

DarkSide-20k: The Next Stage in the Direct Dark Matter Search Using Liquid Argon

Friday 31 March 2023 08:45 (15 minutes)

Dual-phase noble liquid Time Projection Chambers (TPCs) and single-phase scintillation-only detectors offer competitive ways to search for dark matter (DM) directly, via elastically scattering off of detector target nuclei and electrons. Argon possesses an intrinsic property allowing for powerful discrimination between electron (background) and nuclear (signal) recoils in the search for high-mass DM. The Global Argon Dark Matter Collaboration (GADMC) has undertaken an ambitious program from the extraction and purification of Underground Argon (UAr), depleted in ^{39}Ar to reduce the radioactive background, to the development of large arrays of Silicon Photo Multiplier (SiPM) modules capable of resolving single photoelectrons. DarkSide-20k (dual-phase TPC) is the next stage of this program and has entered the construction phase at the Gran Sasso underground laboratory (LNGS) in central Italy. An exposure goal of ≈ 200 tonne-years with near-zero instrumental background has been set for sensitivity to a WIMP-nucleon scattering cross section of $\approx 10^{-47} \text{ cm}^2$ for a WIMP mass of 1 TeV/ c^2 over a 10-year run. The DarkSide-20k experimental program and recent progress will be presented.

Author: THORPE, Thomas Nathan (University of California Los Angeles (US))

Presenter: THORPE, Thomas Nathan (University of California Los Angeles (US))

Session Classification: SESSION 10: Direct Detection: status of liquid/gas WIMP detectors (CHAIR: Alvine Kamaha -UCLA)

Track Classification: Non-directional direct dark matter detection