



Contribution ID: 99

Type: **not specified**

Dark Matter searches with the DarkSide experiment

Monday 26 August 2019 15:20 (20 minutes)

The DarkSide program aims at detecting weakly interacting particle dark matter using dual-phase Liquid Argon Time Projection Chambers (LAr TPC) of increasing sensitivity. One of the distinctive features of the program is the use of underground argon with significantly lower ^{39}Ar when compared with atmospheric argon.

The first detector of the program, DarkSide-50 (DS-50) is running at LNGS since 2013. It is the first detector of its kind with a large (30 tonnes), liquid scintillator neutron veto and water Cherenkov (1,000 tonnes) muon veto concentrically enveloping the dark matter target. An initial $1,422 \text{ kg}\cdot\text{day}$ exposure run with atmospheric argon yielded a null result of the dark matter search and zero background from radioactive sources. Operations with underground argon started in March 2015, and results from background-free 500-day exposure have been recently released. Argon-39 suppression in underground argon is proven to be more than 1000-fold, making much larger detectors free of instrumental background possible. Recently, DS-50 has also yielded exquisite sensitivity for low and very-low mass dark matter particles, below $10 \text{ GeV}/c^2$.

I will review the DS-50 results and present the future of the DarkSide program, DS-20k. DS-20k is multi-tens of tons detector designed for a background-free exposure of 100 tonne-years, with a projected sensitivity to WIMP-nucleon cross section of better than 10^{-47} cm^2 for WIMPs of mass $1 \text{ TeV}/c^2$, a mass scale of special interest because above the reach of the LHC. Details of the DS-20k detector and R&D towards its finalization will be presented in the global context of direct dark matter searches.

Author: Prof. POCAR, Andrea (University of Massachusetts, Amherst)

Presenter: Prof. POCAR, Andrea (University of Massachusetts, Amherst)

Session Classification: Parallel Session