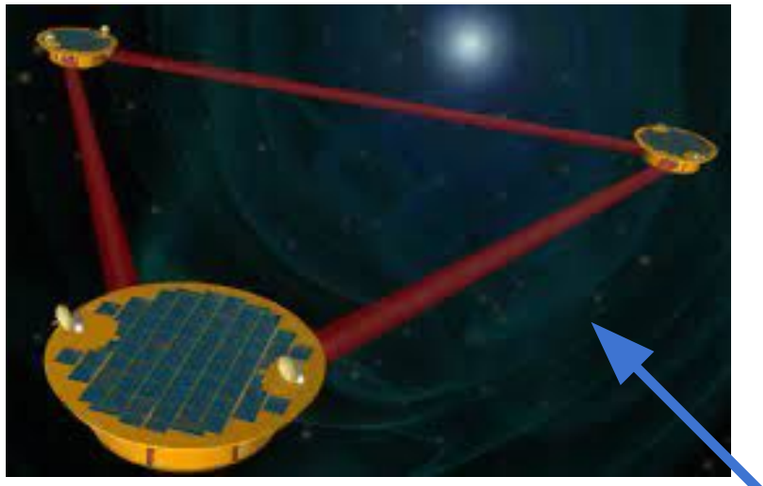
Update on the ET OBS Division 5

Synergy with other GW observatories

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

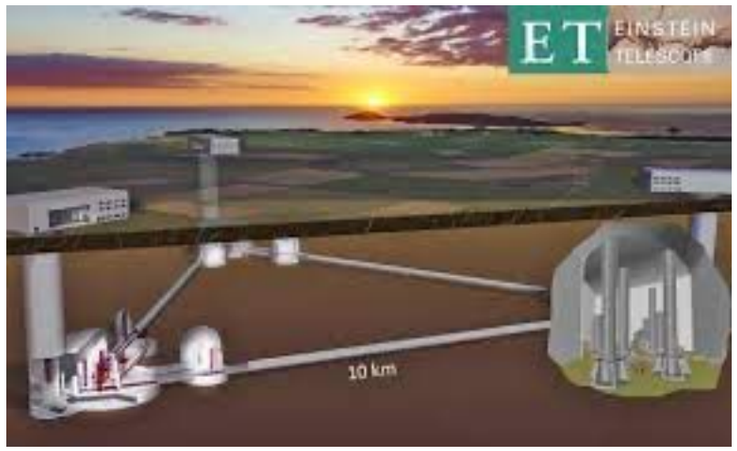
ET France Meeting, 10/10/2024

Goals of the division



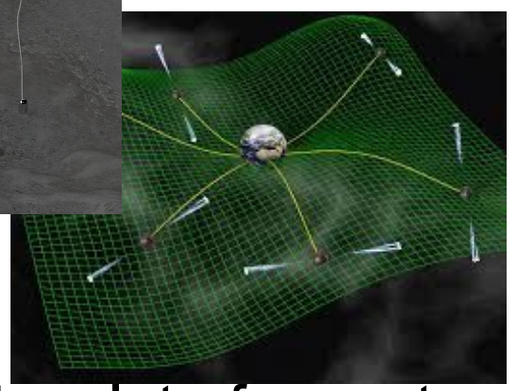
LISA, Taiji, DECIGO, …

Connect ET science to all GW observatories



ET

Cosmic Explorer, NEMO, …



LGWA, PTA, Atom Interferometry, …

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Goals of the division

The main questions / objectives for the Div5 division are:

- How to 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?

Organisation of the division

- Currently ~80 ET members signed-up to the Div5 mailing-list
- ET Div5 wiki: https://wiki.et-gw.eu/OSB/GWSynergies/WebHome?validation_key=e7882d89bd087b285f017cccb53828eb
- Monthly telecons (on pause right now)
  - Regular invitations to other divisions to discuss synergies
- Current activities focused on writing the Blue Book

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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

- The goal of the GW Synergies division is:
  - 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 audio band?
  - What are the scientific and sociological challenges in bringing together data from a multitude of detectors?

