

Journée des nouveaux entrants du Pôle Théorie

Group: **GRAVITATION & COSMOLOGY**

March 26, 2025

IJCLab

GRAVITATION & COSMOLOGY

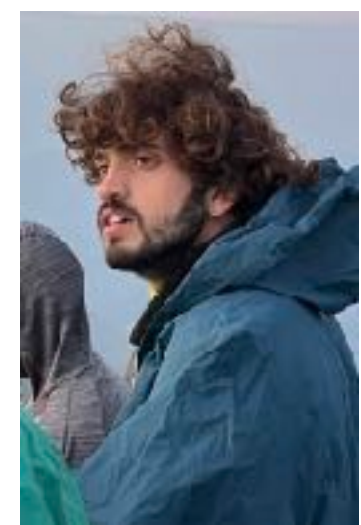
Members of the group

Permanent members: Eugeny Babichev (DR), Christos Charmousis (DR, chef), Karim Noui (PR), Bartjan van Tent (MC)



Postdoc: Jacopo Mazza

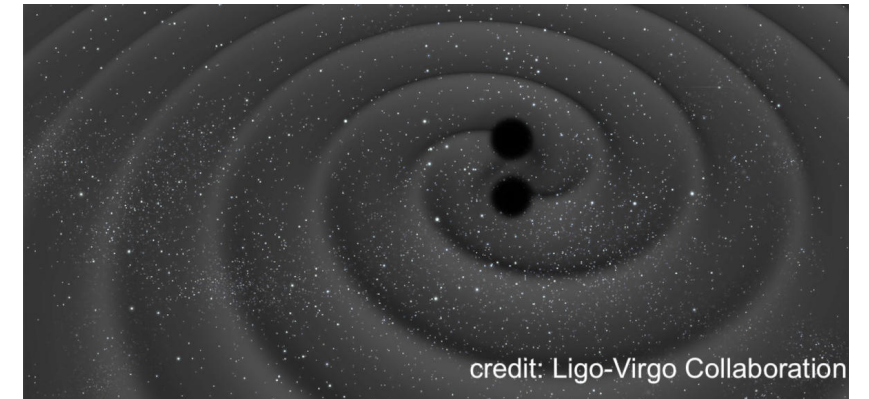
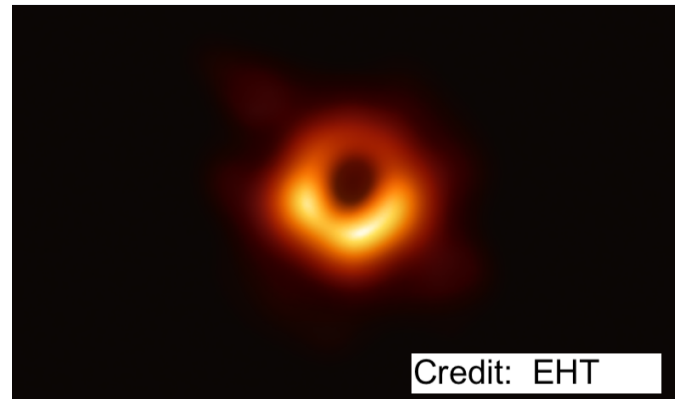
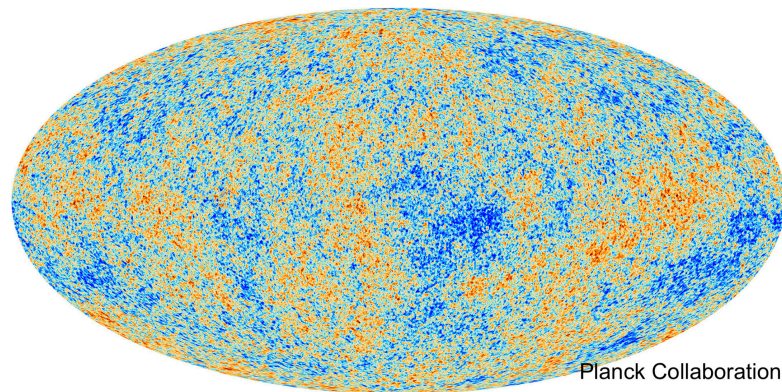
PhD Students: Hugo Candan, Michele Citran, Simon Iteanu



