Contribution ID: **51** Type: **not specified**

Development of GEM gas detectors for X-ray crystal spectrometry

Monday, 1 July 2013 16:45 (1h 10m)

The high-resolution X-ray spectroscopy is a powerful tool for diagnosing the properties of tokamak plasmas. The Bragg crystal X-ray spectroscopy has become well-established technique for diagnosing important plasma parameters. The characteristic X-ray radiation emitted by highly ionized metal impurities provides accurate information on the crucial plasma parameters such as impurity concentrations, ion temperature, and the toroidal rotation velocity [1,2]. High-resolution X-ray diagnostics for MCF devices is expected to allow monitoring the plasma radiation emitted by highly ionised impurity elements. For the purpose of detecting X-ray lines intensities from the energy resolved diagnostics two detectors based on Triple GEM amplification followed by the strip readout electrode were developed in order to measure intensities of soft X-ray radiation diffracted by the crystal suitable for the specific soft X-ray energy range. The characteristic X-ray lines are planning to be measured by new generation energy-resolved micropattern gas detectors with 1-D position reconstruction capability. The analogue signal processing electronics should allow on-line energy measurement and position reconstruction with the precision better than the strip pitch. The monitoring system should provide the measurements of the plasma evolution in time-slices corresponding to 10 ms exposures. In this work we present the development of Triple-GEM detectors guiding to fulfil the mentioned above conditions for monitoring the X-ray emitted by tokamak plasma in the energy region from 2 to 10 keV. The constructed detector has 256 readout channels with the dedicated system for on-line data stream processing. The detector window is of about 20x10 cm2 size. As a conversion medium Ar:CO2 (70:30) gas mixture of 1.5 cm thickness was chosen. Selected results of measurement tests applying the 55Fe and X-ray generator sources will be presented. REFERENCES: [1] K-D Zastrow, H W Morsi, M Danielsson, M G von Hellermann, E Källne, R König, W Mandl and H P Summers,
J Appl Phys 70, 6732 (1991) [2] K. W. Hill et al., Rev. Sci. Instrum. 79, 10E320 (2008)

Presenter: CHERNYSHOVA, Marina

Session Classification: Monday (poster session)