

DarkSide-20k veto photodetector assembly

Tuesday 8 April 2025 14:30 (15 minutes)

DarkSide-20k is a direct dark matter detection experiment which employs a Liquid Argon Time Projection Chamber (TPC) to search for dark matter interactions. A principal background for these searches in DarkSide-20k are radiogenic neutrons introduced by contaminations in the detector material. To reduce this background, DarkSide-20k tags neutron interactions in an Inner Veto detector surrounding the central TPC instrumented by Silicon Photo-Multiplier (SiPM) array light detectors termed veto Photo Detector Units (vPDU)s. vPDUs are currently being produced and quality tested by a consortium of groups across the UK.

Controlling the deposition of radon and its progeny in this process is crucial to achieve the low background goals of DarkSide-20k. By modeling the disequilibrium in the radon decay chain, including processes such as deposition, ventilation, and attachment to aerosol particulates within the photosensor assembly clean room, we can estimate surface activity levels and assess contamination risks. These results provide practical insights for refining assembly workflows and achieving the stringent background requirements.

This talk/poster covers the vPDU assembly and testing currently being carried out, and the cleaning processes and assembly conditions necessary to assure the preservation of the radiopurity of the detector material.

Author: Dr RITCHIE-YATES, Ash

Presenter: Dr RITCHIE-YATES, Ash

Session Classification: Detectors and Instrumentation

Track Classification: Detectors and Instrumentation