

Abstract Submitted
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Constraints on Axions and Axion-like Particles from Fermi Large Area Telescope Observations of Neutron Stars BIJAN BERENJI, California State University, Los Angeles, JENNIFER GASKINS, GRAPPA, University of Amsterdam, MANUEL MEYER, Department of Physics, Stockholm University, FERMI-LAT COLLABORATION COLLABORATION — We present constraints on the nature of axions and axion-like particles (ALPs) by analyzing gamma-ray data from neutron stars using the Fermi Large Area Telescope. In addition to axions solving the strong CP problem of particle physics, axions and ALPs are also possible dark matter candidates. We investigate axions and ALPs produced by nucleon-nucleon bremsstrahlung within neutron stars. We derive a phenomenological model for the gamma-ray spectrum arising from axion decays. By analyzing 5 years of gamma-ray data (between 60 MeV and 200 MeV) for a sample of 4 nearby neutron stars, we do not find evidence for an axion or ALP signal, thus we obtain a combined 95% confidence level upper limit on the axion mass of 5.6×10^{-2} eV, which corresponds to a lower limit for the Peccei-Quinn scale f_a of 1.07×10^8 GeV. Our constraints are more stringent than previous results probing the same physical process, and are competitive with results probing axions and ALPs by different mechanisms.

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