

## **Title: Illuminating the Dark Matter Sector with DarkSide**

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Throughout the past century, a large amount of cosmological and astrophysical evidence suggests that about 85% of the matter in the known Universe does not interact electromagnetically, with origins beyond the Standard Model. A theoretical particle known as a Weakly Interacting Massive Particle (WIMP) is a proposed candidate for this dark matter. A weakly coupled interaction could exist between WIMPs and ordinary matter, potentially inducing a nuclear recoil of ordinary matter from WIMP scattering. Many experiments around the world are attempting to observe this nuclear recoil with various detection methods. The DarkSide-50 detector uses a target of liquid argon extracted from underground sources in a dual-phase time projection chamber to search for WIMP interactions. The unique pulse-shape scintillation signature of argon, coupled with two high efficiency veto detectors and an extremely low background environment at the Gran Sasso laboratory in Italy, have allowed DarkSide-50 to perform a background-free WIMP search. The current results of the DarkSide-50 program will be presented, as well as the plans and physics reach for the DarkSide-20k experiment which will continue to run in background-free mode with an increased target volume of 20 kTon.