**Hybrid Garfield++ simulations of GEM detectors for tokamak plasma radiation monitoring**

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Extreme conditions in fusion reactors necessitate development of new Soft X-Ray (SXR) diagnostic systems, which are able to withstand high radiation environment. Such a system, among the others, should assure safe operation of the machine by monitoring the level of plasma radiation. As high neutron fluxes preclude application of semiconductor-based technologies at future fusion devices, the use of relatively new micropattern gas detectors is being considered instead. The detectors of this type, based on Gas Electron Multiplier (GEM) technology, are being developed for use in tokamak plasma monitoring. The constructed working systems were already tested at the WEST project and other devices. Long term plans may envisage usage of gaseous detector based SXR diagnostics in ITER and in DEMO for real time plasma monitoring and control.

For this use case a full-detector simulation software was created based on the already existing interface and previous results obtained so far within the group. It takes into account interactions of high energy photons and neutrons with the detector parts with proper handling of primary ionization electrons tracks, gas mixture fluorescence and collisions with detector materials. Software combines Geant4 package for interactions with solid parts of the detector, Garfield++ for electron avalanching, Heed for X-ray interaction with gas, Gmsh and Elmer for meshing and electrostatics and introduces a hybrid approach to the simulation of electron drift in different regimes. For further optimization the developed software employs precomputation algorithms in later stages of the electron cascades, where individual electron tracks can be substituted with statistical density distributions. The simulated response profiles of the detector, exposed to 55Fe calibration source radiation, were simulated and verified by comparing them with experimental data. This contribution will present details of hybrid simulator implementation as well as simulation results.