Contribution ID: **428** Type: **Poster**

GTS - Garfield-based Triple-GEM Simulator

Tuesday, November 5, 2019 4:15 PM (15 minutes)

Triple-GEM detectors are gaseous devices used in high energy physics to measure the path of the particles which cross them. The characterisation of triple GEM detectors and the estimation of the performance for real data experiments require a complete comprehension of the mechanisms which transform the passage of one particle in the detector into electric signals, and dedicated MonteCarlo simulations are needed. In this work we will describe GTS (Garfield-based Triple-gem Simulator), a MonteCarlo code which has been developed to simulate the detector response from the passage of particles inside triple GEMs. The software takes into account the processes from the primary ionization up to the signal formation, e.g. avalanche multiplication and the effects of the diffusion on the signal in the gas volume. The software uses a parametrization of the variables of interest to reproduce the detector response based on Garfield, a well known software in literature that already performs this kind of simulation, but with a high consumption of CPU time: GTS reduces significantly the computation time. In addition to the detector response, the simulation of the APV-25 electronics is implemented and the output is used to reconstruct the particle position with the Charge Centroid (CC) and the micro-Time Projection Chamber (μTPC) methods, for the first time in a triple-GEM simulator. A comparison of the simulated performance and the one collected in test beams is used to tuned the parameters used in GTS. Results in different conditions of magnetic field, high voltage settings and incident angle will be shown.

Consider for promotion

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Session Classification: Posters

Track Classification: Track 2 – Offline Computing