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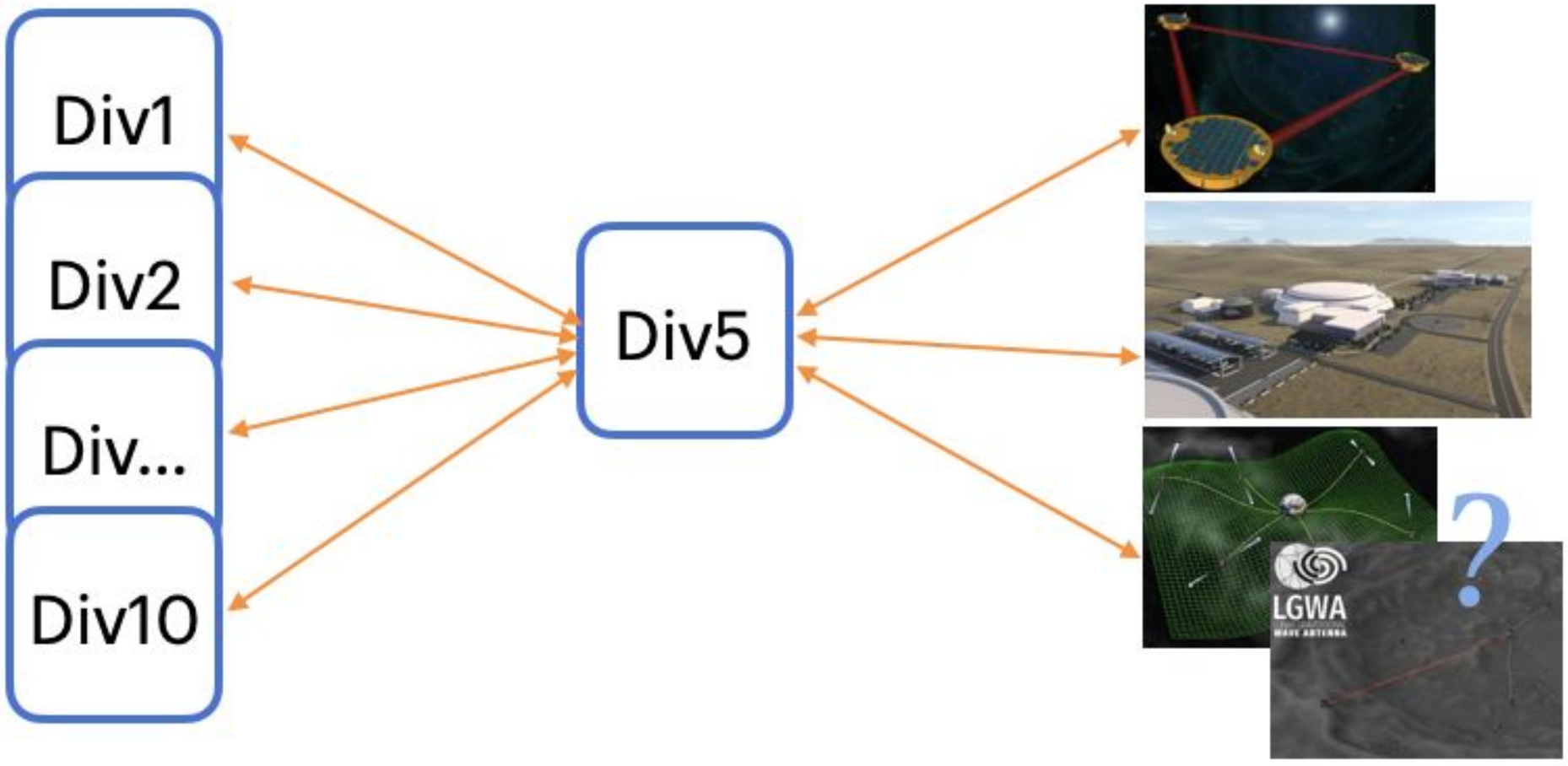

Status of the Blue Book

Outline of OSB Div 5 Chapter

Contents

Currently 39 pages long

6 main sections with assigned coordinators and contributors

Effort in keeping the sections homogeneous:

- One take home message
- Few main questions
- Similar length (aim for 4-5 pages each)

