

READOUT ELECTRONICS FOR THE WIDE APERTURE SILICON TRACKING SYSTEM OF THE BM@N EXPERIMENT AT NICA

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BM@N experiment at NICA in Dubna is currently being upgraded for the study of dense nuclear matter in heavy-ion collisions. One of the major upgrades is a new hybrid tracking system consisting of the large-area Silicon Tracking System (STS) and seven GEM planes [1]. STS is based on the modules with double-sided microstrip silicon sensors of CBM-type. The data driven acquisition system of STS is relying on self-triggering readout channels and data processing chain is adopted for the operation with BM@N trigger [2].

The core components of the readout chain are Front-end Boards (FEB), GBTxEmulator board and GBTxEmulator Readout Interface (GERI) board. The front-end board is an integrated part of the STS module. The main components of FEB are eight STS-XYTER ASICs which are needed for the readout of one side of the silicon sensor. The GBTxEmulator board based on FPGA which emulates functionality of the CERN GBTx ASIC [3] and provides a bidirectional optical link between front-end electronics and data processing boards in the server nodes. The GERI board concentrates and pre-processes the data stream, filters the data according to the BM@N trigger signals and provides an interface to configuration and control of the readout electronics. For the needs of integration into the global BM@N DAQ a trigger-based data filtering was developed and implemented. Methods of integration and synchronization of the STS readout chain with the common data acquisition system BM@N experiment are described.

Front-end electronics, electrical connections, data concentrator and architecture of data processing board are described in the report. The results of testing of a pilot version of the readout chain are presented.

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1. The BM@N STS group, "The Silicon Tracking System as Part of the Hybrid Tracker of the BM@N Experiment: Technical Design Report", JINR, Dubna, 2020, ISBN 978-5-9530-0541-8.
2. D. Dementev, M. Guminski, I. Kovalev, M. Kruszewski, I. Kudryashov, A. Kurganov et al., FastData-Driven Readout System for the Wide Aperture Silicon Tracking System of the BM@N Experiment, Physics of Particles and Nuclei 52 (2021) 830.
3. P. Moreira et al., "GBTX manual." <https://espace.cern.ch/GBT-Project/GBTX/Manuals/gbtxManual.pdf> [Online; accessed 22-September-2021], 2018.

The speaker is a student or young scientist

Yes

Section

1. Intermediate and high energies, heavy ion collisions

Primary authors: SHITENKOV, Mikhail (JINR VBLHEP); DEMENTEV, Dmitriy (JINR VBLHEP)

Co-author: MURIN, Yuri (JINR)

Presenter: SHITENKOV, Mikhail (JINR VBLHEP)

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