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Design of Front End Electronics for direct dark matter detection based on LAr

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Liquid argon (LAr) with a high light yield of approximately 40 photons per keV is an attractive target for the direct detection of WIMPs, which are well motivated galactic dark matter candidates. In this paper, we present a front end electronics design for a LAr dark matter detector with the scintillation read out by PMT, which has an input dynamic range from 5pC to 1nC, and high resolution that single photoelectron can be distinguished. The design consists of 8 preamplifier modules (PAMs), 2 Front end Digital Modules (FDMs) and a Trigger Clock Module (TCM). The FDMs are each equipped with two 14-bit 1-GSPS analog-to-digital converters (ADCs), and the performance of prototype FDM had been test in lab (e.g. Enob is 10.18 bits @175MHz). Moreover, this prototype FDM had been tested with LAr detector collaboratively and test results are also presented.

Minioral

Yes

Description

system

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