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The Effect of Multipole-Enhanced Diffusion on the Joule Heating of a Cold Non-Neutral Plasma STEVEN CHAPMAN, ALEX POVILUS, JOEL FAJANS, University of California - Berkeley, ALPHA COLLABORATION — One proposed technique for trapping anti-atoms is to superimpose a Ioffe-Pritchard style magnetic-minimum neutral trap on a standard Penning trap used to trap the charged atomic constituents. Adding a magnetic multipole field in this way removes the azimuthal symmetry of the ideal Penning trap and introduces a new avenue for radial diffusion. Enhanced diffusion will lead to increased Joule heating of a nonneutral plasma, potentially adversely affecting the formation rate of anti-atoms and increasing the required trap depth. We present a model of this effect with comparison to measurements from an intended anti-atom trap.

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