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A Simulation Study on Residual Gas Chamber Based Photon Beam Position Monitor

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Contaminated photon beams which comes from upstream and downstream dipole magnet in between an Insertion Device (ID), the main light source, often cause a critical measurement error on blade-type Photon Beam Position Monitors (PBPMs). The reason of such misreading is that the center position of the beam is calculated by only with the weak photoelectric current generated from both ends of the blade. Instead of direct photoelectric effect on metal blades, we considered an ionization of residual gas as a main detecting principle of photon beam position to remove the measurement error caused by the contamination. Realistic photon beam profiles which comes from the ID and dipoles were generated, and they were used as a photon source of beam-gas interaction calculation in order to get a distribution of ionized electrons. The electrons were tracked inside a conceptually designed model that consisting of residual gas chamber, electrodes and uniformly distributed electric field. In this paper, we introduce a Monte Carlo simulation method of gaseous type PBPM and a preliminary result of the parameter optimization

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Footnotes

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