

Darkside Status and Prospects

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Located at the INFN Laboratori Nazionali del Gran Sasso, Italy, DarkSide (DS) is a dark matter search project, which features a dual-phase liquid argon Time Projection Chamber as the WIMP detector, surrounded by an organic liquid-scintillator neutron veto and a water-Cherenkov muon veto. The current DS-50 has been running since 2013, initially with atmospheric Ar (AAr) and then, starting in April 2015, with Ar extracted from underground sources. The underground Ar (UAr) is measured to contain lower Ar-39 than AAr by a factor of $(1.4 \pm 0.2) \times 10^3$. We have reported a 70.9 live-days of UAr data set with a fiducial mass of (36.9 ± 0.6) kg in a non-blinded analysis. When combined with our preceding search with AAr, we have set a 90% C.L. upper limit on the WIMP-nucleon spin-independent cross section of 2.0×10^{-44} cm² for WIMPs of 100 GeV/c². This is the world leading exclusion curve with Ar target as of April 2017. By June 2017, DS-50 will have accumulated 500+ live-days of blinded data with the UAr target. The blind analysis is ongoing. The proposed next stage, DS-20k, will have a 20-ton fiducial mass, SiPM as the photo-sensors, and background well below that from coherent scattering of solar and atmospheric neutrinos. DS-20k plans to start commissioning in 2020 and will be sensitive to WIMP-nucleon interaction cross sections of 1×10^{-47} cm² for WIMPs of 1 TeV/c² for an exposure of 100 ton yr.

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