

DarkSide-20k Design and Physics Prospects

Friday 27 March 2020 17:00 (15 minutes)

DarkSide-20k, is designed as a 20-tonne fiducial mass Time Projection Chamber with SiPM based photosensors, expected to be free of any instrumental background for an exposure of $>100 \text{ ton} \times \text{years}$.

The dual phase TPC will use a total of 50 t low radioactivity Argon from underground source and will be realized within a sealed acrylic vessel surrounded by an active neutron veto detector. The latter is composed of a Gd-loaded acrylic shell immersed in an atmospheric liquid argon bath contained in a ProtoDune-like membrane cryostat.

Like its predecessor DarkSide-20k will be housed at the Gran Sasso (LNGS) underground laboratory, and it is expected to attain a WIMP-nucleon cross section exclusion sensitivity of 10^{-47} cm^2 for a WIMP mass of $1 \text{ TeV}/c^2$ in a 5 yr run.

A subsequent objective, towards the end of the next decade, will be the construction of the ultimate detector, ARGO, with a 300 t fiducial mass to push the sensitivity to the neutrino floor region for high mass WIMPs.

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