

Crate Distribution and Trigger Processing Module for the KOTO Experiment

This paper introduces a new Crate Distribution and Trigger Processing Module (CDT) designed for the KOTO Experiment at J-PARC, Japan.

The CDT Module will work in the existing KOTO-ADC crates. Each 6U VME Crate includes 16 ADC Modules which require an 8ns sampling clock and two trigger pulses.

This new Module receives these signals from the System Master and distributes them to the ADCs via CAT6 Interconnects.

In addition to this Fan-Out Function, the new CDT Modules collect high speed serial LVDS Data from the ADC modules, representing Cluster Bits from each ADC Channel.

This new feature doesn't require new ADC hardware and the Cluster Data are recorded via the same CAT6 cables that are used for Fan-Out.

All local Cluster Bits from the KOTO CsI Crates are gathered into one place, a Decision Making CDT (DM-CDT), where a system Cluster Map is generated.

Communication between the Crate CDT and the DM-CDT is done via optical Links at 2.5Gbps data rate.

Cluster Numbers, calculated inside the DM-CDT, are sent to Master via a CAT6 cable.

Currently in the KOTO Experiment, the Level-1 Trigger decision is made based on the Total Energy of the Calorimeter.

The Cluster Numbers collected with the new CDT, will be used in combination to the Total Energy values for an enhanced Level-1 Trigger decision.

The full design and final test results are presented.

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