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Status and prospects of DarkSide-20k: a direct dark matter search experiment using liquid argon

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DarkSide run since mid-2015 a 50-kg-active-mass dual-phase 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 200 tonne x year. Like its predecessor, DarkSide-20k will be housed at the INFN Gran Sasso underground laboratory (LNGS), 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 exposure. DarkSide-20k will be installed inside a membrane cryostat containing more than 700 t of liquid Argon and use a Gd-PMMA based neutron veto detector. This talk will give the latest updates on the DarkSide-20k project.

Submitted on behalf of a Collaboration?

Yes

Author: Prof. WANG, Yi (Institute of High Energy Physics, Chinese Academy of Sciences)

Presenter: Prof. WANG, Yi (Institute of High Energy Physics, Chinese Academy of Sciences)

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