

Axion-Photon Conversion in Magnetospheres: The Role of the Plasma

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The most promising indirect search for the existence of axion dark matter uses radio telescopes to look for narrow spectral lines generated in the magnetospheres of neutron stars. Unfortunately, a large list of theoretical uncertainties has prevented this search strategy from being accepted as robust. In this talk I will present a novel end-to-end pipeline that traces individual photon trajectories from their point of genesis in the magnetosphere to asymptotic distances. This method allows one assess many of the outstanding uncertainties, including: (1) do refraction and reflection induce strong inhomogeneous features in the flux, (2) can refraction induce premature axion-photon de-phasing, (3) what is the expected width of the line, (4) does the flux have a strong time-dependence, and (5) can these radio photons be efficiently absorbed.

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