Status of the Blue Book

Outline of OSB Div 5 Chapter

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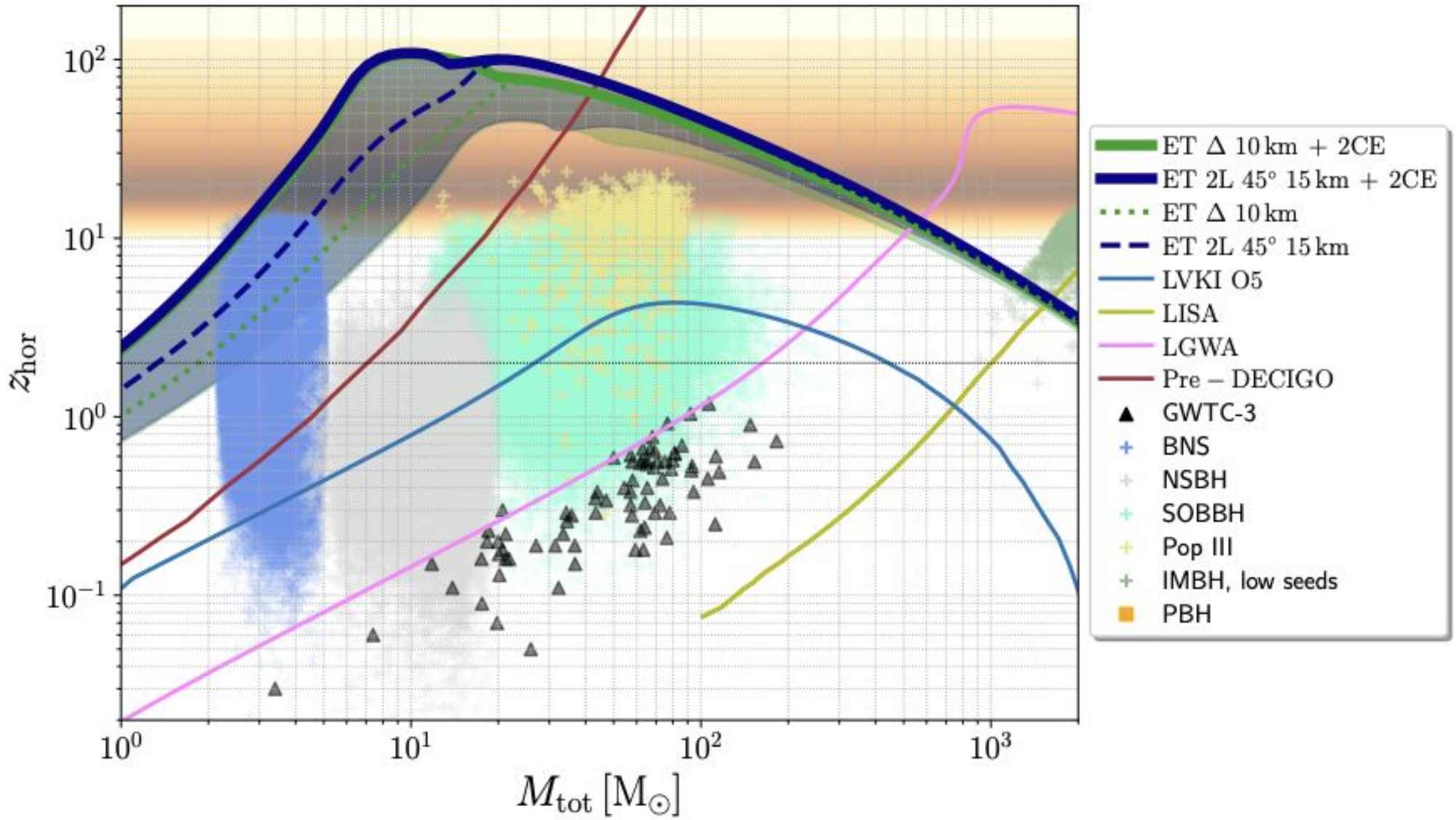
Timeline:

We are late!

