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CENTRO DE I&D EM MATEMÁTICA E APLICAÇÕES  
CENTER FOR R&D IN MATHEMATICS AND  
APPLICATIONS

# Gravitational Geometry and Dynamics Group Seminar

Wed. 17<sup>th</sup> May '23 On Campus at 11h00

## Prospects for multi- probe cosmology as gravity and inflation probes

The next decade will see an overwhelming number of cosmological surveys coming online. The Square Kilometre Array Observatory (SKAO) will, among several other science cases, map the distribution of cold neutral Hydrogen in the Universe using its spin-flip transition emission line at rest of 21cm or 1.4GHz and a novel technique called Intensity Mapping (IM). The ESA lead space mission Euclid will detect millions of galaxies in the optical and near-infrared. Both experiments will map large volumes of the cosmos with significant footprint overlap in different parts of the spectrum. On these scales, signatures of local primordial non-Gaussianity (PNG) and horizon-scale General Relativistic (GR) effects can be found in the power spectrum. However, cosmic variance limits their detection but combining different surveys allows us to beat down cosmic variance. This multi-tracer (MT) technique can in fact can be a game changer on linear scales, but many other systematic effects may mimic primordial non-Gaussianity. We will start by reviewing the effect of primordial non-Gaussianity in the large-scale structure (LSS), and how general relativity affects the observed power spectrum. We will review the prospects of measuring PNG and in which scenarios one can attain an error smaller than unity. We will also show the need to include some of the GR effects as they mimic the PNG signal and would bias any such estimate. We will study how radio-optical synergies can be used in practice and which systematics need to be under control for future tentative measurements. We will finish by exploring further probes of the dark matter distribution such as Line IM and Gravitational waves merger events.

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**Zoom meeting ID 962 2413 8340**

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[https://videoconfcolibri.zoom.us/j/96224138340?](https://videoconfcolibri.zoom.us/j/96224138340?pwd=YkZUMGILb0dqVjcxOVpXMTFVMTBxQT09)

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*about us gravitation.web.ua.pt*

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