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Research topics

General Relativity and Beyond: Cosmology & Compact Objects



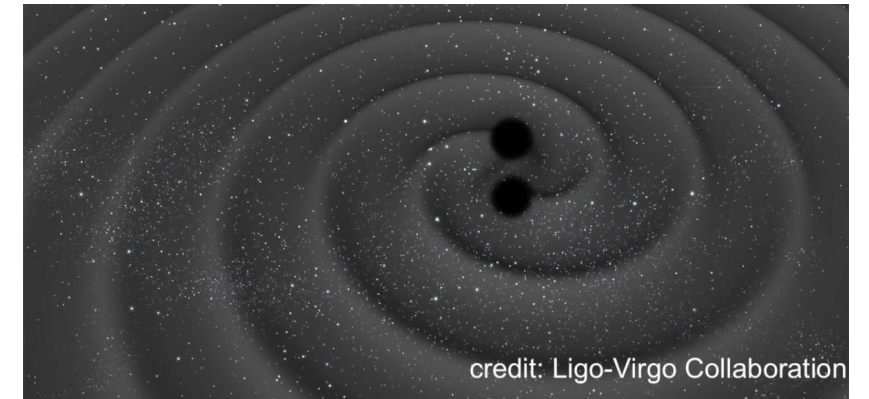
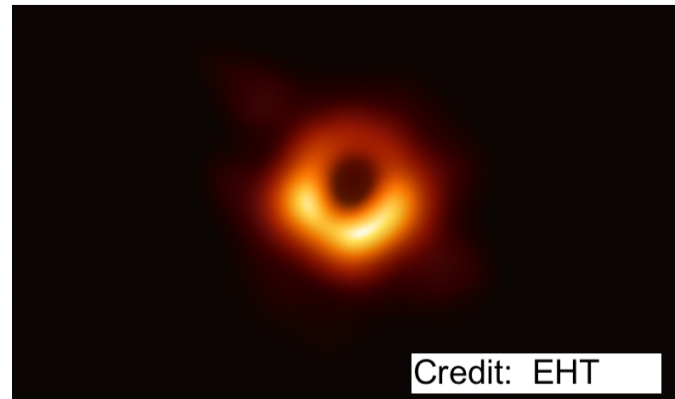
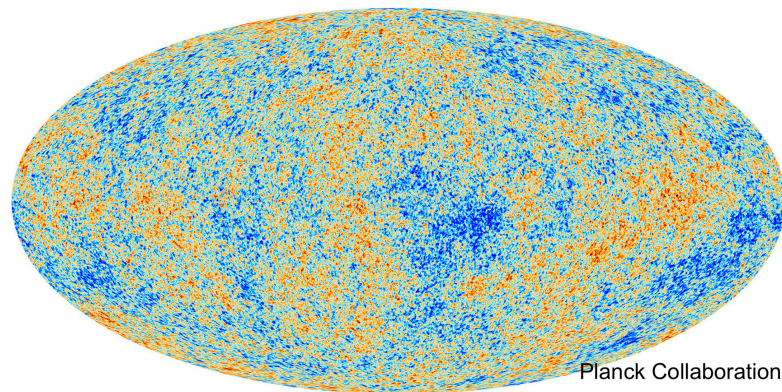
We try to address fundamental questions:

- Primordial cosmology: Research on B-modes? Relation to Large Scale Structures? Primordial Black Holes?
- Dark Matter: production, properties, signatures
- Dark Energy and cosmological constant problem: relation to modified gravity?
- Exotic compact objects? Signs in gravitational wave signals?

