

Update on Photon Detection Module for Large-Scale Noble Liquid Experiments and Precise Timing Systems

Friday, May 28, 2021 9:25 AM (30 minutes)

This contribution presents an update on the Photon Detection Module (PDM) R&D for large-scale noble liquid experiments and precise timing systems. Based on a multilayered silicon interposer, for radio purity and coefficient of thermal expansion matching between its components, the PDM has built-in modularity for system scaling. It is based on an array of Photon-to-Digital Converters (PDCs, a.k.a. digital SiPMs), which have advantages over analog SiPMs by using the boolean nature of Single Photon Avalanche Diodes (SPADs). The PDM also includes a tile controller for digital signal processing, timestamping and to manage the various components. Then a power management integrated circuit is required to bias the SPADs and the PDM components. Finally, a laser-less silicon photonics-based communication module is integrated to interface with the data acquisition system. The implementation status, challenges and benefits of each component will be discussed.

TIPP2020 abstract resubmission?

No, this is an entirely new submission.

Funding information

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Session Classification: Plenary