Development of a Two Dimensional Position Sensitive Transition Radiation Detector for High Energy Electron Identification in High Counting Rate Experiments

M. Petriş, **M. Petrovici**, **V. Cătănescu**

Horia Hulubei National Institute of Physics and Nuclear Engineering, Bucharest-Magurele, P.O.Box MG-6, RO-077125, Romania

The CBM experiment is a heavy ion fixed target experiment at the future accelerator FAIR aiming to investigate the properties of nuclear matter at extreme conditions of temperature and baryonic density. The measurement of rare probes requires high beam intensities with reaction rates up to 10 MHz. In order to meet the challenging physics goal of measuring rare probes with accurate vertex determination at such interaction rates and high multiplicity, the experimental setup has to identify leptons and hadrons in high counting rate environment. The high interaction rates require fast and radiation hard detectors with a dedicated self-triggered front-end electronics. Moreover, the high multiplicity of about 1000 charged particles in central Au+Au collisions at 25 AGeV requires high granularity detectors.

Transition radiation detectors (TRD) for identification of high-momentum electrons with a pion rejection factor of $\sim$100 for 90% electron efficiency and tracking of all charged particles are considered to be part of the experimental set-up. The most forward CBM-TRD detectors have to cope with counting rates up to 100 kHz/cm^2.

The TRD prototypes developed in our group fulfill the required performance for electron discrimination with a minimized number of TRD layers. They provide as well the position information across and along the readout electrode pads with a single TRD layer with very good position resolutions. For processing the signals of the developed TRD prototypes, a new front-end ASIC called Fast Analog Signal Processor (FASP) has been developed. Details on the performance of the TRD prototypes operated using developed FEE will be presented.