

The Effects of Patch Potentials in Penning-Malmberg Traps

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Antiprotons created by laser ionization of antihydrogen are observed to quickly escape the ALPHA trap. Further, positron plasmas heat more quickly after the trap is illuminated by laser light for several hours. These unexpected phenomena are caused by patch potentials - variations in the electrical potential along metal surfaces. A simple model for the effects of patch potentials explains the particle loss, and an experimental technique is developed for measuring the magnitude of the electric field produced by the potentials. The model is validated by controlled experiments and simulations.

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