Contribution ID: **166** Type: **Parallel talk**

New Evidence for DM-like Anomalies in neutron multiplicity spectra

Tuesday 29 August 2023 17:00 (15 minutes)

As it was reported at ICRC 2021 [1], TAUP 2021 [2], and VCI 2022 [3], subterrestrial neutron spectra show weak but consistent anomalies at multiplicities ˜100 and above. The origin of the excess events remains ambiguous, but, in principle, it could be a signature of Dark Matter WIMP annihilation-like interaction with a massive Pb target. However, since the results of the available measurements are below the 5-sigma discovery level, and the observed anomalous structures are on a significant muon-induced background, an independent verification at even greater depth is needed. For that purpose, we have launched NEMESIS 1.4 –a new dedicated experiment consisting of 1134 kg of Pb and 14 He-3 detectors with PE moderators and a fully digital readout. NEMESIS 1.4 has been taking data at the deepest level (1.4 km, 4000 m.w.e.) of the Pyhäsalmi mine, Finland, since November 2022. The presentation will describe the idea behind the new setup, compare the first results with Monte Carlo simulations and other available data, and give the outlook for further research. If the existence of the anomalies is unambiguously confirmed and the model interpretation [4] positively verified, this will be the first Indirect Detection of Dark Matter in the laboratory.

[1] https://doi.org/10.22323/1.395.0514
[2] http://doi.org/10.1088/1742-6596/2156/1/012029
[3] https://doi.org/10.1016/j.nima.2022.167223
[4] TAUP abstract #221

Submitted on behalf of a Collaboration?

Yes

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Session Classification: Dark matter and its detection

Track Classification: Dark matter and its detection