A performance study of the conceptual implementation of the GEM-tracking detector in Monte Carlo simulation

N Divani Veis¹,²,³, M M Firoozabadi¹, and T R Saito²,³

1. Department of Physics, Faculty of Science, University of Birjand, Birjand, Iran
2. Helmholtz Center for Heavy Ion Research, GSI, Darmstadt, Germany
3. Helmholtz Institute of Mainz, Mainz, Germany

E-mail: n_divani@birjand.ac.ir, n.divani@gsi.de

(Received 22 May 2017; in final form 18 July 2019)

Abstract

PANDA experiment (antiProton ANnihilation at DArmsstadt) is one of the key projects of the future FAIR facilities to investigate the reactions of antiprotons with protons and nuclear targets. PANDA experiment is designed to serve as a completely extraordinary physical potential due to exploiting the availability of cold and high-intensity beams of antiprotons. One of the significant parts of the PANDA set-up consists of gas electron multiplayer tracking systems which are under study and construction. A gas electron multiplier GEM is a type of gaseous ionization detector used as the first forward tracking system behind the central tracker in the PANDA setup to improve the measurement of charged particle trajectories with a high resolution in the forward direction. This study is concerned with implementing and developing one typical kind of these systems using Monte Carlo simulation based on the conceptual design and investigation of its performance.

Keywords: PANDA experiment, GEM detectors, track efficiency and track momentum resolution, fractional radiation length.