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(G*) Multi-Source TPB Evaporation for DarkSide-20k

Monday 19 June 2023 16:00 (15 minutes)

Darkside-20k, planned to be constructed at the LNGS underground laboratory in Italy, is a forthcoming detector that aims at using a Liquid Argon (LAr) target to detect the scattering of dark matter particles from argon atoms. The detector will collect an exposure of 200 tonne-years while keeping the instrumental background level in the WIMP search region of interest to a minimum.

At the center of the detector, a two-phase Liquid Argon Time Projection Chamber (LArTPC) will be filled with low-radioactivity Underground Argon (UAr) with a 20-tonne active volume. The TPC barrel will be made up of eight gadolinium (Gd) loaded PMMA (acrylic) panels. The acrylic anode and cathode plates of the TPC barrel will be coated with Clevios to realize the electrical potentials in the TPC and with 1,1,4,4 tetraphenyl-1,3-butadiene (TPB) to wavelength shift the 128 nm argon scintillation light to ≈420 nm which is necessary for the Silicon Photomultiplier (SiPM)–based readout to detect light.

The thermal vacuum evaporation method is the most common way to deposit TPB on the acrylic time projection chamber. For Darkside-20k, a system with multiple point sources to coat the TPC barrel is proposed and, in this talk, I will present how using more than one point source can improve the uniformity of the TPB coatings. I will also talk about other important parameters that can affect the uniformity of the coatings.

Keyword-1

DarkSide-20k

Keyword-2

TPB Evaporation

Keyword-3

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