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Probing high-frequency gravitational waves in cosmic magnetic fields

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High-frequency gravitational waves (HFGWs), loosely defined as above kHz, could stem from new physics, e.g., light primordial black holes, beyond-Standard Model mechanisms. One approach to detect such HFGWs is via the inverse Gertsenshtein effect, where gravitons convert to photons in an external magnetic field. Since magnetic fields are ubiquitous in the universe, such graviton-photon conversions are expected to take place and the induced photons could, in principle, distort the otherwise blackbody CMB temperature spectrum. I will present the conservatively estimated upper limits of HFGWs using existing measurements from telescopes such as MWA, LOFAR, and EDGES, as well as improved forecast constraints with the upcoming radio telescope SKA and future CMB surveys.

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