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Performance Evaluation of the COBRA GEM for the Application of the TPC KOHEI TERASAKI, HIDEKI HAMAGAKI, TAKU GUNJI, Center for Nuclear Study, Graduate School of Science, University of Tokyo, YORITO YAMAGUCHI, Stony Brook University — Suppression of the back-drifting ions from avalanche region to drift space (IBF: Ion Backflow) is the key for a Time Projection Chamber (TPC) since IBF easily distorts the drift field. To suppress IBF, Gating Grid system is widely used for the TPC but this limits the data taking rate. Gas Electron Multiplier (GEM) has advantages in the reduction of IBF and high rate capability. By adopting GEM, it is possible to run a TPC continuously under high rate and high multiplicity conditions. Motivated by the study of IBF reduction for RICH with Thick COBRA, which has been developed by F. A. Amero et al., we developed COBRA GEMs for the application of a TPC. With a stack configuration, IBF reaches about $0.1 \sim 0.5\%$, which is $\times$ 5-10 better IBF than the standard GEMs. However, the measured energy resolution with COBRA is 20% (σ) and this is much worse than the resolution with standard GEMs. Measurement of long-time stability of gain indicates that gain of COBRA varies significantly due to charging up effect. Simulation studies based on Garfield++ are performed for understanding quantitatively the reasons of worse energy resolution and instability of gain. In this presentation, we will report the simulation studies together with the measured performance of the COBRA GEM.

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