so big detectors
- The entire Universe has been transparent for GWs, back to the Big Bang
- Fundamental physics, Cosmology, Astronomy & astrophysics

***The importance of GW research
has reached funding agencies***

