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Intergalactic medium as a probe of fundamental physics

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Most of the volume of the Universe consists of the Intergalactic Medium (IGM), space between collapsed structures like galaxies and galaxy clusters. Extragalactic photons and charged particles that propagate through the Universe spend most of their time in the IGM and can be influenced by its properties. In this talk, I will present a few examples of how we can study fundamental physics from IGM-particles interaction. These include constraints on new light feebly interacting particles as dark photons and axions, as well as the properties of the Intergalactic Magnetic Field (IGMF). If the IGMF contains a primordial component, it can have unique information about the processes in the Early Universe. However, the powerful galactic feedback processes can affect the observed properties of the IGMF. I will discuss how both the upper bounds on the IGMF, obtained using radio astronomy, and the lower bounds, obtained by gamma-ray astronomy, are affected by these processes and the prospect of measuring the volume-filling component of the IGMF using future CTA and SKA data.

Collaboration name

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