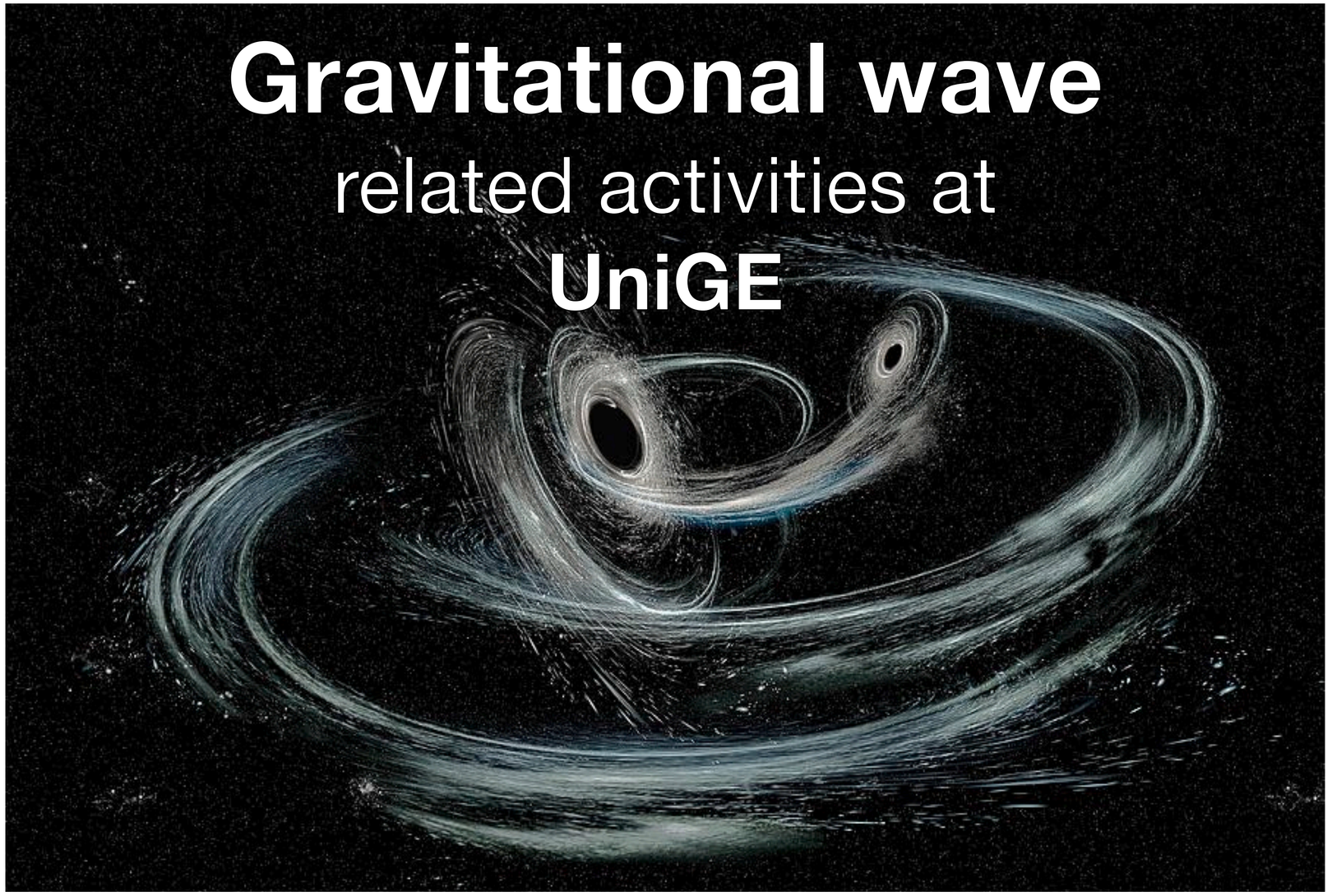
Gravitational wave
related activities at
UniGE



Anastasios Fragkos
on behalf of the GWSC Executive Board
24/10/2022

GWSC GRAVITATIONAL WAVE SCIENCE CENTER

UNIVERSITÉ DE GENÈVE
FACULTÉ DES SCIENCES

Research areas in Gravitational-Wave Science

in the Departments of Astronomy, Theoretical Physics, and Particle & Nuclear Physics

