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## Results from the CBM mini-FLES Online Computing Cluster Demonstrator

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The Compressed Baryonic Matter (CBM) experiment is currently under construction at the GSI/FAIR accelerator facility in Darmstadt, Germany. In CBM, all event selection is performed in a large online processing system, the “First-level Event Selector” (FLES). The data are received from the self-triggered detectors at an input-stage computer farm designed for a data rate of 1 TByte/s. The distributed input interface will be realized using custom FPGA-based PCIe add-on cards, which preprocess and index the incoming data streams. The data is then transferred to an online processing cluster of several hundred nodes, which will be located in the shared Green-IT data center on campus.

Employing a time-based container data format to decontextualize the time-stamped signal messages from the detectors, data segments of specific time intervals can be distributed on the farm and processed independently. Timeslice building, the continuous process of collecting the data of a time interval simultaneously from all detectors, places a high load on the network and requires careful scheduling and management. Optimizing the design of the online data management includes minimizing copy operations of data in memory, using DMA/RDMA wherever possible, reducing data interdependencies, and employing large memory buffers to limit the critical network transaction rate.

As a demonstrator for the future FLES system, the mini-FLES system has been set up and is currently in operation at the GSI/FAIR facility. Designed as a vertical slice of the full system, it contains a fraction of all foreseen components. It is used to verify the developed hardware and software architecture and includes an initial version of a FLES control system. As part of the mini-CBM experiment of FAIR Phase-0, it is also the central data acquisition and online monitoring system of a multi-detector setup for physics data taking. This presentation will give an overview of the mini-FLES system of the CBM experiment and discuss its performance. The presented material includes latest results from operation in several recent mini-CBM campaigns at the GSI/FAIR SIS18.

### Consider for promotion

No

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