

Cryogenic SiPMs for the optical readout of DarkSide-20k

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Silicon photomultipliers (SiPM) have gained significant traction as an alternative technology to the well-established photomultiplier tube (PMT), with numerous high-sensitivity experiments adopting them either complementarily or as a replacement for PMTs. SiPMs are an ideal match for low-background cryogenic applications, such as massive noble liquid experiments for dark matter direct detection, due to (i) the significant reduction of dark noise in cold environments, (ii) relatively low radioactive content, and (iii) scalable industrial production. For these reasons, the Global Argon Dark Matter Collaboration has committed to this technology for DarkSide-20k, currently under construction at LNGS Hall C. The development of a large-area cryogenic SiPM-based photon counter has culminated in the Photon Detector Unit (PDU), a compact photosensor measuring $20 \times 20 \text{ cm}^2$ with 100 cm^2 active surface per channel, based on SiPM technology from Fondazione Bruno Kessler and incorporating custom front-end electronics suited for cryogenics. More than 600 PDUs are being produced and tested in various collaboration facilities to construct the two $\sim 10.5 \text{ m}^2$ optical planes of the massive two-phase argon time projection chamber of DarkSide-20k and the optical readout of its veto system.

Do you need a VISA letter for traveling to Canada ?

No

Author: MATTEUCCI, Giuseppe (Università degli Studi di Napoli Federico II)

Presenter: MATTEUCCI, Giuseppe (Università degli Studi di Napoli Federico II)

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