

Characterization of DarkSide-20k large-area SiPM Tiles

Wednesday, 10 July 2024 17:10 (20 minutes)

One of the most challenging open problems in physics is the direct detection of dark matter candidates. Several low-background underground experiments are currently involved in the search of Weakly Interacting Massive Particles (WIMP) employing noble liquids like xenon or argon that have very good scintillation properties. High-performance single-photon detectors are required to acquire the faint signals emitted by the expected interaction of such candidates in the detector.

DS-20k detector is a double-phase Time Projection Chamber (TPC) containing 20 tons of ultrapure liquid argon in the fiducial volume. The scintillation light emitted by particles interacting with argon in the TPC will be read out by custom developed, cryogenic, low-noise grouped arrays of Silicon Photo Multipliers (SiPMs). The TPC will be equipped with 21 m² of active surface and 5 m² will be installed in the surrounding active veto. The mass production of the SiPM sensors will occur at the Nuova Officina Assergi at Laboratory Nazionali del Gran Sasso, a brand new facility including a 400 m² clean room. This talk will report about the characterization of the 5 × 5 cm² SiPM Tiles of DS-20k, currently underway. Preliminary yield of tested pre-production Tiles is approaching 90%. Furthermore, the first measurements of the Dark Count Rate of large area SiPM-based photodetectors will be presented. Our preliminary analysis exhibits DCR values of the order of 1 Hz/cm².

Primary author: MARASCIULLI, Andrea (Istituto Nazionale di Fisica Nucleare)

Co-authors: TABORDA PULGARIN, Oscar Alejandro (Istituto Nazionale di Fisica Nucleare); HORIKAWA, Sosuke (Istituto Nazionale di Fisica Nucleare)

Presenter: MARASCIULLI, Andrea (Istituto Nazionale di Fisica Nucleare)

Session Classification: Poster session

Track Classification: Poster session: Direct detection