Contribution ID : **182** Type : **Poster**

Thulium-containing bolometer for solar axion resonant absorption search

Thursday, 1 December 2022 13:00 (15)

Axion is a hypothetical pseudoscalar Nambu-Goldstone boson that was introduced as an extension to the Standard Model intended to solve the strong CP problem. It also could be a possible solution for a series of other fundamental physics problems such as the the dark matter or photon ultratransparency of the Universe. As the least model-dependent axion interaction is its interaction with a nuclei, the most promising reaction for axion search is the resonant absorption.

If an axion exists, the sun would be a strong source of axion radiation, produced by mainly the so-called ABC reactions (Atomic recombination and deexcitation, Bremsstrahlung and Compton). These reactions produce axions with energies in the keV range and thus their detection through resonant absorption requires a nuclide with low-energy magnetic type gamma-transition. An optimal nuclide fulfilling these requirements is ^{169}Tm that has an M1 transition with energy of 8.41 keV with magnetic type transition fraction that could be estimated close to unity.

In this work we describe a novice technique of axion search with Tm-containing crystal $\mathrm{Tm_3Al_5O_{12}}$, a garnet that could be operated in the bolometric regime. A small sample of this crystal of 8.18 g has been already applied for axion search producing a new limit of the coupling constants: $|g_{A\gamma}(g^0_{AN} + g^3AN)| \leq 1.44 \times 10^{-14} GeV^{-1}$ and $|g_{Ae}((g^0_{AN} + g^3AN)| \leq 2.81 \times 10^{-16}$.

Primary author(s) : DRACHNEV, ilia (PNPI NRC KI); LOMSKAYA, Irina (PNPI NRCKI named B.P. Konstantinov); DERBIN, Alexander (Petersburg Nuclear Physics Institute); MURATOVA, Valentina (Petersburg Nuclear Physics Institute NRC KI); UNZHAKOV, Evgeniy (Petersburg Nuclear Physics Institute)

Presenter(s) : DRACHNEV, ilia (PNPI NRC KI)

Session Classification : Poster Session

Track Classification : Astroparticle physics