

Track Reconstruction in the Muon and Transition Radiation Detectors of the CBM Experiment at FAIR

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The Compressed Baryonic Matter (CBM) experiment at the future FAIR accelerator at Darmstadt is being designed for a comprehensive measurement of hadron and lepton production in heavy-ion collisions from 8-45 AGeV beam energy, producing events with large track multiplicity and high hit density. The setup consists of several detectors including as tracking detectors the silicon tracking system (STS), the muon detector (MUCH) or alternatively a set of Transition Radiation Detectors (TRD).

In this contribution, the status of the track reconstruction software including track finding, fitting and propagation is presented for MUCH and TRD.

Since both MUCH and TRD detectors have similar designs where material layers are alternating with detector stations the track reconstruction algorithm is flexible with respect to its applicability to different detectors. It is an important ingredient to feasibility studies of different physics channels and to the optimization of the detectors.

The track propagation algorithm takes into account an inhomogeneous magnetic field and includes accurate calculation of multiple scattering and energy losses in the detector material. Track parameters and covariance matrices are estimated using the Kalman filter method and a Kalman filter modification by assigning weights to hits and using simulated annealing. Two different track finder methods based on track following and these approaches are developed with either using track branches or not.

The track reconstruction efficiency for central Au+Au collisions at 25 AGeV beam energy using events from the UrQMD model is at the level of 93-97% for both detectors.

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