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Prototype of a Read-out control ASIC for data collection and commands distribution

CMOS pixel sensors are widely used as Inner Tracker System (ITK) detector for their precise spatial resolution, low noise, fast reaction, and low material budget. STCFpix is a CMOS pixel sensor under development for the ITK in Super Tau-Charm Facility (STCF), which is expected to be a $2 \times 2 \text{ cm}^2$ chip containing 16 K pixels. In the context of the Inner Tracker data path, a STCF Read-Out Controller (STCF-ROC) ASIC has been designed to preprocess, store, aggregate and reorganize the data coming from the STCFpix ASIC. Each STCF-ROC will be responsible for the data collection for 8 CMOS pixel sensors, whose line rate is 400 Mbps. In order to apply to different hit rates, the aggregation mode of STCF-ROC is designed to be configurable. After reforming and packing, the data are transferred to the following optical transceiver ASIC via a minimum of one serial link. Moreover, the main readout mode of STCFpix is triggered externally, so the STCF-ROC receives the trigger signal sent by the back-end, and sends the trigger opcode to the STCFpix ASIC as soon so possible. STCF-ROC also receives complex encoded control information, and sends it to the STCFpix ASIC configuration register after checking and decoding. A prototype of the STCF-ROC ASIC has been designed and fabricated in 130 nm CMOS process, and the test results show that all the designed functionality work well.

Minioral

Yes

IEEE Member

No

Are you a student?

Yes

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