- First draft by end of October
- Review by end of November

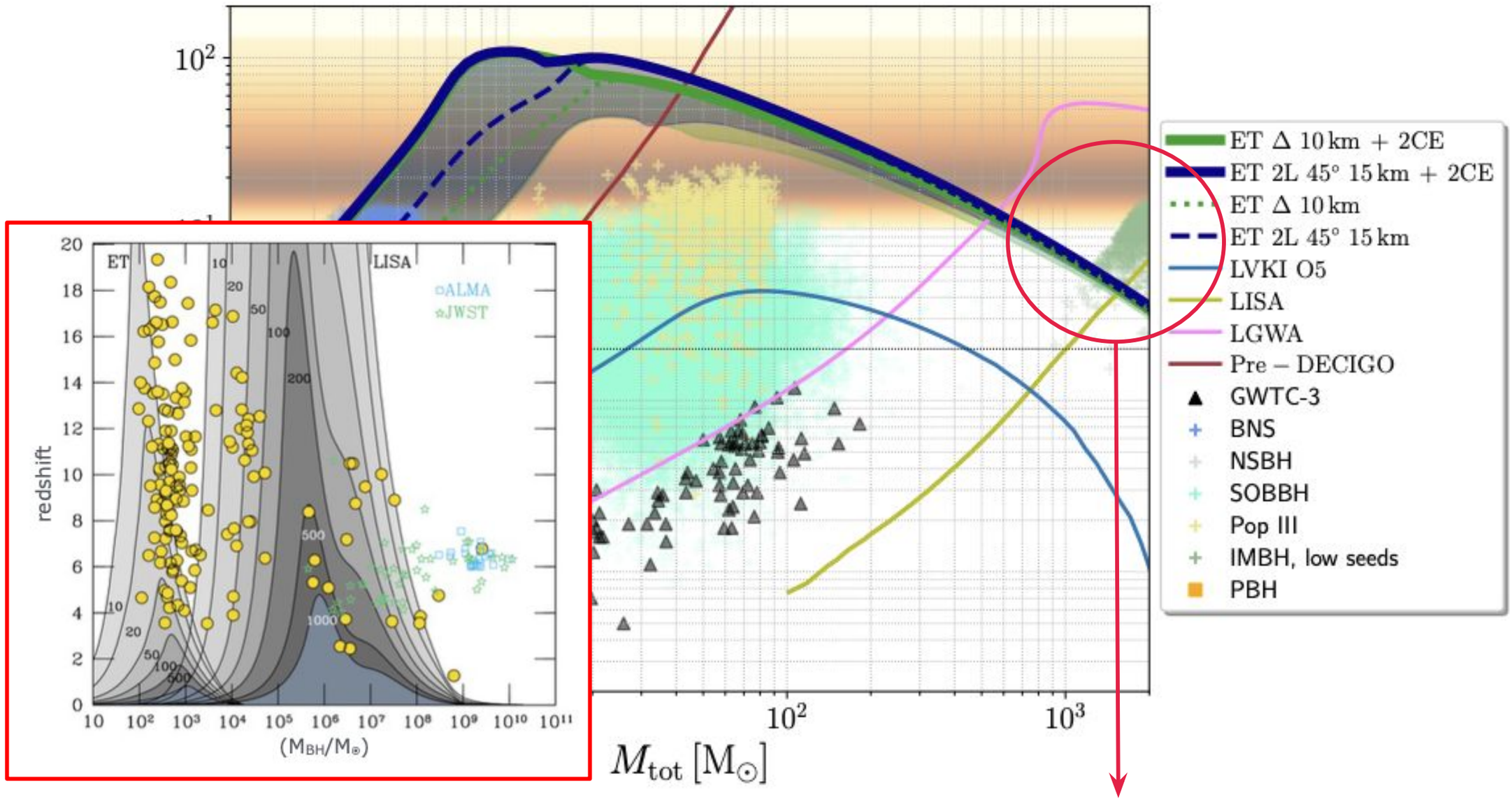
Highlights from the Blue Book

OSB Div 5 Chapter



