

The Data-Acquisition System of the KOTO Experiment

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The KOTO experiment searches for the rare kaon decay $K_L^0 \rightarrow \pi^0 \nu \bar{\nu}$. Because of the small theoretical uncertainty in the Standard Model, it is sensitive to the new physics. In order to collect the signal events, pipeline readout is developed to enable two-level trigger decisions. The first level requires energy sum in the calorimeter and the absence of signal in other detector components. The second level requires two electromagnetic showers (clusters) in the calorimeter. Pulses from nearly 4000 channels are digitized and recorded by the custom analog-to-digital (ADC) modules with a pipeline depth of about 5.2 μs . The entire system was completed in June 2018. The dead time was measured to be 0.16 μs and the live time ratio was > 99%. In the near future, custom modules with multiple optical receivers will be used to transfer data from the ADCs and to build events. Then complete events are sent to the PC farms via 10 Gbps optical links for sophisticated trigger decisions (Level-3). In addition to improve the data collection efficiencies, it broadens the physics triggering capabilities for the KOTO experiment. The overall architecture and the prospects of this upgrade will be presented.

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Secondary track (number)

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