Astrophysics

- Formation and evolution of coalescing binary compact objects and compact binaries - Fragkos
- Population studies of gravitational-wave sources - Fragkos
- Stellar-interior and binary-evolution physics and their imprints to GW source properties - Meynet, Fragkos
- Formation of intermediate-mass black holes - Charbonnel

Cosmology & theoretical physics

- Study of large-scale structure, dark energy and dark matter physics with gravitational waves - Maggiore, Riotto, Caprinni, Foffa, Bonvin, Kunz, Lombriser
- General relativity and modified gravity - Maggiore, Foffa, Bonvin, Kunz, Lombriser
- Primordial black holes - Riotto

Data analysis

- Astrophysical parameter estimation of gravitational-wave sources - Maggiore, Hoffa
- Machine learning methods in data analysis - Schramm
- Gravitational-wave source population inference - Riotto, Fragkos

Multi-messenger astronomy

- Observations of Gamma-ray bursts - Integral Science Data Center - Paltani, Ferrigno
- Future high-energy missions: Athena, Thesseus - Paltani, Eckert, Bozzo

Gravitational-Wave Science Center (GWSC) at UniGE

https://gwsc.unige.ch

GWSC | GRAVITATIONAL WAVE SCIENCE CENTER

"GWSC aims at consolidating the existing GW-related activities within UniGE, stimulating new, interdisciplinary research in the domain, and federating the efforts for a Swiss involvement to future GW observatories, such as the Einstein Telescope."

Proposal approved on December 22nd, 2021

Executive Board: M. Maggiore (DPT; Coordinator), A. Fragkos (ASTRO; Vice-Coordinator), S. Schramm (DPNC), Georges Meynet (ASTRO), A. Riotto (DPT), F. Sanchez Nieto (DPNC)
4 PhD student and 4 Postdoctoral & Senior Researcher Members, 5 Affiliated Members

Activities

Over a dozen of scientific papers published or in the review process

51st Saas-Fee Advanced Course in Astrophysics
Week-long school on "Compact-Object Astrophysics in the Era of Multi-Messenger Astronomy" targeted to early-career researchers.

Applications of AI to gravitational wave science
Mini virtual workshop, bringing together Swiss GW and AI community with international domain experts. Plans to be repeated as an in-person event.

GWSC Colloquium Series - Co-hosted by Astro/DPT/DPNC
Most recent, by Max-Planck Institute for Astrophysics Research Director, Dr. Selma E. de Mink, on Stellar progenitors of gravitational wave sources

CERN-GWSC Gravitational-Wave meeting
A monthly science meeting attended by UniGE Astro/DPT/DPNC and CERN researchers related to GWs, where we exchange ideas related to ongoing local research projects and recent developments in the field.