Highlights from the Blue Book

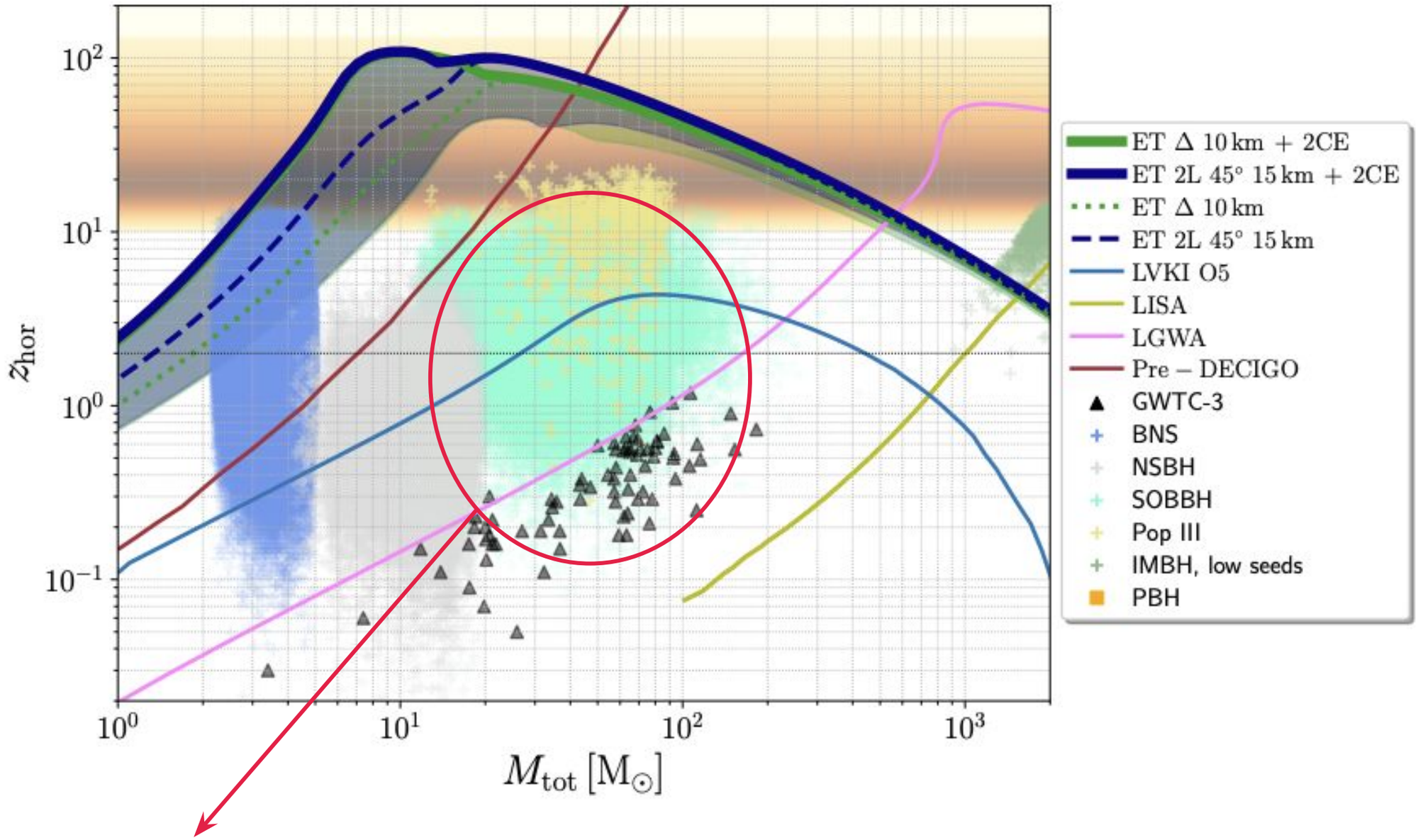
OSB Div 5 Chapter



IMBH at high-z have strong synergies with LISA, DECIGO, LGWA

