Contribution ID: **117** Type: **oral**

Ring Recognition and Electron Identification in the RICH detector of the CBM Experiment at FAIR

Thursday, 26 March 2009 14:00 (20 minutes)

The Compressed Baryonic Matter (CBM) experiment at the future FAIR facility at Darmstadt will measure dileptons emitted from the hot and dense phase in heavy-ion collisions. In case of an electron measurement, a high purity of identified electrons is required in order to suppress the background. Electron identification in CBM will be performed by a Ring Imaging Cherenkov (RICH) detector and Transition Radiation Detectors (TRD).
In this contribution we will present algorithms and software which have been developed for electron identification in CBM. Efficient and fast ring recognition in the RICH detector is based on the Hough Transform method which has been accelerated considerably compared to a standard implementation. Ring quality selection is done using an Artificial Neural Network which also has been used for electron identification. Due to optical distortions ellipse fitting and radius correction routines are used for improved ring radius resolution. These methods allow for a high purity and efficiency of reconstructed electron rings. For momenta above 2 GeV/c the ring reconstruction efficiency for electrons embedded in central Au+Au collisions at 25 AGeV beam energy is 95% resulting in an electron identification efficiency of 90% at a pion suppression factor of 500. Including information from the TRD a pion suppression of 10000 is reached at 80% efficiency.
The developed algorithm is very robust to a high ring density environment. Current work focuses on detector layout studies in order to optimize the detector setup while keeping a high performance.

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Session Classification: Event Processing

Track Classification: Event Processing