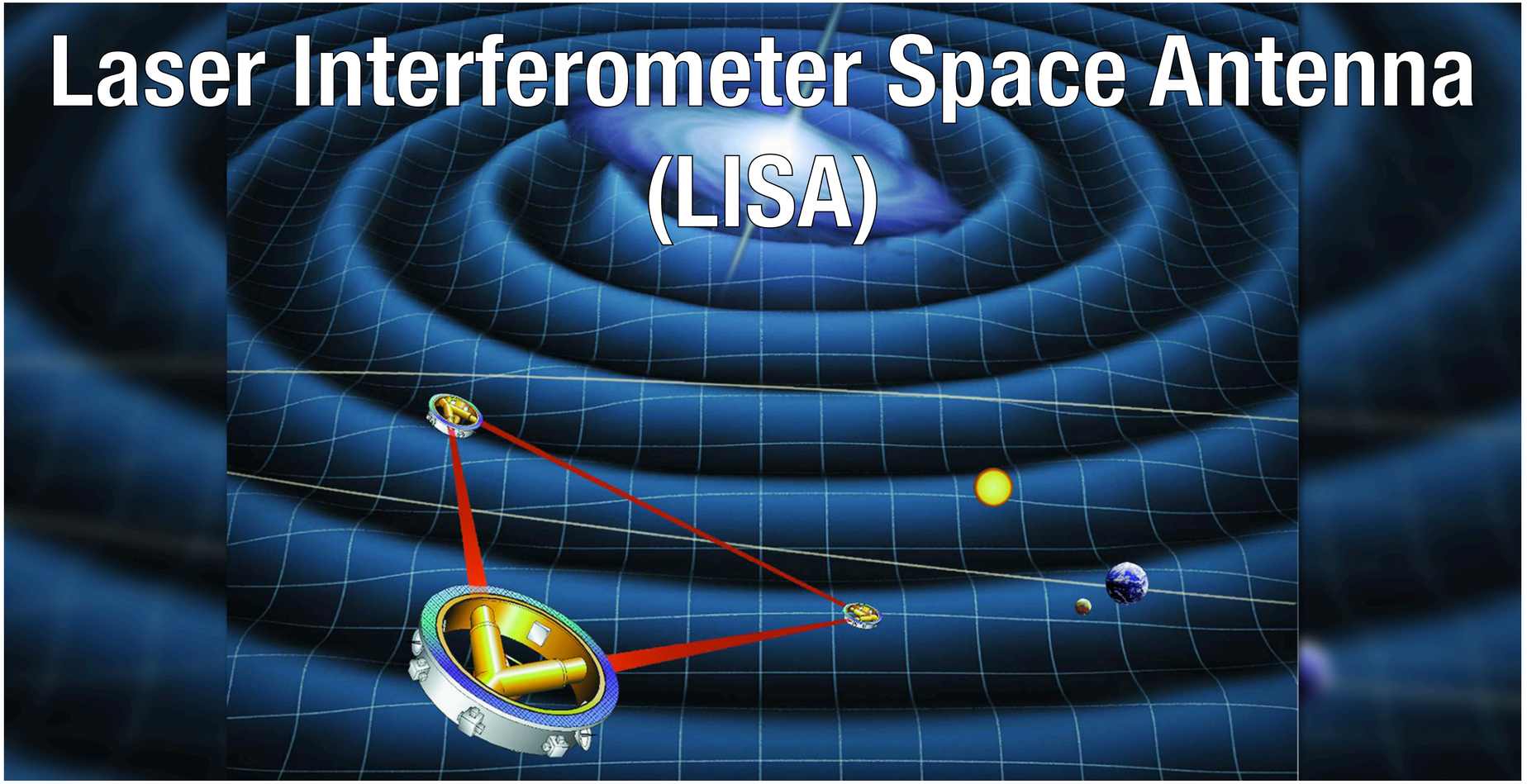
Projects

- **4 SNSF Projects and 1 ERC** related to GWs awarded to GWSC Executive Board Members
- European I**NFRA-DEV project** (co-funded by SERI) on the Einstein Telescope Preparatory Phase (Swiss PI: Fragkos)
- 1 **Boninchi Foundation** Research grant (PI: Riotto)

Pending Proposals

- **SNSF Sinergia Grant** on GWs and Machine learning (PI: Fragkos, Co-Is: Maggiore, Mayer, Hofmann)
- **2 Proposals to the Boninchi Foundation** (PIs: Schramm, Fragkos, Maggiore, Meynet) - **to be co-financed by Dept. Astro. And DPNC.**

