

Primordial magnetic fields and 21-cm line observation

Tuesday 24 March 2020 14:50 (25 minutes)

The primordial magnetic fields (PMFs) are expected to be generated in the early universe, and they are a possible origin of the present galactic magnetic fields. In this talk, we suggest a novel method to investigate the PMFs with 21-cm line observation. The recent observation of the 21-cm global absorption signal by EDGES suggests that the intergalactic medium (IGM) gas has been cooler than the cosmic microwave background around $z \sim 17$. This result can provide a strong constraint on heating sources for the IGM gas at these redshifts. The PMFs are one of such heating sources due to the magnetohydrodynamic effects. By numerically solving the thermal evolution of the IGM gas with the PMFs, we find that the EDGES result gives a stringent limit on the PMFs as $B_{\{1\text{Mpc}\}} \text{ less than } 10^{-10} \text{ G}$.

Presenter: MINODA, Teppei (Nagoya University)

Session Classification: Short talks