

# **News of the ET OBS Division 5**

## **Synergy with other GW observatories**

**M. Colpi, B.S. Sathyaprakash, N. Tamanini**

ET Symposium, Cagliari 10/05/2023

# Old division chairs

- ET OSB Div5 chairs up until end of 2022:
  - Nelson Christensen (Observ. Côte d'Azur)
  - Samaya Nissanke (GRAPPA / Univ. of Amsterdam)
  - Bangalore Sathyaprakash (Penn State)

# New division chairs

- ET OSB Div5 chairs since beginning 2023:

**Monica Colpi**  
(Univ. Milano  
Bicocca)



**Bangalore  
Sathyaprakash**  
(Penn State  
Univ.)



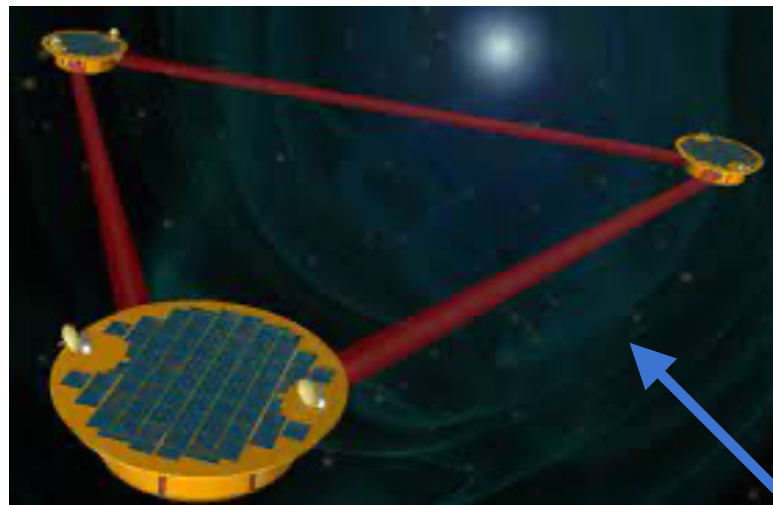
**Nicola  
Tamanini**  
(Laboratoire  
des 2 Infinis -  
Toulouse)



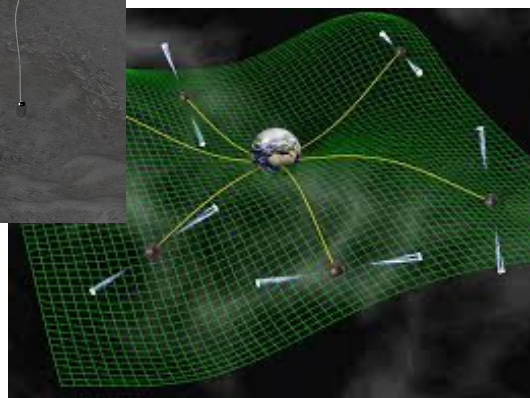
**Samaya  
Nissanke**  
(GRAPPA /  
Amsterdam)  
(on leave until  
end of 2023)



