

Development of a waveform readout system for Ge detectors in hypernuclear gamma-ray spectroscopy

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For a hypernuclear gamma-ray spectroscopy experiment at the J-PARC K1.8 beam line, a new Ge detector array (Hyperball-J) is under construction.

Hyperball-J consists of 32 Ge detectors that have a transistor-reset preamp.

The reset-type preamp is necessary to withstand the high energy deposit rate in the experiment caused by penetrations of high energy beam particles.

The maximum beam intensity of J-PARC is expected to reach to 10 MHz which is 5 times larger than that of KEK-PS.

Current readout circuit including pulse height ADC will fail from increased baseline shifts after the preamp reset and pileup events.

As a new readout method, a waveform readout system is being developed.

At the present stage, We have succeeded in reading correct energy by fitting to a digitized waveforms.

When shaping time is 2 usec, energy resolution is FWHM 3.5 keV for 1 MeV gamma ray.

The minimum separation of two pulses that can be resolved is 1 usec.

In this presentation, I will discuss an algorithm that has been developed and report on the performance of the new readout method for J-PARC experiment.

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