Contribution ID: **2** Type: **Parallel Session Talk: Systematics and Analysis Techniques**

New constraints on neutrino electric millicharge from elastic neutrino-electron scattering and coherent elastic neutrino-nucleus scattering

In different extensions of the Standard Model of Particle Physics (SMPP), the neutrino acquire electric millicharge and charge radius, as well as electric and magnetic dipole moments, the latter being the most studied property in the literature. However, the possibility that neutrino be a millicharged particle has also been a subject of study in different theoretical and experimental works. Additionally, several experimental constraints on the neutrino electric millicharge (NEM) have been reported from reactors, accelerators, and astrophysical measurements. In this talk, we will present the results from a statistical analysis using data from reactor neutrino experiments, which include elastic neutrino-electron scattering (ENES) processes, where both individual and combined limits on the neutrino electric millicharge were obtained. Likewise, we will show bounds from several future experimental proposals involving coherent elastic neutrino-nucleus scattering (CEνNS). In the first case, the limit of NEM achieved from the combined results of different experiments is 1.5×10^{-12} e at 90% C.L., and in the second scenario the bound corresponds to 3.5×10^{-13} e (90% C.L.). The outcomes indicate CEνNS experimental proposals might be a suitable alternative to improve the current limits of NEM. https://arxiv.org/abs/1907.04942.

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