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Darkside-50 Results and the Future Liquid Argon Dark Matter Program

Tuesday 6 August 2019 16:00 (12 minutes)

Summary

DarkSide uses a dual-phase Liquid Argon Time Projection Chamber to search for WIMP dark matter. The talk will present the world leading result on the search for low mass ($M_{WIMP} < 20 \text{ GeV}/c^2$) and high mass ($M_{WIMP} > 100 \text{ GeV}/c^2$) WIMPs from the current experiment, DarkSide-50, running since mid 2015 a 50-kg-active-mass TPC, filled with argon from an underground source. 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 TPC with SiPM based photosensors, expected to be free of any instrumental background for an exposure of $>100 \text{ ton} \times \text{years}$. 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.

The combination of the three experiments, part of a single family, will cover completely the WIMP hypothesis from $1 \text{ GeV}/c^2$ to several hundreds of TeV/c^2 masses.

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