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Time-based particle reconstruction and event selection in the CBM experiment.

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The CBM experiment is a future fixed-target heavy-ion experiment at FAIR/GSI, targeting for very rare probe measurements. In order to obtain sufficient statistics, the experiment will operate at high interaction rates of up to 10 MHz. Moreover, most of the trigger signatures are complex and require information from several detector subsystems. Thus, CBM needs a novel data read-out and analysis concept based on free streaming front-end electronics. The CBM experiment will collect time-stamped data into a readout buffer in a form of a time-slice and deliver it to a large computer farm. In order to effectively reduce the number of events to be recorded, a First Level Event Selection (FLES) has to identify a clean event sample containing the desired physical observable.

Grouping measurements into physical collisions in this case must be performed in software and requires reconstruction not only in space, but also in time, the so-called 4-dimensional reconstruction. The FLES reconstruction package consists of several modules: track finding, track fitting, event building, short-lived particles finding, and event selection, which allow reconstructing time-slices in parallel (between processor cores). The tracks, reconstructed with the 4D Cellular Automaton track finder, are combined into event-corresponding clusters according to the estimated production time, obtained with the 4D Kalman Filter method. The reconstructed events are given as an input to the KF Particle Finder package for short-lived particle reconstruction. The last stage of the FLES package is a selection of events according to the requested trigger signatures. The reconstruction procedure and the results of its application to simulated collisions for the CBM detector setup are presented.

Content type

Experiment

Collaboration

CBM

Centralised submission by Collaboration

Presenter name already specified

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