

Einstein Telescope OSB

Div 2: Cosmology

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2nd ET Annual Meeting @ Orsay: 14 Nov 2023

Cosmology with ET

- **Probe Early Universe Physics**
- **Cosmography, Dark Matter and Dark Energy**
- **GW synergy with other cosmological probes**

Division webpage:

<https://wiki.et-gw.eu/OSB/Cosmology/WebHome>

Div 2 Telecons

- Division-wide telecons (~ 40 attendees)

Settling on a monthly rhythm: typically third Wed of every month

- Presentations on a range of topics (listed on next slides)
- *Encourage presentations by early career scientists!*

Div 2 Telecons

- Vuk Mandic (SGWB and the Snowmass process)
- Giulio Scelfo (Cross-correlation of GWs in cosmology)
- Michele Mancarella (Dark standard sirens with 3G detectors)
- Sumit Kumar (Probing Baryon Acoustic Oscillation peak with GWs)
- Alex Jenkins (Dark Matter microphysics from GW event rates)
- Simone Mastrogiovanni (Cosmic dipole with ET and CE)
- Lorenzo Valbusa Dall'Armi (Circular polarization of astrophysical SGWB)
- Michalis Agathos (SGWB from SNe in massive scalar-tensor gravity)
- Matteo Califano (Λ CDM and dark energy forecasts for ET)
- Konstantin Leyde & Grégoire Pierra (importance of population models for cosmology inference)
- Kamiel Janssens (correlated magnetic noise)
- Danny Laghi (Dark siren cosmology with BBH in 3G)

Div 2 Telecons

- Giorgio Mentasti: Anisotropic search with ET and ground-based detectors
- Riccardo Sturani: Cosmology plans from the Brazil "BETS" research unit
- Juan García-Bellido: Cosmic acceleration from first principles: SMBH growth
- Sofia Canevarolo: Lensing bias on cosmological parameters from bright standard sirens

XIII ET Symposium @ Cagliari

- Charles Badger: Probing Early Universe Supercooled Phase Transitions with GW Data
- Debika Chowdhury: Response of the Einstein Telescope to Doppler anisotropies
- Simone Mastrogiovanni: Detection and estimation of the cosmic dipole with next generation GW detectors
- Nicola Borghi: Cosmology and astrophysics with dark sirens and galaxy catalogs
- Matteo Califano: Forecasts for Λ CDM and Dark Energy models through ET mock data

Div 2 Papers

We received ~ 40 papers focused on cosmology

Just in the last months...

- Paolo Marcoccia+ “Probing primordial black holes at high redshift with future gravitational wave detectors”
- Giulia Capurri+ “Astrophysical and Cosmological Relevance of the High-Frequency Features in the Stochastic Gravitational-Wave Background”
- Sofia Canevarolo+ “Lensing bias on cosmological parameters from bright standard sirens”

Full list on the WIKI of Div 2: [link](#) (please alert us about missing entries)

ET Blue Book

Section 1: Overview of ET cosmology and introduction to following sections

Section 2: Probing early universe

Section 3: Sensitivity to GW background

Section 4: Cosmography and late universe

Section 5: Cross-correlations with ET

ET Blue Book

Section 2: Probing early universe

- Topological defects: cosmic strings and domain walls
[D. Steer, S. Blasi]
- Phase transitions: sound waves, bubble collisions, turbulence
[A. Mariotti, C. Badger]
- Parity violation

ET Blue Book

Section 3: Sensitivity to GW background

- Power-law sensitivity
- Angular sensitivity
- Source separation

[M. Pieroni, L. Valbusa Dall'Armi]

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Section 4: Cosmography

[M. Mancarella, S. Mastrogiovanni, R. Sturani]

- LSS connection

[M. Moresco]

- Modified gravity and GW propagation

[M. Maggiore, E. A. Romano]

- Dark matter and primordial black holes

[A. Romero-Rodriguez and O. Pujolas]

- DE connection

ET Blue Book

Section 5: Cross-correlation

- Cross-correlation of resolved events
- Cross-correlation of SGWB
- Cross-correlation of GW with CMB

[G. Scelfo, G. Perna, ...]

ET Blue Book

- Link to Overleaf:

<https://www.overleaf.com/3671992634mdjpmnvjppbv#f3d3d2>

Still interested in joining and contributing?

Please get in touch!

Division wikipage: <https://wiki.et-gw.eu/OSB/Cosmology/WebHome>

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