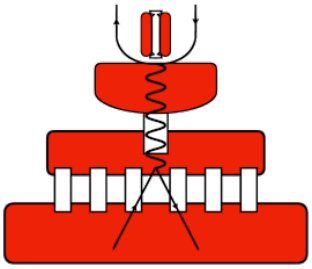

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The Data-Acquisition System with Cluster-Finding Trigger at the J-PARC KOTO Experiment

Tuesday, 10 September 2019 17:40 (1 minute)

The J-PARC KOTO experiment aims to search the rare kaon decay $K_L^0 \to \pi^0\nu\bar{\nu}$, which breaks CP in the FCNC process. It is sensitive to the new physics beyond the Standard Model because of the small theoretical uncertainty. The signature of $K_L^0 \to \pi^0\nu\bar{\nu}$ is two photon clusters on the CsI calorimeter from the pion without any hit in other detector components. To collect $K_L^0 \to \pi^0\nu\bar{\nu}$ with that signature, the two-level trigger system is introduced. The custom-designed ADCs continuously sample and digitize the analog pulses from nearly 4000 channels for each $8\ ns$. The first level trigger is determined by the combination of energy sum in the CsI calorimeter and other detector parts in veto. The clustering bits generated in each ADC are then sent to a custom-designed module for counting the number of clusters, which is the condition for the second level trigger. The architecture and the performance of this system after the commission from 2017 will be presented.

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