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Readout of Large Capacitance SiPMs in Noble Liquid TPCs

Tuesday, May 25, 2021 10:42 AM (18 minutes)

Silicon Photomultipliers (SiPMs), used for light detection in Noble Liquid Time Projection Chambers (TPCs), can be ganged as good spatial resolution is not needed in the light detection. Thus, the detector capacitance seen at the input of the SiPM readout electronics is larger than any previous detector arrangement: from 5 to 12.5 nF. We propose an integrated readout system suitable for reading out large capacitance SiPM arrays in Noble Liquid TPCs, using two cryogenic ASICs developed at BNL. The two-ASIC readout separates high sensitivity analog functionality from mixed and digital circuits, optimizes allocation of functionalities with fewer risks, and makes paths of development more independent. The analog ASIC is a modified LArASIC chip developed for the readout of charge signals in liquid Argon TPCs. The signal and data processing ASIC provides the ADC, digital filtering, data processing, receives the configuration data, commands and synchronization, and drives data to the DAQ.

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Primary authors: RESCIA, Sergio; Dr BOLOTNIKOV, Aleksey (Brookhaven National Laboratory); CARINI, Gabriella (Brookhaven National Laboratory); CHEN, Hucheng (Brookhaven National Laboratory); CHIU, Mickey (Brookhaven National Laboratory); DABROWSKI, Mieczyslaw (Brookhaven National Laboratory); DEPTUCH, Grzegorz (Brookhaven National Laboratory); GASO, Shanshan (Brookhaven National Laboratory); GIACOMINI, Gabriele (Brookhaven National Laboratory); MIRYALA, sandeep (Brookhaven National Laboratory); MOORE, David (Yale University); RADEKA, Veljko (Brookhaven National Laboratory); RAGUZIN, Eric (Brookhaven National Laboratory); TSANG, Thomas (Brookhaven National Laboratory); WORCESTER, Matthew (Brookhaven National Laboratory)

Presenter: RESCIA, Sergio

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