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Development of a Fast Timing ASIC for Large-area SiPM Array Readout

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The detector of tRopIcal DEep-sea Neutrino Telescope (TRIDENT), hybrid digital optical module (hDOM), employs large-area silicon photomultiplier (SiPM) arrays combined with photomultiplier tubes to boost photon detection efficiency and pointing capability. The experiment requires that the time response of the single photon signal read out by the SiPM array is less than 300 ps (full width at half maximum, FWHM). A fast timing ASIC is designed to read out the fast signal of the SiPM array with a square centimeter area (dozens of S13360-3050CS). Each SiPM in the array can generate a trigger signal. The trigger signals of multiple channels are combined into one channel and output to the off-chip TDC in the LVDS standard. The post-simulations show that the timing jitter is less than 200 ps (FWHM) with the single photo-electron signal input. Compared to the discrete device readout approach, this ASIC has the advantages of higher integration and lower power consumption.

Minioral

Yes

IEEE Member

No

Are you a student?

Yes

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