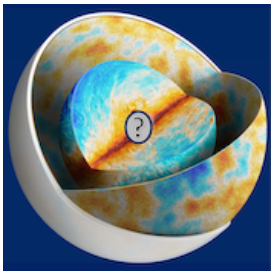

ID de Contribution: **9** Type: **Non spécifié**

Constraining cosmic reionisation by combining the kinetic Sunyaev-Zel'dovich effect and the 21cm signal

mardi 5 décembre 2023 14:00 (20 minutes)

During the Epoch of Reionisation (EoR), neutral hydrogen in the intergalactic medium can emit radiation through the 21cm hyperfine transition. The 21cm signal is a direct probe of this epoch, but a notoriously difficult observation to make.
On the other hand, the kinetic Sunyaev-Zel'dovich effect (pkSZ) is induced by the scattering of CMB photons with a medium of free electrons that possess a non-zero bulk velocity. These scatterings alter the small-scale CMB temperature anisotropies, which correlate with the growth of ionising regions during reionization.
So far, only upper limits have been set on both observables. We propose to leverage the information content enclosed in both power spectra to make the most of current observations.
We write both the 21cm and the pkSZ power spectra in terms of a simple parametric model of reionisation. This equation allows us to simultaneously use both data set to constrain the history and morphology of reionisation.
Through an MCMC analysis, we discover that these two observables exhibit complementary characteristics, leading to significantly improved constraints on reionisation compared to analysing each data set separately. We present how future measurements of the 21cm power spectrum with the SKA and the pkSZ power spectrum measurement are combined to constrain models of cosmic reionisation. Our findings demonstrate that a few well-informed measurements of the 21cm power spectrum and pkSZ data can precisely determine the reionisation history of the Universe.

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