Contribution ID: **113**   Type: **Poster**

KARATE - a setup for high rate tests on the CMS Outer Tracker 2S module readout chain

Thursday 5 September 2019 16:55 (20 minutes)

KARATE (KArlsruher high RAte TEst) is a new system to stress the readout chain of strip modules for the future CMS Outer Tracker at HL LHC. The readout chain of a module starts with CMS Binary Chips (CBC) connected simultaneously to two sensors. The sparsified output is send out via an optical link. KARATE injects patterns with varying pulse heights, occupancies and trigger rates into the CBC giving full control on 48 channels at 40 MHz. Afterwards injection pattern are compared with readout patterns. The talk introduces the system and summarizes measurements on a CBC that is read out electrically.

Summary

KARATE (KArlsruher high RAte TEst) is a new test system to stress the readout chain of detector modules for the upgrade of the CMS Outer Tracker for the high-luminosity LHC. The readout chain of a 2S module consists of 16 CMS Binary Chips (CBC) connected simultaneously to two stacked silicon strip sensors. Each CBC contributes data to the level 1 trigger by detecting particles with large transverse momenta. The output is sparsified on two concentrator chips which are then connected to a Gigabit transceiver preparing the data for output through an optical module. Standard test systems such as test beams or radioactive source measurements need a track reconstruction or do have gaussian distributed hit profiles and do not reach the occupancy or trigger rates expected in the future outer tracker of CMS. KARATE uses a combination of LEDs and photodiodes to inject hit patterns with varying pulse heights, occupancies and trigger rates into the front-end of the CBC giving full control on 48 channels at 40 MHz. This gives the opportunity to directly compare injection patterns with readout patterns. The talk introduces the test system and summarizes measurements on a CBC that is read out electrically.

Author: MAIER, Stefan (KIT - Karlsruhe Institute of Technology (DE))

Co-authors: DIERLAMM, Alexander (KIT - Karlsruhe Institute of Technology (DE)); HUSEMANN, Ulrich (KIT - Karlsruhe Institute of Technology (DE)); MULLER, Thomas (KIT - Karlsruhe Institute of Technology (DE))

Presenter: MAIER, Stefan (KIT - Karlsruhe Institute of Technology (DE))

Session Classification: Posters

Track Classification: Production, Testing and Reliability