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Sensitivity reach of gamma-ray measurements for cosmological magnetic fields

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A primordial magnetic field with the strength in the 1-10 pG range can resolve the tension between different measurements of the Hubble constant and provide an explanation for the excess opacity in the 21 cm line at redshift 15<z<20, if it is present during the recombination and reionization epochs. This field can also survive in the voids of the large-scale Structure in the present day universe. We study the sensitivity reach of the gamma-ray technique for measurement of cosmological magnetic field using deep exposure(s) of the nearest hard spectrum blazar(s) with CTA telescopes. We show that the gamma-ray measurement method can sense the primordial magnetic field with a strength of up to 10−11~G. Combination of the cosmic microwave background and gamma-ray constraints can thus sense the full range of possible cosmological magnetic fields to confirm or rule out their relevance to the problem of the origin of cosmic magnetic fields, as well as their influence on recombination and reionization epochs.

Keywords

Intergalactic Magnetic Field; AGN; Gamma-ray astronomy

Collaboration

other Collaboration

Subcategory

Theoretical Results

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