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Indirect Detection of WIMPs with NEMESIS

Considerable experimental and theoretical work has been devoted to solving the Dark Matter (DM) puzzle. However, apart from gravitational evidence, no other measurements confirm DM existence. Weakly Interacting Massive Particles (WIMPs) are perhaps the most broadly accepted hypothesis postulated for DM. If true, the galaxies are immersed in a vast halo of WIMP particles moving at a different speed than the visible matter causing a detectable WIMP flux. Several large-scale experiments are searching for recoil signals from WIMP scattering. The new NEMESIS experiment, collecting data since November 2019, has a different approach. We are attempting Indirect WIMP detection following their assumed self-annihilation in a bulky Pb target. With the anticipated WIMP mass ˜10 GeV/c2, such an event would also obliterate the target nucleus. The detectable signature would be a massive emission of particles and gamma-rays. Most of the time, only neutrons and high-energy leptons would emerge from the Pb target. Interestingly, our analysis of NEMESIS, NMDS, and ZEPLIN-II data revealed three distinct anomalies in muon-suppressed neutron multiplicity spectra. The statistics are still marginal, but the exact match of the extracted multiplicities and intensities for all three experiments rules out an accidental fluke. The proposed NEMESIS update should cross the needed 5-sigma discovery threshold during the first year of running.

Primary experiment

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