Contribution ID : **178** Type : **Talk in parallel session**

Recovering BAO in a SKA intensity mapping survey

Wednesday, 1 September 2021 17:40 (15)

The radio-observatory Square Kilometre Array (SKA) will have great potential to map the large-scale structure of the Universe. HI Intensity Mapping is one of the main planned surveys, that will map neutral hydrogen (HI) using large angular pixels, but which will be able to reconstruct the three dimensional LSS of the Universe at very large scales ($0 < z < 6$). We study the clustering of HI intensity maps produced from simulations with a focus on baryonic acoustic oscillations (BAO) and the effects induced by telescope beam smoothing and foreground cleaning. We start by creating an HI catalogue based on the Semi-Analytic Galaxy Evolution (SAGE) model applied to the $z = 1.321$ snapshot of the UNIT simulations. With this catalogue we investigate the relation between model HI and the dark matter haloes and we also study the abundance of HI, predicted by this model. We then create synthetic HI intensity maps with a Nearest-Grid-Point approach. In order to simulate the telescope beam effect, a Gaussian smoothing is applied on the plane perpendicular to the line of sight. The effect of foreground removal methods is simulated by exponentially damping the largest wavelength Fourier modes on the radial direction. We study the anisotropic 2-point correlation function (2PCF) and how it is affected by the aforementioned observational effects. In order to better isolate the BAO signal, we study several 2PCF mu-wedges (with a restricted range of orientations) tailored to address the systematics effects and we compare them with different definitions of radial 2PCFs. Finally, we discuss our findings in the context of an SKA-like survey, finding a clear BAO signal in most of the estimators here proposed. Based on 2105.10454

Reference to paper (DOI or arXiv)

2105.10454

Your gender (free text)

Primary author(s) : Dr. ÁVILA , Santiago (IFT - UAM/CSIC); VOS GINÉS, Bernhard (Universidad Autónoma de Madrid); Dr. CUNNINGTON, Steven (School of Physics and Astronomy, Queen Mary University of London); Dr. STEVENS, Adam (International Centre for Radio Astronomy Research, The University of Western Australia); Prof. YEPES, Gustavo (Departamento de Física Teórica, Facultad de Ciencias, Universidad Autónoma de Madrid); Prof. KNEBE, Alexander (Departamento de Física Teórica, Facultad de Ciencias, Universidad Autónoma de Madrid); Dr. CHUANG, Chia-Hsun (Kavli Institute for Particle Astrophysics and Cosmology, Stanford University)

Presenter(s) : VOS GINÉS, Bernhard (Universidad Autónoma de Madrid)

Session Classification : Discussion Panel Cosmology 3

Track Classification : Cosmology and particle physics