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POS-J100 – Multi-Interacting Massive Particles in DEAP-3600

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DEAP-3600, hosted at SNOLAB, has been designed for the search of WIMPs, Weakly Interacting Massive Particles; its target of 3.3 t of liquid argon is the largest direct detection experiment. In addition to its sensitivity to WIMPs, DEAP-3600 is sensitive to super-massive dark matter candidates with masses up to the Planck scale. At dark matter-argon cross-sections above 10^{-24} cm² and dark matter masses above 10^{16} GeV, dark matter particles are expected to reach an underground experiment and give a detectable signal in liquid argon; indeed particles at lower masses and such high cross-sections are eventually stopped by the overburden. Moreover, due to the large cross-section, all MIMPs that enter the detector are expected to produce signals; as a consequence, the sensitivity to high masses depends on the cross-sectional area of the detector. The expected signal in DEAP-3600 is a collinear sequence of nuclear recoils in the same acquisition window, giving a very clear and unique signature; hence, we refer to them as MIMPs, Multi-interacting Massive Particles. In the present talk, the search for MIMPs in three years of data-taking is presented, showing the first search for multi-scattering dark matter in noble liquids ever performed.

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