Low Radioactivity Techniques (LRT2024)



Contribution ID: 91

Type: Talk

Rare event searches with argon detectors

Wednesday, 2 October 2024 08:55 (25 minutes)

Liquid argon, a key player in our quest to unravel the physics beyond the standard model, is indeed one of the most sensitive targets for GeV-scale dark matter candidates, such as Weakly Interacting Massive Particles (WIMPs), as demonstrated by the DEAP-3600 experiment and DarkSide-50 experiment. The unique R&D has led to the design of the next experiment within the Global Argon Dark Matter collaboration, DarkSide-20k, currently under construction at LNGS. Its 50-tonne ultra-pure argon target will allow for investigating for the very first time in argon dark matter-nucleon cross-section as low as 7.4 x 10^{-48} cm^2 for a WIMP mass of 1 TeV/c^2 in a 200 t yr run. At the same time, the first calibrations on superheated argon are proceeding within the Scintillating Bubble Chamber demonstrator, whose setup at SNOLAB shows a projected sensitivity down to 10^{-43} cm² at 1 GeV/c². On the other hand, argon has served as an active veto for the neutrinoless double beta decay of 76-Germanium, first in GERDA and now in LEGEND-200, whose collaboration recently showed their newest lower limit at 1.0 x 10^{-27} year, confirming the substantial background rejection possible thanks to the argon bath and pushing for the extension of this technology also to the future LEGEND-1000, where the argon would be extracted in the URANIA plant, aiming for the same mBq/kg argon radioactivity level also at the very base of DarkSide-20k's success.

Primary author: LAI, Michela (University of California Riverside)Presenter: LAI, Michela (University of California Riverside)Session Classification: Noble Element Based Detectors