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Precise evaluation of electric field distortion in the ILD-TPC

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The ILD (International Large Detector) is currently proposed as a measurement concept for the Higgs Factory, which uses Time Projection chamber (ILD-TPC) combined with a gas and an electron amplifier device as the central track detector for momentum measurement. It is necessary to consider the problem that positive ions generated during the generation of ionized electrons distort the electric field in the drift space, which distorts the drift electron trajectory. It is very important to investigate the effect of electric field distortion in order to confirm the usefulness of the track detector.

In this study, based on the simulation results of space charge distribution, the effect of distortion of the electric field due to ions in 3-dimensional space within the TPC on the arrival position of ionized electrons was evaluated. Although electric field distortion has been analyzed in 2D space, a high-precision investigation in 3D space has not been conducted. We will continue our quantitative evaluation and simulations for various charge distributions to generalize the trend of the electric field distortion and its effect on the arrival position of ionized electrons.

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