

Primordial Magnetic Fields as seen by the Rotation Measure analysis in the rarified cosmic regions

Monday, 6 May 2024 17:17 (2 minutes)

Radio-frequency surveys from the Square Kilometer Array (SKA) pathfinders and precursors (along with the future SKA surveys) shape (will be shaping) our views on the unresolved questions of Astrophysics and Cosmology. Some examples of such questions include how and when the Universe was magnetised and what was the role of magnetic fields in forming the large-scale structure. The radio emission, observed on galaxy and galaxy cluster scales, and possibly detectable far beyond these scales with future surveys, trace the large-scale magnetisation of the Universe. In my work, we strive to understand what is the origin of these large-scale magnetic fields (LSMFs) and whether the seed fields coming from the early Universe, i.e., primordial magnetic fields (PMFs), are viable candidates for explaining the observed properties of LSMFs. In my talk, I will discuss the results from our magnetohydrodynamic (MHD), cosmological simulations aiming to produce the mock Rotation Measure (RM) data. We construct the deep light cones by stacking the simulated boxes until redshift 2 focusing on the RM in the rarified regions of the cosmic web (i.e., the residual RM, RRM). We study different PMF models having different coherence scales to understand how the observational RRM evolution translates into constraints on the PMF strengths. In the second part of the talk, I will also present our ongoing work on simulating the realistic radio galaxies. For the first time, we are simulating magnetised jets in cosmological simulations with a realistic magnetic field structure ejected from the active galactic nuclei.

keywords

Rotation Measure, large-scale magnetic fields, primordial magnetic fields, cosmological simulations

In-person or online?

in-person

Career level

ECR

Primary author: MTCHEDLIDZE, Salome (University of Bologna, Ilia State University)

Presenter: MTCHEDLIDZE, Salome (University of Bologna, Ilia State University)

Session Classification: Poster Sparklers