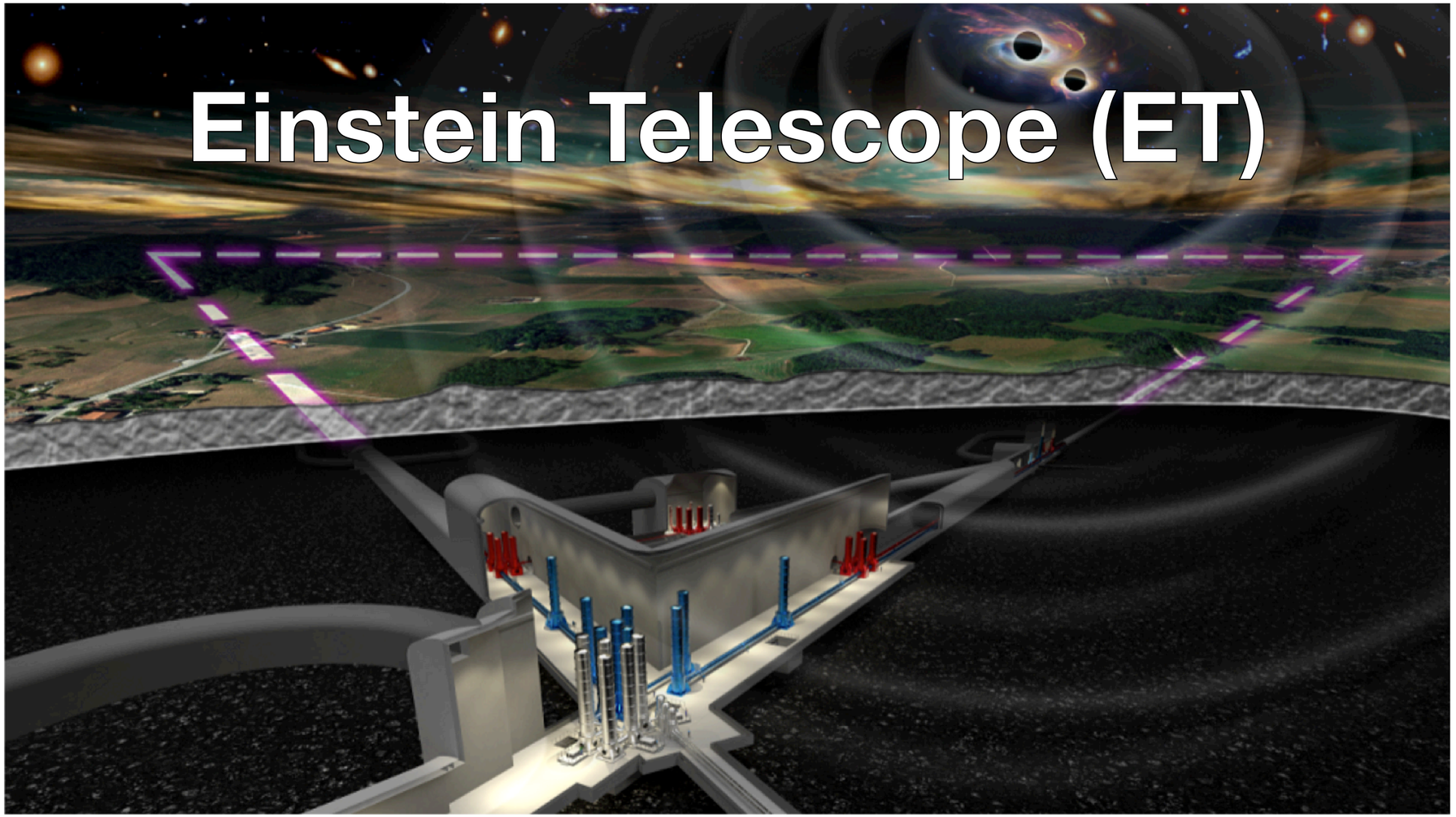
Laser Interferometer Space Antenna (LISA)