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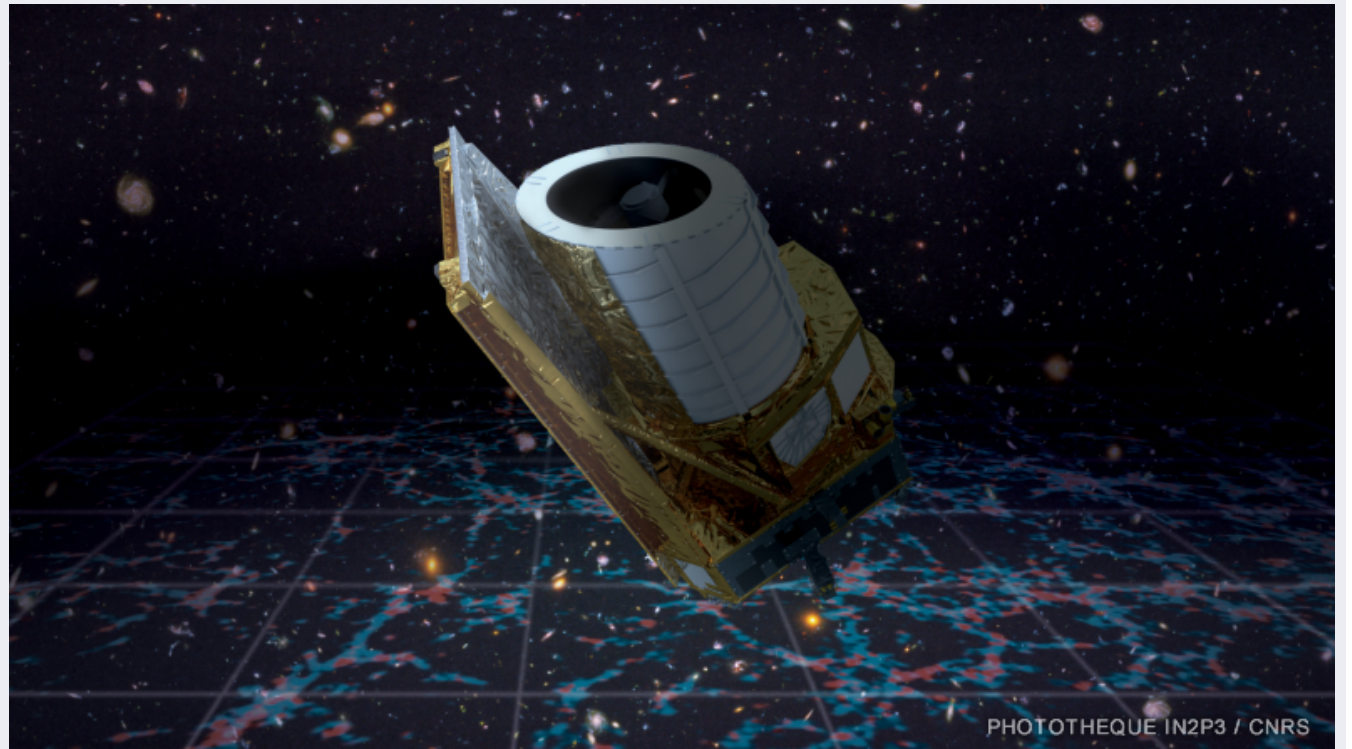
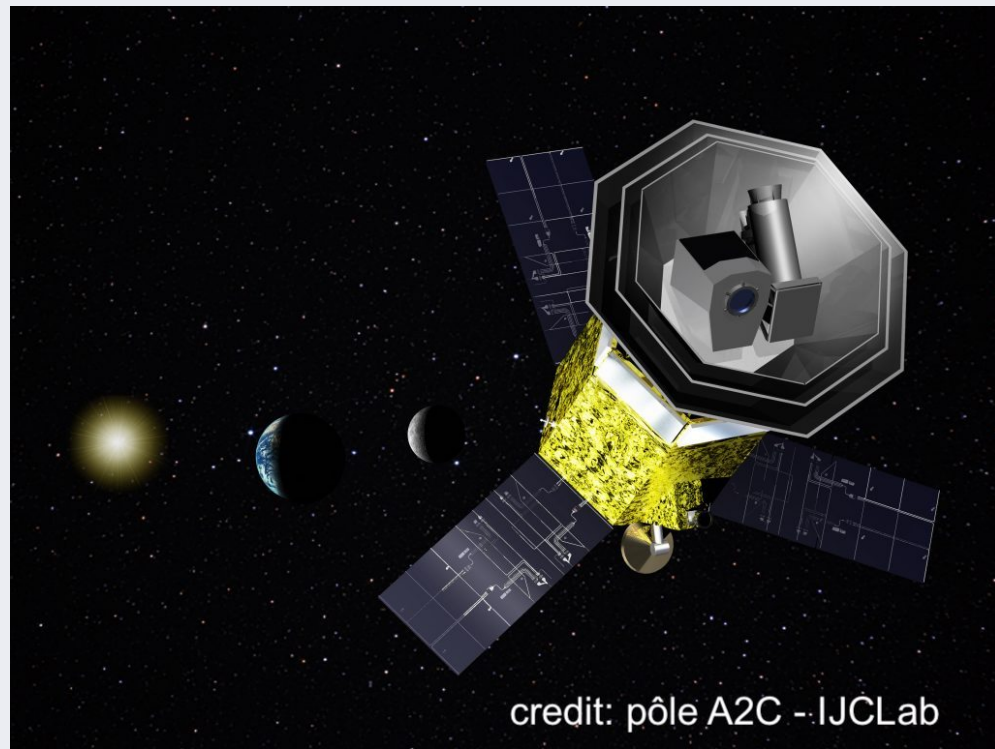
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Close relation to
research in particle
physics group

