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The DarkSide Program at LNGS

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DarkSide is a direct detection dark matter program based on two-phase argon time projection chambers using argon from underground sources that is naturally depleted in ^{39}Ar . DarkSide-50, the first physics detector in the DarkSide program, will be deployed within the Borexino CTF tank in Gran Sasso Laboratory, Italy. The unique combination of the CTF muon veto, ultra-low background construction techniques, depleted argon, and a dedicated high efficiency neutron veto based on boron-loaded liquid scintillator should give DarkSide-50 the ability to convincingly demonstrate a background expectation of a fraction of an event in a 0.1 tonne-year exposure. This will not only give the experiment the ability to probe for WIMP interactions with a cross-section sensitivity of $10\text{E-}45\text{cm}^2$, but also allow it to demonstrate the ability of larger, tonne-scale, detectors in the DarkSide program to operate background free.

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