

Abstract Submitted
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DarkSide-50 WIMP search results with low radioactivity argon

XIN XIANG, Princeton Univ, DARKSIDE COLLABORATION — Located at the Laboratori Nazionali del Gran Sasso, DarkSide-50 is the first physics detector of the DarkSide dark matter search program. The experiment features a dual-phase Time Projection Chamber as the WIMP detector, surrounded by an organic liquid-scintillator neutron veto and a water-Cherenkov muon detector. We report the results from the first use of low radioactivity argon extracted from underground sources in a dark matter search. We have determined that underground argon is depleted in ^{39}Ar by a factor $(1.4 \pm 0.2) \times 10^3$ relative to atmospheric argon whose ^{39}Ar activity is 1 bq/kg. The underground argon is also found to contain (2.05 ± 0.13) mBq/kg of ^{85}Kr . We find no evidence for dark matter in the form of WIMPs in 70.9 live-days of data with a fiducial mass of (36.9 ± 0.6) kg. When combined with our preceding search with an atmospheric argon target, we set a 90% C.L. upper limit on the WIMP-nucleon spin-independent cross section of 2.0×10^{-44} cm² (8.6×10^{-44} cm², 8.0×10^{-43} cm²) for a WIMP mass of 100 GeV/c² (1 TeV/c², 10 TeV/c²). DS-50 will continue dark matter search with the underground argon target for a total of 3 years. See also the DS-50 presentations by E. Edkins and G. Koh.

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