



Contribution ID: 92

Type: **Poster Presentation**

Direct measurement of the ionization quenching factor of nuclear recoils in germanium in the keV energy range for the CONUS experiment

Tuesday, 3 May 2022 10:20 (10 minutes)

Recent development of ultra-sensitive particle detectors have opened the possibility to detect the neutrinos via coherent elastic neutrino-nucleus scattering ($\text{CE}\nu\text{NS}$). Having a larger cross-section, this process offers opportunities to further study this elusive particle in rather compact detectors and paves the way for new explorations beyond the Standard Model of particle physics.

The CONUS experiment is located at 17m from the 3.9GW_{th} core of the nuclear power plant Brokdorf (Germany) and aims to detect $\text{CE}\nu\text{NS}$ with four 1 kg-sized high-purity germanium detectors with a sub-keV energy threshold. A deep understanding of the detector response to nuclear recoils is needed for the interpretation of the data and motivated a dedicated measurement of the ionization quenching factor in 2020 at the PTB facility in Braunschweig (Germany), where an HPGe target was irradiated by mono-energetic neutrons. In this talk, the results of this campaign will be presented in details and the most recent results of the CONUS experiment will be exposed, in light of this new knowledge.

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Session Classification: Fundamental physics

Track Classification: Fundamental Physics