# Goals of the division

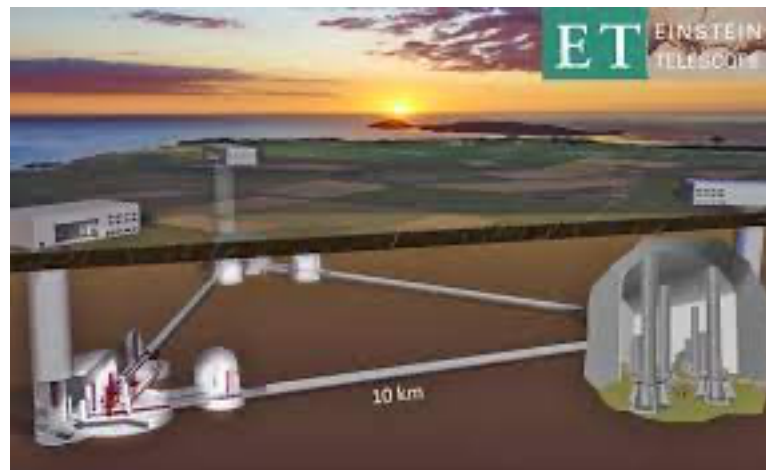


**LISA, Taiji, DECIGO, ...**

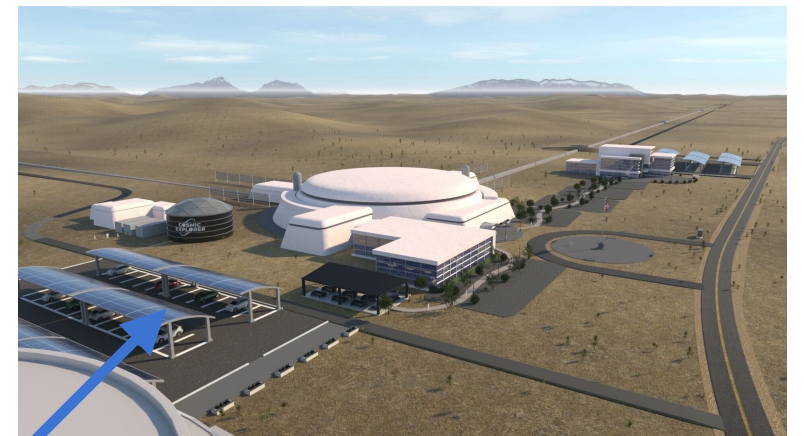


**LGWA, PTA, Atom Interferometry, ...**

**Connect ET  
science to all GW  
observatories**



**ET**



**Cosmic Explorer, NEMO, ...**

**?**



# Goals of the division

The **main questions / objectives** for the Div5 division are:

- How do joint observations with space-based interferometers increase the science reach of ET?
- What additional insights could ET provide by observing sources coincidentally with other detectors in the kHz band?
- What are the scientific and sociological challenges in bringing together data from a multitude of detectors?

# Current status

- Currently ~70 ET members signed-up to the Div5 mailing-list
- ET Div5 wiki:  
[https://wiki.et-gw.eu/OSB/GWSynergies/WebHome?validation\\_key=e7882d89bdo87b285fo17cccb53828eb](https://wiki.et-gw.eu/OSB/GWSynergies/WebHome?validation_key=e7882d89bdo87b285fo17cccb53828eb)



## OSB/GWSynergies

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## Welcome to the OSB/GWSynergies web

### Who are we?

The goal of this Division is to explore synergy of observing gravitational waves with Einstein Telescope and other ground-based detectors and space-based observatories. Other Divisions will explore the advantage of combining ET data with electromagnetic telescopes and particle detectors. We will consider the advantage of bringing together data from ET, Cosmic Explorer (CE) and Neutron-Star Extreme Matter Observatory (NEMO), space-based observatories such as the European Laser Interferometer Space Antenna (LISA) and the Chinese [TianQin](#) observatory, and the pulsar timing arrays, such as the Square Kilometer Array (SKA), European Pulsar Timing Array (EPTA), American [NanoGrav](#) and the Australian Parks Pulsar Timing Array (PPAT).

### Goals

The science objectives are naturally focused on those areas where ET can benefit from other observatories. Joint observations could improve sky localization of events, measure distances more accurately and increase the bandwidth over which individual sources are detected. The goal of this Division is to explore

# Organisation of the division

We can divide our investigations into three working packages as follows:

