

Exploring Low-Mass Dark Matter with the DarkSide Detectors

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Dark matter candidates with masses below $10 \text{ GeV}/c^2$ show considerable potential. Our last-generation detector, DarkSide-50, has achieved world-leading results in this mass range using ionization-only analysis with 46kg of active mass. Building upon the advancements of DarkSide-50 for low-mass dark matter searches, and in line with the ongoing progress towards the next-generation high-mass dark matter detector, DarkSide-20k, a dedicated detector named DarkSide-LowMass has been proposed. DarkSide-LowMass is optimized for low-threshold electron-counting measurements, and sensitivity to light dark matter is explored across various potential energy thresholds and background rates. Our studies indicate that DarkSide-LowMass can achieve sensitivity to light dark matter down to the level of the solar neutrino fog for GeV-scale masses, and significant sensitivity down to $10 \text{ MeV}/c^2$, considering the Migdal effect or interactions with electrons.

Alternate track

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Yes

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