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The NA62 Liquid Krypton calorimeter readout system.

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The NA62 experiment at CERN SPS accelerator will study the ultra-rare decays of charged kaons. The high-resolution Liquid Krypton (LKr) electromagnetic calorimeter is a key component of the experiment photon-veto system.
The new LKr readout system comprises 14 thousand 14-bit ADC acquisition channels, 432×1 Gbit Ethernet data request and readout links routed by 28×10 Gbit network switches to the experiment computer farm, and distinct timing, trigger and control (TTC) distribution system.
This paper presents the architecture of the LKr readout and TTC systems, the overall performance and the first successfully collected experiment physics data.

Summary

The LKr readout system has a modular multi-channel architecture based on 14-bit ADC, high-capacity DDR3 SoDIMM memory modules and high-speed serial links. In addition to the data processing and readout, the LKr digitised signals from the selected channels are summed to build super-cells and delivered to the experiment trigger system.
The rate of kaon decays reaching the detector is about 10 MHz and only a very small fraction of these events are interesting. Therefore, the data taking sequence is driven by high-performance triggering system based on the TTC system that was developed for the LHC experiments and is used by all NA62 sub-detectors. The LKr-specific TTC-LKr interface receives all timing signals via the optical distribution network. It then converts, decodes and delivers these signals to the calorimeter data acquisition electronics.
The complete back-end electronics is composed of 432 32-channel Calorimeter REAdout Module digitisers (CREAM) and 28 TTC interface (TTC-LKr) modules housed in 28 6U VME64 crates which, together with 28 10 Gbit network routers, are arranged in eight 58U racks.
The entire LKr readout was commissioned and first physics data of the new NA62 experiment were successfully collected in the fall of 2014, after CERN's Long Shutdown. The LKr readout system has demonstrated excellent overall performance beyond the experiment requirements.

Primary author: RYJOV, Vladimir (CERN)

Co-authors: CECCUCCI, Augusto (CERN); ROUET, James (CERN); DE SIMONE, Nicola (Universita e INFN Roma Tor Vergata (IT)); FARTHOUAT, Philippe (CERN); FANTECHI, Riccardo (Universita di Pisa & INFN (IT)); VENDITTI, Stefano (CERN)

Presenter: RYJOV, Vladimir (CERN)

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