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Search for exotic neutrino interactions using solar neutrinos in XMASS-I

We have searched for exotic neutrino-electron interactions that could be produced by a neutrino millicharge, magnetic moment or dark photons using solar neutrinos in the XMASS-I. No significant signals have been observed and upper limit of these constant values are estimated as preliminary. For the neutrino millicharge search, 5.4×10^{-11}e for all flavors of neutrino is obtained. We also set individual flavors to be $7.3 \times 10^{-12}e$ for ν_e, $1.1 \times 10^{-11}e$ for ν_μ, and $1.1 \times 10^{-11}e$ for ν_τ. These limits ate the most stringent yet obtained from direct measurements. For the neutrino magnetic moment search, $1.8 \times 10^{-10}\mu_B$ is obtained. In addition, we obtain upper limits for the coupling constant of dark photons and almost exclude the possibility to understand the muon $g-2$ anomaly by dark photons.

Mini-abstract

XMASS-I experiment search for exotic neutrino-electron interactions in xenon using solar neutrinos.

Experiment/Collaboration

XMASS collaboration

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