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High Frequency Gravitational Wave Bounds from Galactic Neutron Stars

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High-Frequency Gravitational Waves (HFGWs) constitute a unique window on the early Universe as well as exotic astrophysical objects. If the current gravitational wave experiments are more dedicated to the low frequency regime, the graviton conversion into photons in a strong magnetic field constitutes a powerful tool to probe HFGWs. In this paper, we show that neutron stars, due to their extreme magnetic field, are a perfect laboratory to study the conversion of HFGWs into photons. Using realistic models for the galactic neutron star population, we calculate for the first time the expected photon flux induced by the conversion of an isotropic stochastic gravitational wave background in the magnetosphere of the ensemble of neutron stars present in the Milky Way. We compare this photon flux to the observed one from several telescopes and derive upper limits on the stochastic gravitational wave background in the frequency range 10^8 Hz - 10^{25} Hz. We find our limits to be competitive in the frequency range 10^8 Hz - 10^{15} Hz.

Title of the Poster/Talk

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