

The DarkSide-20k Photo Detection Unit packaging process flow in NOA

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

DarkSide-20k is a dual-phase liquid argon time projection chamber (LAr-TPC) detector for the direct detection of dark matter (DM) particles that is under construction in Hall C of the Laboratori Nazionali Del Gran Sasso (Italy).

Light detection represents a critical and challenging aspect of this detector. The light collection is based on the novel FBK NUV-HD Cryo silicon photomultiplier (SiPM) devices. SiPMs are extracted from 1400 8-inch production wafers, each consisting of 268 dies, and bonded into 528 photodetection units (PDUs) in a new ISO-6 400 m² clean room packaging facility built at INFN LNGS. This talk will present a detailed account of the process flow for the production of PDUs. It will commence with an overview of the SiPMs wafer testing and dicing procedures, before progressing to the SiPMs bonding and examination of the final assembly stage. Additionally, the presentation will provide an insight into the software and database framework utilized for the analysis and storage of data acquired throughout the entire process chain.

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Session Classification: Poster session

Track Classification: Poster session: Direct detection