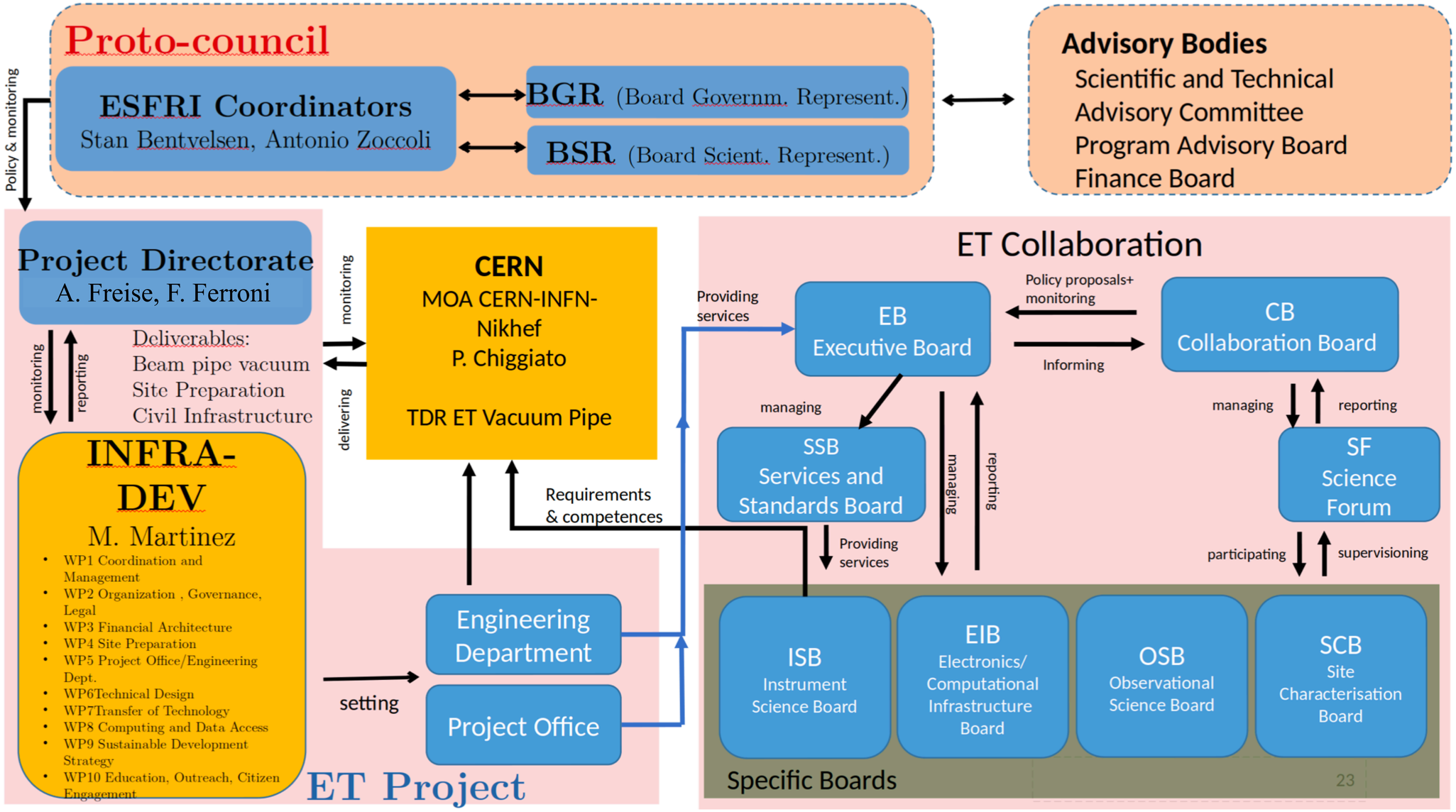
Consortium members: Caprini, Fragkos, Foffa, Maggiore, Paltani

