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DarkSide-20k: Next generation Direct Dark Matter searches with liquid Argon

Wednesday 23 August 2023 16:50 (20 minutes)

Darkside-20k is a next-generation dual-phase Liquid Argon Time Projection Chamber (LAr TPC), currently under construction at the Gran Sasso National Laboratory (LNGS) in Italy. The 20t fiducial liquid Argon mass will probe WIMP-nucleon interactions, with sensitivity to cross sections equal to 10^{-48} cm^2 for a WIMP mass of 0.1 TeV/$\boxtimes^2$ considering the exposure goal of 200 tonne-years.

Darkside-20k is designed to be a nearly "instrumental background-free" experiment, meaning that <0.1 events are expected in the WIMP search region during the planned exposure. To achieve this goal, the TPC is surrounded by an inner (neutron) and outer (muon) veto, while low-radioactivity underground argon (depleted in ^{39}Ar), is used as the inner detector (TPC and inner veto) medium. Additionally, an extensive campaign of radio assays is performed to ensure the radiopurity of the materials used. Both the TPC and the veto systems are instrumented with novel cryogenic Silicon photomultipliers (SiPM), capable of resolving single photoelectrons and providing the required spatial and timing resolution.

This contribution will provide an overview of the DarkSide-20k experimental program, including the physics potential. The construction status of the DarkSide-20k detector will be reported with a focus on the photodetector system construction and testing procedures.

Collaboration / Activity

DarkSide-20k Collaboration

Primary author: MANTHOS, Ioannis (University of Birmingham)

Presenter: MANTHOS, Ioannis (University of Birmingham)

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