Highlights from the Blue Book

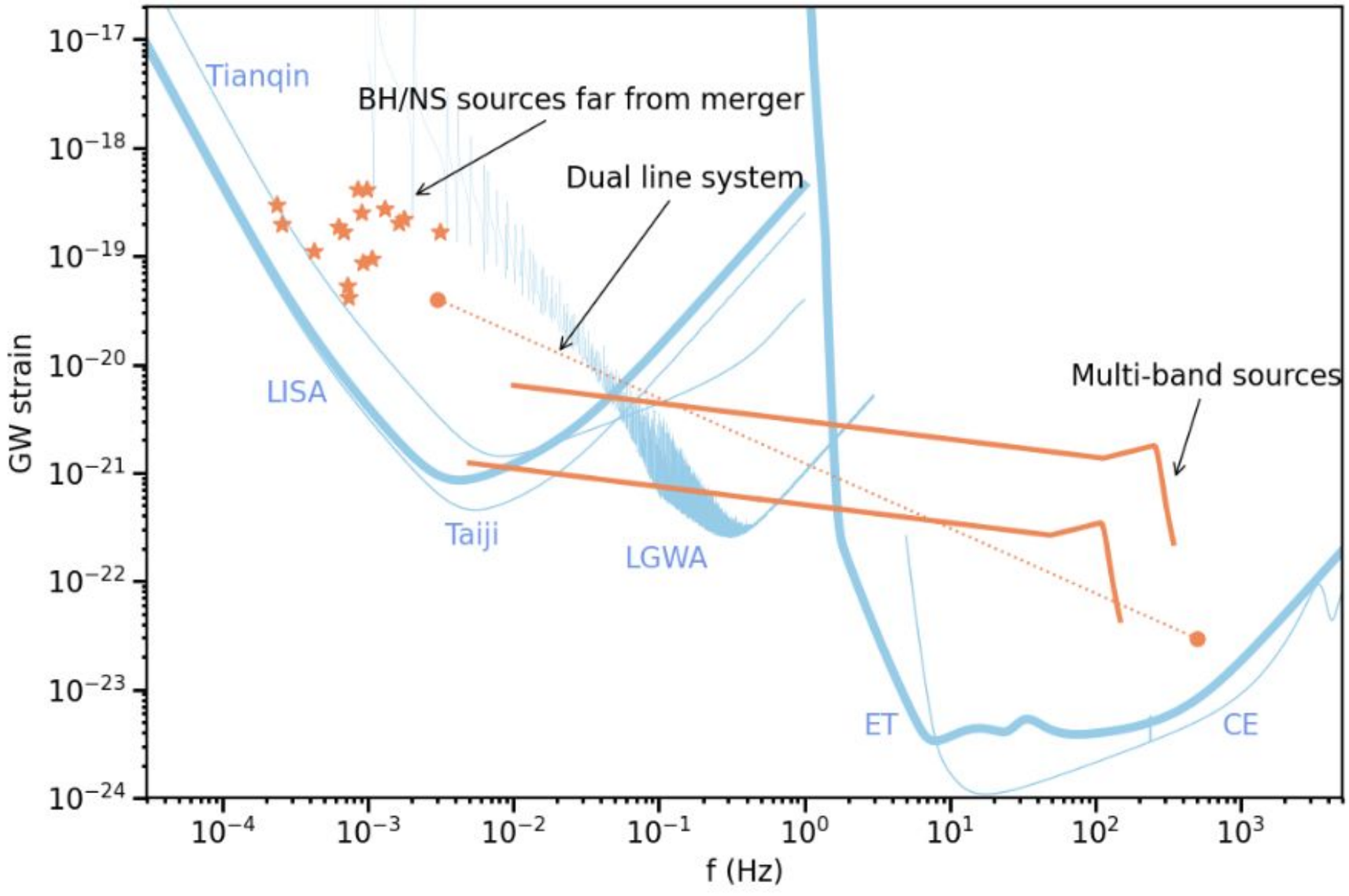
OSB Div 5 Chapter



Stellar-mass BBHs synergies with LGWA, DECIGO, LISA, …

Highlights from the Blue Book

