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Simulating axion electrodynamics near pulsars

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It has been demonstrated that axions can generically copiously produced from fluctuations in the background electromagnetic fields of pulsars. For axions with masses in the range 10^{-9}eV

less than m_a

less than 10^{-4}eV , a large fraction of axions sourced from this process will remain gravitationally confined near the surface of the star, accumulating on long timescales, forming dense axion clouds.

Here, I will discuss how the presence of a dense axion could can back-react on the electrodynamic processes responsible for the generation of observed radiation from neutron stars. I will present preliminary results from numerical simulations aimed at identifying new observational signatures in the electromagnetic spectrum of pulsars that can be used to constrain the axion parameter space.

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