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Direct Dark Matter search with Liquid Argon at Gran Sasso: Dark Side

DarkSide-50 (DS-50) at Gran Sasso underground laboratory, Italy, is a direct dark matter search experiment based on a TPC with liquid argon from underground sources. The DS-50 TPC, with 50 kg of active argon and a projected fiducial mass of >33 kg, is installed inside an active neutron veto based on a boron-loaded organic scintillator. The neutron veto is built inside a water cherenkov muon veto. DS-50 has been taking data since Nov 2013, collecting more than $2e7$ events with atmospheric argon. This data represents an exposure to the largest background, beta decays of Ar-39, comparable to the full three-year run planned for DS-50 with underground argon. When analyzed with a threshold that would give a sensitivity in the full run of about $1e-45$ cm^2 at a WIMP mass of 100 GeV/c^2 , there is no Ar-39 background observed. The detector design and performance will be presented as well as results from the atmospheric argon run still in progress. Plans for the underground argon run and for a ton-scale detector within the same neutron veto vessel will be presented.

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Track Classification: Experiments: 2d) Dark Matter Detectors