OSB Div 5 Chapter

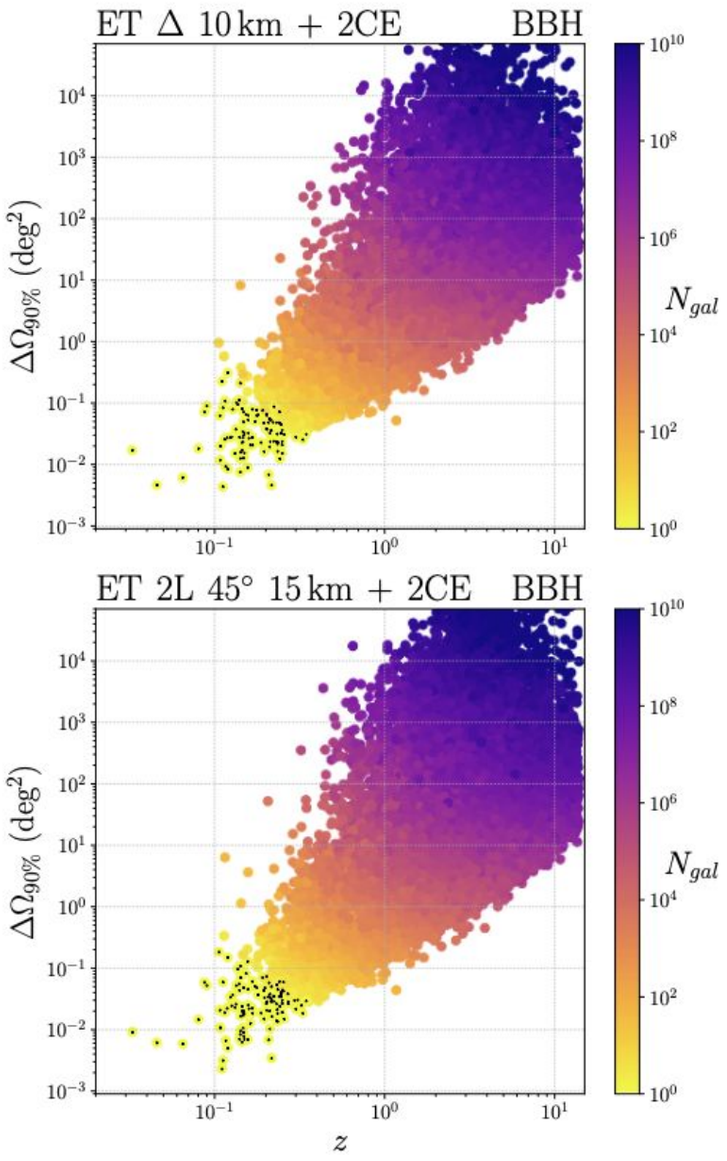


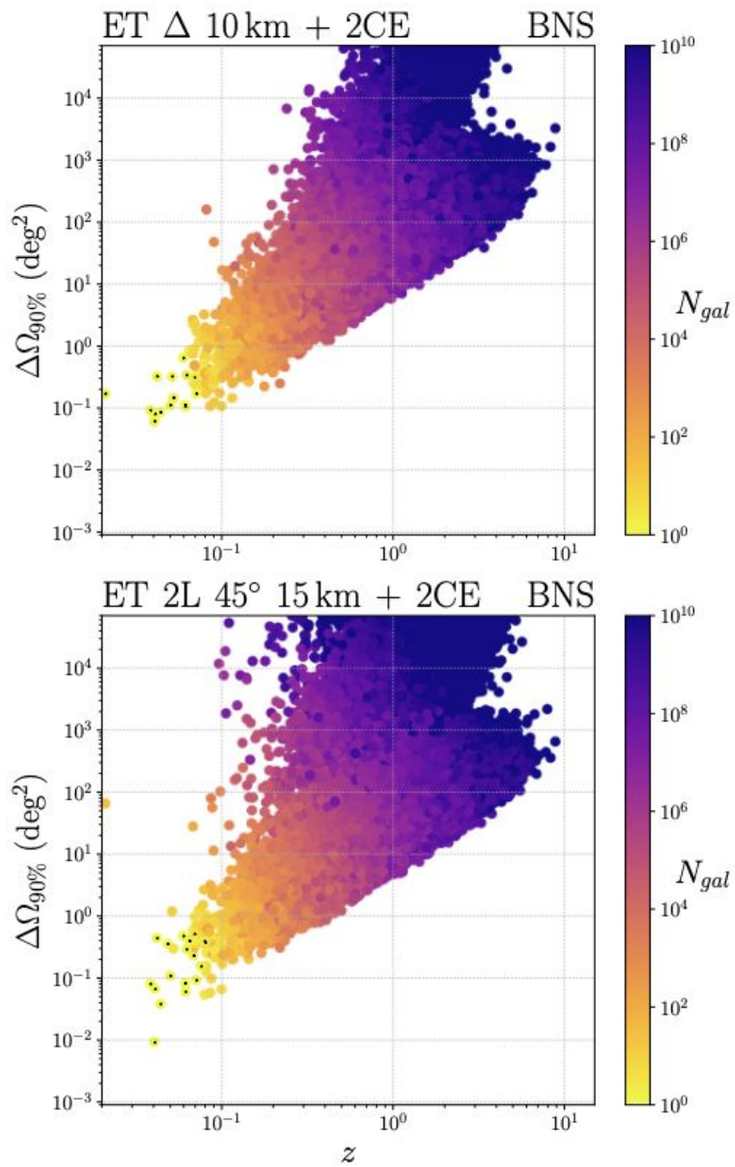
Stellar-mass BBHs synergies with LGWA, DECIGO, LISA, …