Active in LISA Astrophysics Working Group & LISA Cosmology Working Group

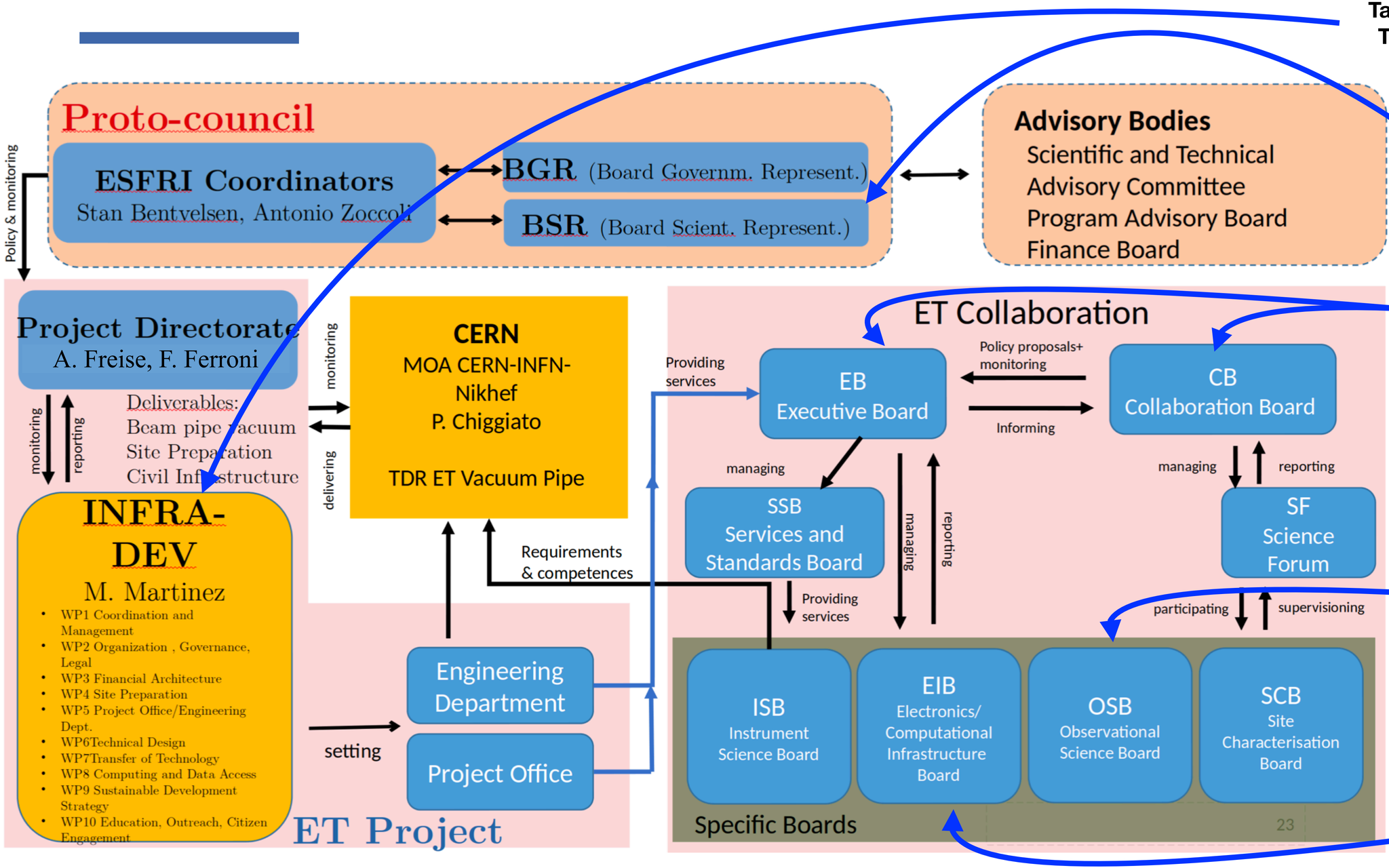
Einstein Telescope (ET)



The organigram of the Einstein Telescope



The organigram of the Einstein Telescope



National Contact: Anastasios Fragkos
Task Leader: Anastasios Fragkos
Task Leader: Michele Maggiore
Steven Schramm
Stefano Foffa

