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Darkside-20k: A 20 ton Liquid Argon Dark Matter Experiment
HENNING BACK, Pacific Northwest National Laboratory, DARKSIDE-20K COLLABORATION — The Darkside-20k detector is the next step in the Darkside dark matter search program at the Laboratori Nazionali del Gran Sasso in Italy. The Darkside detectors have grown in fiducial mass starting with 10kg in Darkside10, to 50 kg in Darkside50, and finally a proposed 20,000 kg fiducial mass, Darkside20k. The Darkside detectors are dual-phase argon TPCs that combine the very powerful scintillation pulse-shape analysis and ionization information to discriminate against background events. Two unique aspects to the Darkside program is the use of an external neutron veto based on borated liquid scintillator, and the use of low radioactivity argon from underground sources as the target. Argon from the atmosphere has an ^{39}Ar activity of 1Bq/kg, which would be the limiting background, but the underground argon is essentially free of ^{39}Ar. Additionally, the detector is placed in a water Cherenkov muon veto. Combining all these techniques allows Darkside-20k to achieve a background-free 100 t-yr exposure accumulated in a 5 yr run. Darkside-20k is expected to start operations in 2020 with data taking starting in 2021, and will be sensitive to WIMP-nucleon interaction cross sections of 110^{-47} cm^2 ($1x10^{-46}$ cm^2) for WIMPs of 1 TeV/c^2 (10 TeV/c^2) mass

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