Highlights from the Blue Book

OSB Div 5 Chapter

BBHs



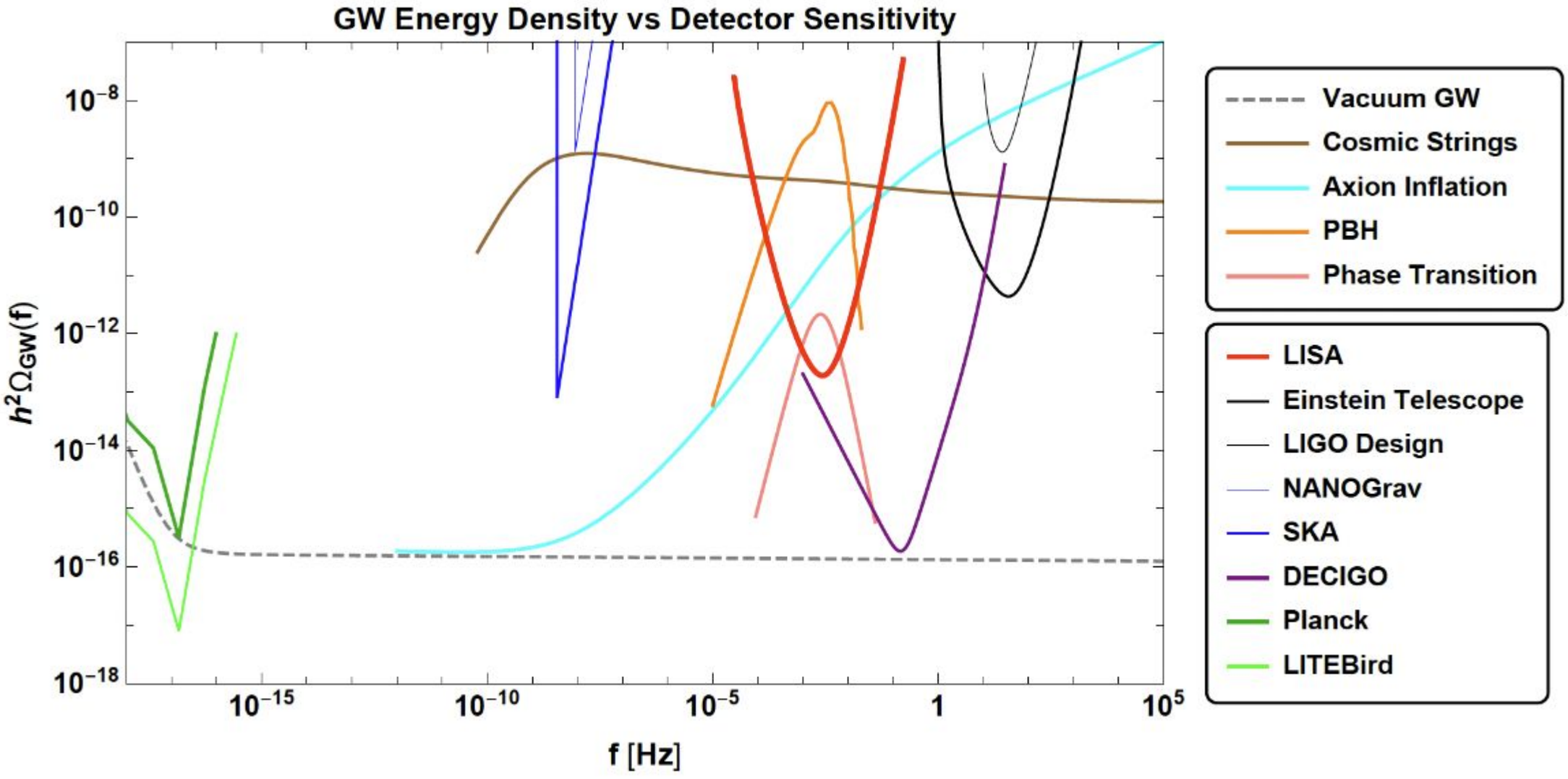


BNSs

Synergy with CE essential for sky-localisation (cosmology, …)

Highlights from the Blue Book

OSB Div 5 Chapter



Strong multi-band synergies for SGWB searches (early universe)

Summary

- Goal of the division is exploring synergies with other GW observatories
- Science strongly interconnected with other OSB divisions
- Current effort focused on the Blue Book

MERCI!