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Ion Back Flow Suppression From a Passive Gating Grid

Future high luminosity experiments, such as sPHENIX or any EIC detector, will greatly benefit from the use of a Time Projection Chamber (TPC) as one of its main tracking systems. A TPC's ability to measure space points of charged tracks makes it an excellent detector for the desired resolution in momentum and energy loss dE/dx . The resolution is limited by distortions from Space Charge (SC) in the drift volume, and the main contribution to SC is from ions created in the amplification stage. Reducing SC is thus done through suppressing the Ion Back Flow (IBF) coming from the gain area. We are studying this suppression using a bi-polar gating grid. Past experiments have successfully used active grids, but we are exploring a passive grid in a magnetic field in order to allow high electron transparency while maintaining low ion transparency. Furthermore, I'll discuss the position distortion of electrons, which results from moving along the bi-polar wire, and our strategy to compensate for these non-linear responses by pre-distorting our unique Zig-Zag readout pads.

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