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Selected event reconstruction algorithms for the CBM experiment at FAIR

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Development of fast and efficient event reconstruction algorithms is an important and challenging task in the Compressed Baryonic Matter (CBM) experiment at the future FAIR facility. The event reconstruction algorithms have to process terabytes of input data produced in particle collisions. In this contribution, several event reconstruction algorithms, which use available features of modern processors, namely, SIMD execution model, are presented. Optimization and vectorization of the algorithms in the following CBM detectors are discussed: Ring Imaging Cherenkov (RICH) detector, Transition Radiation Detectors (TRD) and Muon Chamber (MUCH). In RICH event reconstruction includes ring finding (based on Hough Transform method), fitting (based on circle or ellipse fit methods) and association of reconstructed rings and tracks. In TRD and MUCH track reconstruction algorithms are based on track following and Kalman Filter methods. All algorithms were significantly optimized to achieve maximum speed up and minimum memory consumption. Obtained results showed that a significant speed up factor for all algorithms was achieved and the reconstruction efficiency stays at high level.

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