Scientific Representative: Anastasios Fragkos

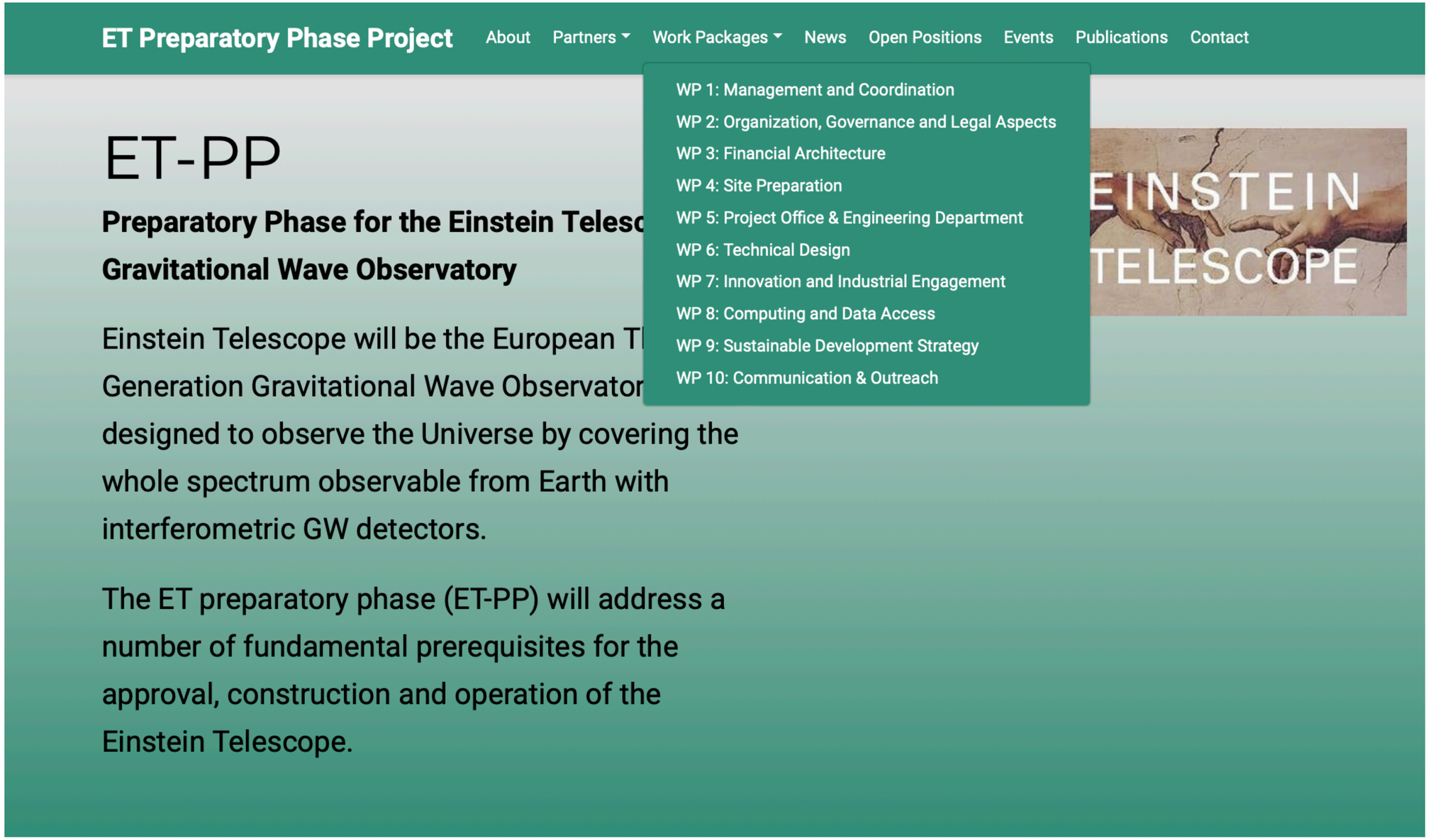
Michele Maggiore

Board Chair: Michele Maggiore
Division chair: Antonio Riotto
Anastasios Fragkos
Steven Schramm
Stefano Foffa
Georges Meynet

