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A model of charge transfer processes in GEM foils

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Tracking detectors based on GEM foils are widely used in ongoing experiments and are the choice for numerous upgrades in the near future. An example is ALICE at the LHC of CERN, where the use of GEM foils will allow the TPC to be employed in a high-rate environment.

In order to optimize and predict the performance of GEM detectors in terms of gain, energy resolution and ion backflow, a good and quantitative understanding of charge transfer processes of electrons and ions between the individual GEM foils is mandatory. Based on analytic electric flux calculations a model has been derived in order to describe the charge transfer for GEM foils in terms of the GEM geometry (hole size, pitch and thickness) and the electric field configuration. The obtained expressions inherently describe the characteristic curves of the charge transfer efficiencies and predict the asymptotic limits as found in simulations. The results will be presented and compared to simulations using Magboltz and Garfield++.

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