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Study of triple and quadruple GEM detector[1] SOURAV TARAFDAR, BRANDON BLANKENSHIP, VICKI GREENE, MIKE Z REYNOLDS, JULIA VELKOVSKA, Vanderbilt Univ — Gas Electron Multipliers (GEMs) are gaseous ionization detectors operated using the principle of multistage avalanche of primary ionizing electrons, which results in the amplification of weak signals. GEMs are used in both particle and nuclear physics and medical science. The parameters associated with the performance of GEMs are effective gain, ion back flow, energy resolution, and stability over time. The choice of gas mixture for operating GEM detectors also affects their performance. The effective gain quantifies the avalanche process by the GEM while the ion back flow characterizes the fraction of Ions that drift in the opposite direction to the avalanche electrons in GEM detectors. The backwards-drifting Ions in GEM detectors are undesirable because they distort the uniform electric field in the detector gas volume. Studies done by our group involve optimizing the effective gain for different gas mixtures over various operating voltages, reducing ion back flow while enhancing the energy resolution for detected particles for both triple and quadruple gem detectors.

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