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Simulations of various GEM foil hole geometries using Garfield++[1] PHAM PHUONGANH, National Superconducting Cyclotron Laboratory, MSU, THE MONA COLLABORATION — The Gaseous Electron Multiplier (GEM) detector is used to detect ionizing radiation. A GEM detector consists of a gas filled volume containing a thin polymer layer that is coated with metal on both sides. The thin layer is perforated to achieve a high density (50 - 100 mm-2) of small holes with diameters of roughly 50 microns. A large potential difference (typically 400 V) is applied between the two metal surfaces in order to create a large electric field inside the holes, thus producing an electronic avalanche from the electrons created by the ionization of gas molecules by the incoming radiation. The electron shower drifts to a collection electrode where they produce a measurable charge that is proportional to the energy deposited by the radiation in the gas volume. Simulations using Garfield++ were run for five different geometries with various sizes (top/middle/bottom m): double conical (70/50/70 m), conical (30/50/70 m), inverted conical (70/50/30 m), cylindrical (70/70/70 m), and cylindrical-50 (50/50/50 m). Preliminary simulations show that a larger hole size will allow more electrons to pass through the GEM layer, however, a reduction in gain due to a smaller hole size can be compensated by a higher density of electric field lines which produces a larger avalanche.

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