Contribution ID: **82** Type: **Poster**

Essential data processing for soft X-ray diagnostics based on GEM detector measurements for fusion plasma imaging

Tuesday, 13 October 2015 16:20 (0 minutes)

The measurement system based on GEM - Gas Electron Multiplier detector is developed for X ray diagnostics of magnetic confinement tokamak plasmas. The fast and accurate mode of the serial data acquisition is applied for the dynamic plasma diagnostics. The ADC samples triggered by the detector current are acquired independently for the measurement channels. The charges are calculated within the defined time window for the activated channels. Coinciding signals for high flux radiation cause the problem for cluster charge identification. The amplifier with shaper determines time characteristics and limits the pulses frequency. Separation of overlapped signals was introduced and verified for simulation experiments. Data are synchronized with the specified ADC frequency and discrete intervals of charge acquisition are the multiples of the sampling time. Resulting data samples form the table of chronological triplets: [charge value, channel number, triggered time]. Data packages are loaded sequentially to the DDR memory and finally are conveyed to the PC. The charge cluster is identified as a set of adjacent pixel charges in the area of the detector. Regular clusters are counted in the four dimensional space determined by 2-D position, energy (charge value) and time intervals. Final data processing is presented in any 2-D cross-section for selected range of position, energy (charge) and time interval. Several detector structures with single-pixel channels and multi-pixel (directional) channels are considered for two-dimensional X-ray imaging. Radiation source properties are measured by the basic cumulative characteristics: the cluster position distribution and cluster charge value distribution related to the energy spectra.

Primary author: Dr CZARSKI, Tomasz (Institute of Plasma Physics and Laser Microfusion)

Co-authors: Mr WOJENSKI, Andrzej (Warsaw University of Technology); Dr KASPROWICZ, Grzegorz (Warsaw University of Technology); Dr MALINOWSKI, Karol (Institute of Plasma Physics and Laser Microfusion); Prof. POZNIAK, Krzysztof (Warsaw University of Technology); Dr CHERNYSHOVA, Maryna (Institute of Plasma Physics and Laser Microfusion); Dr KOLASINSKI, Piotr (Warsaw University of Technology); Mr KRAWCZYK, Rafal (Warsaw University of Technology); Dr ZABOLOTNY, Wojciech (Warsaw University of Technology)

Presenter: Dr CZARSKI, Tomasz (Institute of Plasma Physics and Laser Microfusion)

Session Classification: Poster session & coffee break

Track Classification: Applications