Division Chair: Steven Schramm
Anastasios Fragkos

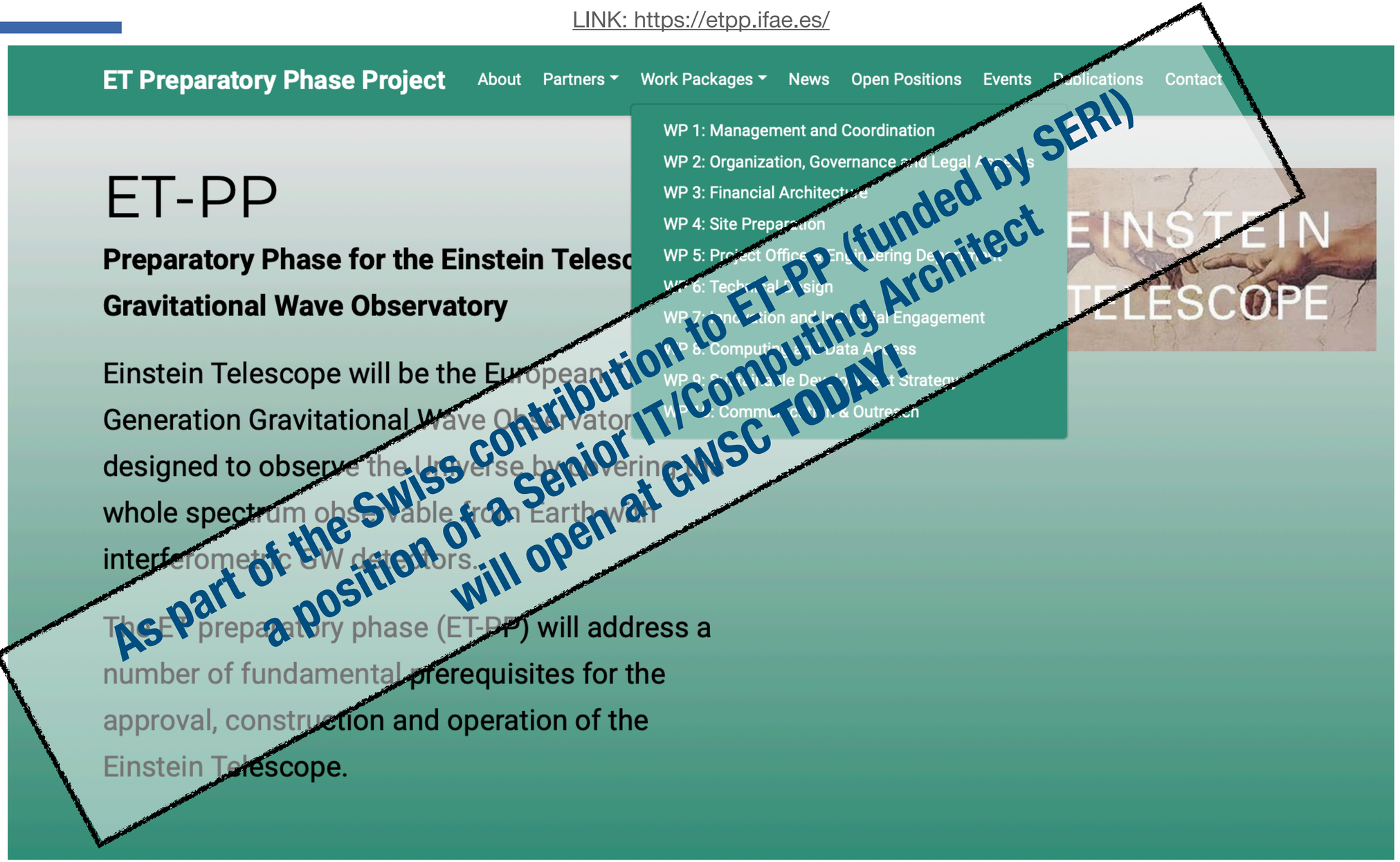
Einstein Telescope Preparatory Phase (ET-PP) INFRA-DEV Project

LINK: https://etpp.ifae.es/



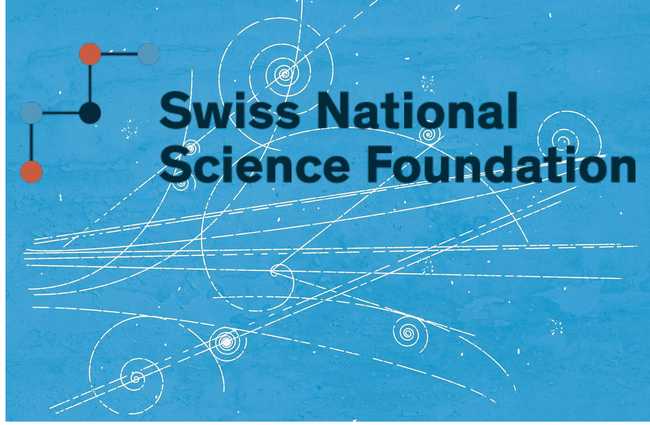
Einstein Telescope Preparatory Phase (ET-PP) INFRA-DEV Project

LINK: https://etpp.ifae.es/



As part of the Swiss contribution to ET-PP (funded by SERI) a position of a Senior IT/Computing Architect will open at GWSC TODAY!

Funding for **LA**rge international **RE**search projects
Planned FLARE project for Einstein Telescope



At UniGE, we plan to submit a proposal for a FLARE project related to Einstein Telescope (led by the Astronomy Department and in collaboration with the Particle Physics Department)

Period: initial project for 2023-2024, but long-term involvement envisioned.

Topic: Input/output optics systems components for the low-frequency interferometer, which will operate at a new laser frequency of 1550nm.

Competences required: Optical engineering, thermo-mechanical engineering, electronics.

Budget: TBD, for 2023-2024 significantly less than the budget requested to SERI for ET for the period 2025-2028 (~1M per year)