

Seminar

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Muenster

Observation of excess electron-recoil events in XENON1T

XENON1T was a xenon dual-phase time projection chamber for WIMP Dark Matter searches and set world-leading limits for numerous Dark Matter candidates and interactions. It finished taking data at Laboratori Nazionali del Gran Sasso in 2018 and will be superseded by XENONnT later this year. In this seminar we present the latest results from a search for solar axions, axion-like particles (ALPs) and the magnetic moment of solar neutrinos. XENON1T was primarily designed to look for nuclear recoils from interactions of WIMPs with xenon atoms, but with its unprecedented low electron recoil background of 76 ± 2 events/(tonne \times year \times keV) in the energy range of 130 keV, it can probe new parameter space for such interactions of solar axions, neutrinos, and ALPs. The search in our recent paper, arXiv:2006.09721, revealed an excess of events below 7 keV, which is where the corresponding signals from electron recoils would be expected. The tested signal hypotheses are favored over background with significances of 3.5σ for solar axions, 3.0σ global (4.0σ local) for ALP dark matter with a peak at 2.3 ± 0.2 keV (68 % C.L.), and 3.2σ for a neutrino magnetic moment. If one of these findings were to be confirmed, it would mean a long awaited piece of new physics. Our recent paper also discusses other explanations including the previously unconsidered β -decay of tritium. In this talk we review the detection principles, cross-checks of our results, and discuss the physics implications as well as alternative background hypotheses.

Donnerstag, 16.07.2020, 14:15 Uhr
Ort: in cyberspace (zoom meeting)