Contribution ID: **17** Type: **Oral talk**

Angular Power Spectrum of the 21 cm Signal from the Dark Ages: Sensitivity to Cosmological Parameters

Thursday, 12 June 2025 10:00 (20 minutes)

The 21 cm line of neutral hydrogen provides a powerful observational window into the early Universe, particularly during the Dark Ages (redshifts \(z \sim 30\text{–}200 \)), before the emergence of the first luminous objects. In this work, presented a theoretical study of the angular power spectrum \(C_\ell \) of 21 cm brightness temperature fluctuations and its dependence on key cosmological parameters.

Described a linear perturbation framework that accounts for density inhomogeneities, peculiar velocities (redshift-space distortions). By modeling the 3D power spectrum of the 21 cm signal and projecting it into angular multipole space, could be investigated the sensitivity of \(C_\ell \) to variations in parameters such as the total matter density \(\Omega_m \), baryon fraction \(\Omega_b \), Hubble constant \(H_0 \), and the fluctuation amplitude \(\sigma_8 \).

Results show that the 21 cm angular power spectrum is sensitive to these parameters, especially at high multipoles where small-scale information is preserved. This highlights the potential of future radio interferometric observations—such as those by the Square Kilometre Array (SKA)—to provide competitive constraints on the cosmological model.

Primary author: KOVAL, Danylo

Presenter: KOVAL, Danylo

Session Classification: Astrophysics and Cosmology

Track Classification: Astrophysics and Cosmology