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Into the Neutrino Fog with XENONnT

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Several astrophysical and cosmological observations on different length scales indicate the presence of a massive, non-luminous and non-baryonic matter component which is commonly referred to as dark matter. Weakly interacting massive particles (WIMPs) which arise from several beyond-Standard-model theories are among the candidates for dark matter. Over the last decade, the search for these particles has been led by the Xenon-based dual-phase time projection chamber detectors. Among them, the XENONnT is currently taking data at Gran Sasso underground laboratories, exploiting 5.9 tonnes of instrumented liquid xenon. The collaboration has made a huge effort to design and commission several upgrades to increase the performance of the detector: a new and larger TPC, new liquid purification system, an online radon distillation column and the world's first water Cherenkov neutron veto. WIMPs detection via nuclear recoils is threatened by the so-called "neutrino fog", an irreducible background produced by neutrinos which can mimic the same nuclear recoil events expected from Dark Matter particle interaction in such a detector. In this talk, it will be reported the first ever reach of the neutrino fog from a dark matter direct search experiment. Using data for the first two science runs with a total exposure of approximately 3.5 tonne-year, solar Boron 8 neutrinos have been detected via Coherent Elastic Neutrino Nucleus Scattering

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