

Polarization Signals from Axion-Photon Resonant Conversion in Neutron Star Magnetosphere

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Neutron stars provide ideal astrophysical laboratories for probing new physics beyond the Standard Model. If axions exist, photons can develop linear polarization during photon-axion conversion in the magnetic field of a neutron star. We find that the plasma in the neutron star magnetosphere could dramatically enhance the polarization through the resonant conversion effect. With the polarization measurements from PSR B0531+21, PSR B0656+14, and 4U 0142+61, we derive new strong constraints on the axion-photon coupling in a broad axion mass range 10^{-11}

lessimm_a

lessim 10^{-3} eV.

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