

Indirect Detection of the QCD Axion: Resonant Conversion in Neutron Star Magnetospheres

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The Peccei-Quinn mechanism addresses the strong charge-parity problem in particle physics by postulating the existence of the QCD axion, a heretofore undetected particle that would interact with known particles. In particular, axion-photon coupling would enable axion-photon conversion in the presence of a magnetic field. Detecting axions requires strong magnetic fields, dense dark matter environments, and instruments capable of measuring the brightness and frequency of emitted photons. Radio telescopes offer a promising avenue for detection, especially in regions rich with young neutron stars. I discuss recent progress in the field from both theoretical and detection perspectives, focusing on results obtained by employing the VEGAS spectrometer on the Green Bank Telescope to investigate axion-photon conversions near the core of the Andromeda galaxy.

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