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Expansion of an Ultracold Plasma with an Exponential Density Profile[1] MACKENZIE WARRENS, GRANT GORMAN, THOMAS KILLIAN, Rice University — Ultracold neutral plasmas (UNPs) provide a powerful platform for studying a wide range of fundamental plasma processes, including the expansion of a plasma into surrounding vacuum. Most previous experiments with UNPs have been performed with plasmas possessing a Gaussian density profile, for which the expansion is well characterized and provides a useful diagnostic of initial electron temperature and three-body recombination in the plasma. A defining characteristic of a Gaussian plasma is self-similar expansion, which gives important time scales and length scales. While Gaussian plasmas are well understood, other interesting initial profiles have not been explored. This poster describes the expansion dynamics observed for UNPs formed by photoionizing a cold atomic gas from a quadrupole magnetic trap, which creates a plasma with an initial exponential, or "cuspy," density distribution. We find that while the cuspy plasma does not self-similarly expand and other expansion details are different, important expansion time scales and length scales can be identified that are similar to the situation for a Gaussian plasma.

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