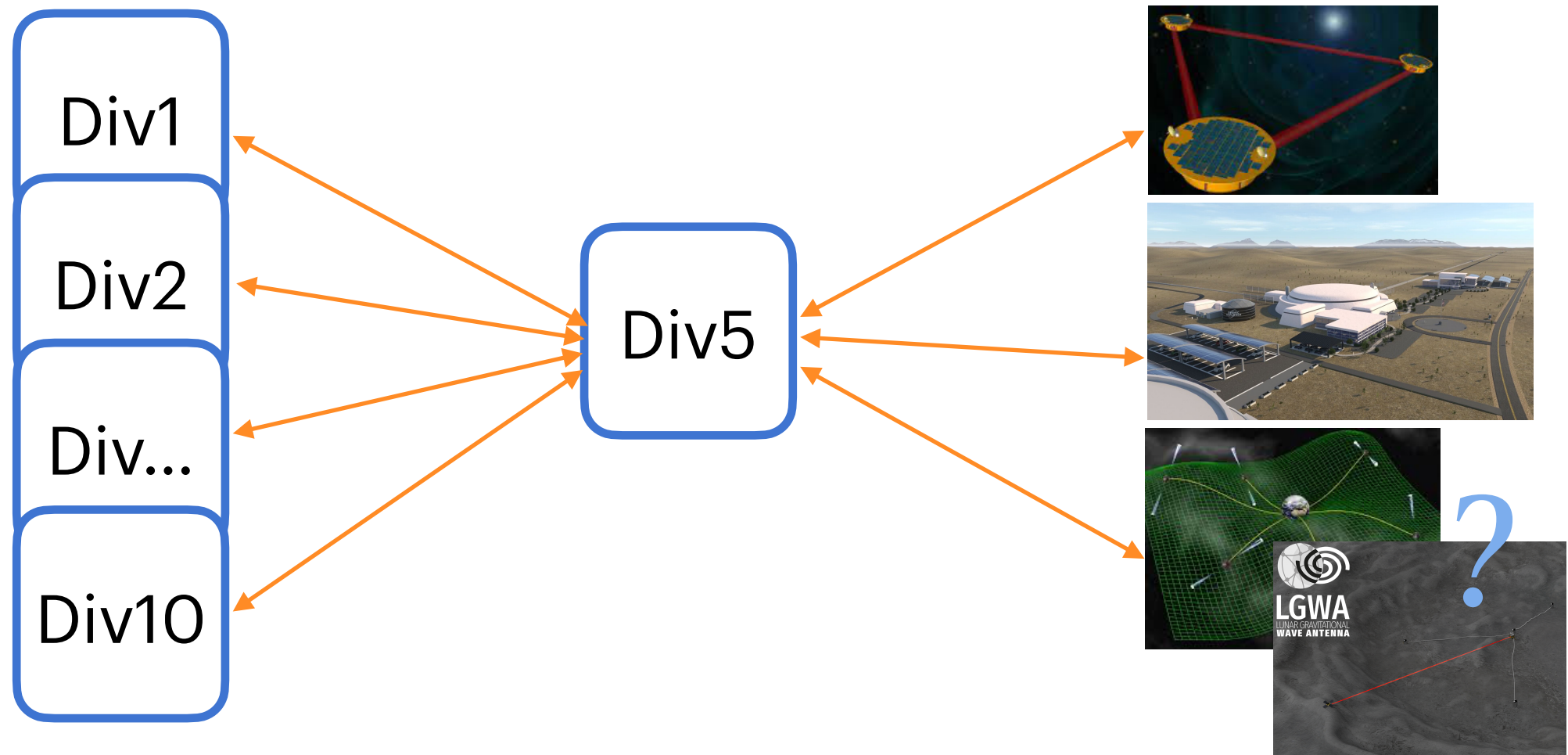
- **WP5.1:** Synergy with other Earth-based GW detectors (in particular Cosmic Explorer)
- **WP5.2:** Synergy with spaceborne GW detectors (in particular LISA)
- **WP5.3:** Synergy with other GW observatories (atom interferometry, Lunar detectors, PTA?, high-frequency detectors, ...)

Each WP should consider exploring synergies across all science case of ET, and in particular on the following important scientific topics:

- **Fundamental Physics**
- **Nuclear Physics** (QCD phase transitions, hot and cold EOS of neutron stars)
- **Hubble tension and cosmography**
- **Seed black holes and hierarchical mergers**
- **Early universe cosmology**

# Organisation of the division

- Monthly calls every last Tuesday of the month at 3pm CEST
- Div5 is naturally connected to all other divisions and explores how the science of ET can be strengthened by other observatories
- Planning to regularly invite speakers from other ET OSB divisions to identify scientific topics of particular interest to highlight synergy with other GW observatories





# Looking ahead

- **Blue Book**
  - Div5 section structured according to WPs
  - Promoting targeted investigations (jointly with other divisions)
  - Setting up joint investigations with other GW collaborations (CE, LISA, PTA?, other?)

# Looking ahead

**We need science experts on numerous topics!**

**Please help us explore how the science of ET can be strengthened by other observatories!**

