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Cryogenic SiPMs for dark matter search with DarkSide-20k

Monday, 26 July 2021 16:30 (15 minutes)

The Global Argon Dark Matter Collaboration is pursuing the construction, at the Gran Sasso Laboratory (LNGS), of DarkSide-20k a dark matter direct search experiment designed as a 20-tonne fiducial mass Time Projection Chamber (TPC) with SiPM based photosensors, expected to be free of any instrumental background for an exposure of >100 ton x years.

Large-area cryogenic SiPM tile modules (PDM) have been developed with lower radiogenic background and higher photo-detection efficiency ($>40\%$) respect to the PMTs usually adopted in dark matter experiments. Two units made of 25×25 cm² arrays of PDMs have been operated and characterized at liquid nitrogen and argon temperatures in small prototype detectors. Several options are currently pursued for transmission of the analog signals to the digitisation electronics at room temperature.

More than 8280 PDMs are needed to fully instrument the DarkSide-20k Liquid Argon TPC. The assembly will take place in NOA, a 700 m² clean room under construction at LNGS that will host a dedicated microelectronics packaging facility. The present status of DarkSide-20k with the latest achievements and the future steps and strategies will be presented.

Collaboration / Activity

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