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## DarkSide-20k and the Future Liquid Argon Dark Matter Program

*Saturday, 9 July 2022 14:50 (20 minutes)*

DarkSide run since mid-2015 a 50-kg-active-mass dual-phase Liquid Argon Time Projection Chamber (TPC), filled with low radioactivity argon from an underground source and produced world-class results for both the low mass ( $M_{WIMP} < 20 GeV/c^2$ ) and high mass ( $M_{WIMP} > 100 GeV/c^2$ ) direct detection search for dark matter.

The next stage of the DarkSide program will be a new generation experiment involving a global collaboration from all the current Argon based experiments. DarkSide-20k is designed as a 20-tonne fiducial mass dual-phase Liquid Argon TPC with SiPM based cryogenic photosensors and is expected to be free of any instrumental background for exposure of  $>100$  tonne x year. Like its predecessor, DarkSide-20k will be housed at the INFN Gran Sasso (LNGS) underground laboratory, and it is expected to attain a WIMP-nucleon cross-section exclusion sensitivity of  $7.4 \times 10^{-48} cm^2$  for a WIMP mass of  $1 TeV/c^2$  in a 200 t yr run. DarkSide-20k will be installed inside a membrane cryostat containing more than 700 t of liquid Argon and be surrounded by an active neutron veto based on a Gd-loaded acrylic shell. The talk will give the latest updates on the ongoing R&D and prototype tests validating the initial design.

### In-person participation

Yes

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