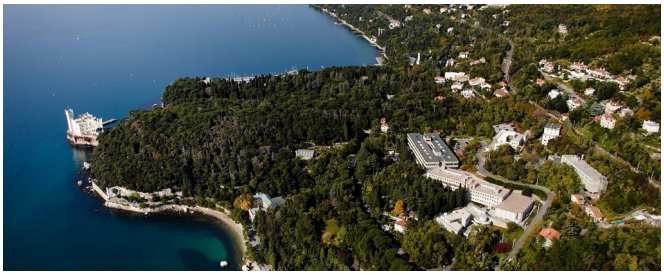

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Prospects for blind CMB B-Modes reconstruction in future experiments

Friday 1 September 2023 15:25 (25 minutes)

Cosmology is now entering into the era of high-sensitivity CMB polarization experiments, which will target the detection of primordial B-modes to definitively prove the cosmic inflation scenario. Such signal is predicted to be much lower than the polarized Galactic emission (foregrounds) in any region of the sky pointing to the need for effective component separation methods. Given our current limited knowledge of the polarized foregrounds, the blind Needlet-ILC (NILC) method has great relevance, since it does not assume any specific model for their emission. However, this algorithm cannot be straightforwardly applied to partial-sky CMB polarization data. Moreover, when tested on realistic simulations of future satellite experiments, the NILC CMB reconstruction is significantly contaminated by residual Galactic emission, which would bias the estimate of the tensor-to-scalar ratio. In this talk, after a brief introduction to the topic, I will show how NILC can be extended to partial-sky polarization observations of future ground-based CMB experiments, specifically addressing the major complications that such an extension yields. I will then present a new method, Multi-Clustering NILC (MC-NILC), which improves the foregrounds subtraction by performing NILC variance minimization in several different sky patches, identified with a fully blind approach and by taking into account the spatial variability of the spectral properties of the B-modes Galactic emission. The new pipeline has been validated on realistic simulations of the LiteBIRD satellite. We will show that MC-NILC allows to reach the sensitivity on the tensor-to-scalar ratio targeted by the experiment independently of the assumed Galactic model. The results presented in this talk can be found in arXiv:2208.12059 and arXiv:2212.04456.

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