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

Tuesday, August 6, 2019 4:00 PM (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 ton x 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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