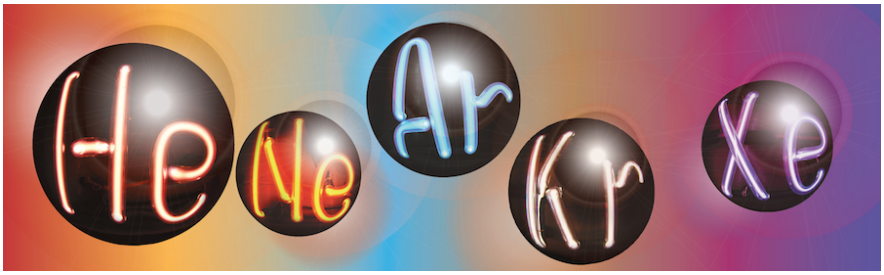

Contribution ID: **39** Type: **Oral**

Advancements in SiPM Technology for Cryogenic Detectors for Dark Matter and Neutrino Research

Tuesday 27 August 2024 11:50 (20 minutes)

Silicon PhotoMultipliers (SiPMs) are being explored as potential photosensors employed in detectors operating at low temperatures, such as noble liquid (argon or xenon) experiments used in direct dark matter searches and neutrino physic investigations. Several studies have been conducted to optimize the features of these silicon photosensors, and many tests have been performed to improve the performances of SiPMs. In particular, the enhancement of photon detection efficiency is an essential requirement for dark matter and low-energy neutrino detection.

In the present work, we will review the historical transition from the first studies, through extensive R&D efforts, to the recent initial applications in real experiments at cryogenic temperatures.

An examination of the main SiPMs parameter behavior in cryogenic environments will be carried out, and the state-of-the-art of cryogenic SiPMs will be reported. We will then discuss the achieved performance of cryogenic SiPMs within ongoing detectors and their application in future experiments.

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Session Classification: Light/Charge Readout

Track Classification: Light/charge readout (PMT, SiPM, WLS, electronics etc.): SiPM