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Relation to observations in the near future



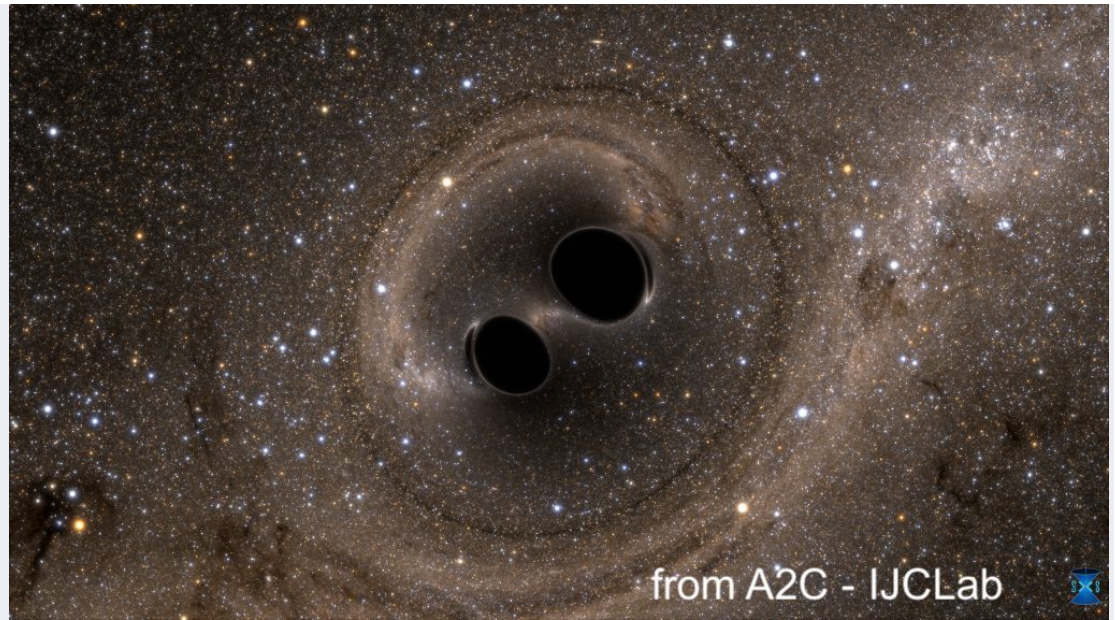
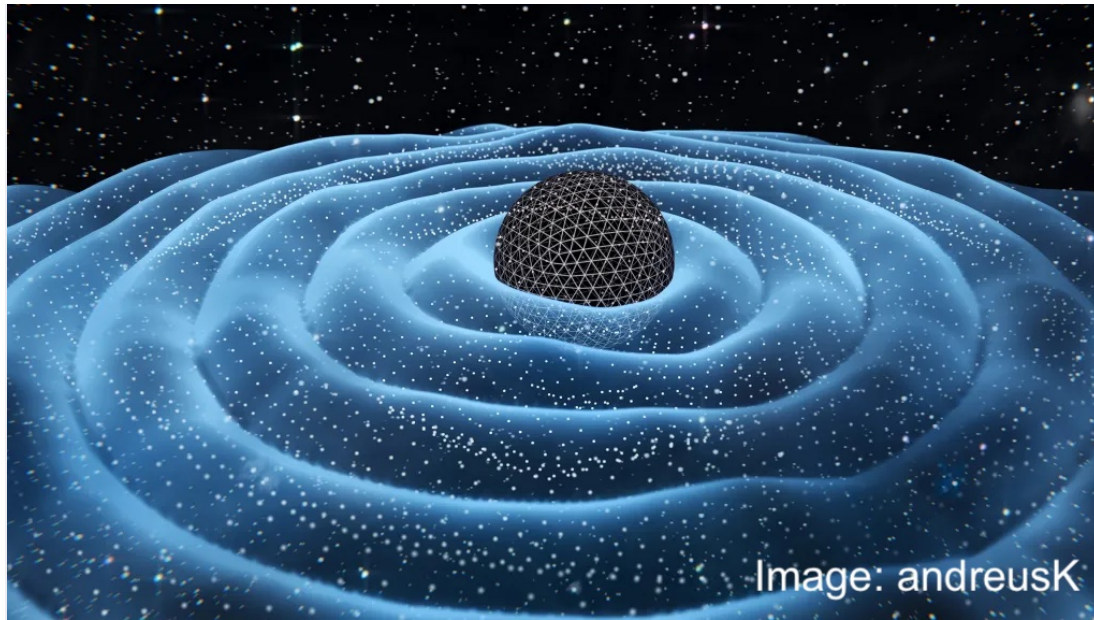
Cosmology:

LiteBIRD, Euclid and LSST-Vera Rubin in the line of sight

- Tensor fluctuations and B-modes in the CMB
- Relate primordial non-Gaussianity to the non-Gaussianity in the LSS
- Link between Primordial Black Holes, dark matter and leptogenesis
- Equation of State of dark energy: is it a cosmological constant?

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Relation to observations in the near future



Compact Objects and Gravitational Waves:

Pulsar timing array experiment (including NANOGrav),
New generation of GW interferometers (Einstein-Telescope)

- Testing Gravity with alternative theories
- Signatures of Dark matter models
- Classifying/Understanding (rotating) new compact objects - Images
- Compute Gravitational Wave Forms and confront to observations

GRAVITATION & COSMOLOGY

A well-recognized, active and interactive group

Large National and International Collaborations

- PI of two ANR Projects : StronG with the LUTh in Meudon and COSQUA
- Board of the GdR Gravitational Waves
- Members of Large collaborations : LiteBird, ET

The future

- Hiring : Poct-Docs (DIM Origine) and permanent researchers (section 02 CNRS)
- IN2P3 Master Project on “Compact Objects” (with APC theorists)
- Increase links with A2C division (Cosmology and Gravitational Waves)