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New Constraints on the Coupling of Axion-Like-Particles with Photons via Inverse Primakoff Scattering

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Axions-like-particles (ALP) naturally appear in many extensions of the Standard Model of particle physics, and are viable candidates to Cosmological Dark Matter. The Sun can also be an astrophysical source of ALP, produced through the Primakoff process. It can leave their signatures at detector through the inverse Primakoff (IP) scattering. We identify inelastic channels to the IP-processes due to atomic excitation and ionization. Their cross sections are derived with full electromagnetic fields of atomic charge and current densities, and computed by well-benchmarked atomic many-body methods. We also present new upper limits on ALP - photon couplings between 1 eV to 1 MeV using TEXONO and XENON1T experiments.

Session

Astroparticle Physics and Cosmology

Authors: Ms C., Greeshma (Department of Physics, Central University of South Bihar, Gaya 824236, India); Dr SINGH, Lakhwinder (Department of Physics, Central University of South Bihar, Gaya, India)

Co-authors: Prof. LIU, C. -P. (Department of Physics, National Dong Hwa University, Shoufeng, Hualien 97401, Taiwan); Dr WU, C.-P. (Département de Physique, Université de Montréal, Montréal H3C 3J7, Canada); Prof. CHI, H.-C. (Department of Physics, National Dong Hwa University, Shoufeng, Hualien 97401, Taiwan.); Prof. WONG, H.T. (Institute of Physics, Academia Sinica, Taipei 11529, Taiwan); Prof. CHEN, J.-W. (Physics Division, National Center for Theoretical Sciences, National Taiwan University, Taipei 10617, Taiwan); Dr PANDEY, M.K. (Department of Physics, CTP and LeCosPA, National Taiwan University, Taipei 10617, Taiwan.)

Presenter: Dr SINGH, Lakhwinder (Department of Physics, Central University of South Bihar, Gaya, India)

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