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Event building from free streaming data at the CBM

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The CBM will be the first experiment employing a new data streaming technique. All data collected from the CBM detector will be transported to computer farm. Physical objects (such as tracks and vertexes) will be reconstructed at the real time and interesting events will be stored for further detailed analysis. A unit of data in this approach is a timeslice –all data collected from the detector in a given period of time. Each timeslice contains data from many heavy ions collisions and may be treated independently from other timeslices at different nodes of computing farm. Data produced by particles originating from individual heavy ions collision (event) should be used for physical analysis rather than free streaming data. Event building can be performed at different data levels. The simplest event building technique works at the level of individual activations of readout electronics channels (digis). Each digi contains information about activation time, readout channel number, etc. Event building can be divided on two steps. The first one is an event finding and the second one is an event composition, when data corresponding to found event collected from several subdetectors. Event finding is performed using data only from a given CBM subdetector. This subdetector should be fast, has good time resolution and low noise levels. In general, event is found if the number of digis in a given time window exceeds a given threshold which depends on colliding system and interaction rate. Currently STS and BFTC considered as a data sources for event finding. General event composition method for different subdetectors has been developed and tested. The digi from a given subdetector is attributed to the event if its time after correction lies in an acceptance time window. The acceptance time window should be extended according to time resolution of the subdetector. r/c should be subtracted from the digi time for the correction, where r is a distance between triggered readout channel and c is a speed of light. This event composition method works for all subdetectors except calorimeters.

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