

A Multicell trap for Long-term Confinement of Large Numbers of Positrons*

C. M. Surko and J. R. Danielson
Department of Physics
University of California, San Diego, La Jolla California, USA

There are numerous potential applications of high-capacity and/or portable antimatter traps [1]. Previously, we proposed the design for a high-capacity, multicell Penning-Malmberg trap for positrons [1, 2]. Here, we discuss an improved design based on the results of recent experiments [3] to confine and tailor electron plasmas using the “rotating wall” (RW) technique. We are now able to access a regime in which careful tuning of the RW frequency is unnecessary, and transport is insensitive to plasma density and length [3]. Operating a high-capacity, multicell positron trap in this regime offers a number of advantages. The design of a 95-cell trap for $N \geq 1 \times 10^{12}$ positrons will be discussed. Directions for future work, including possible extensions of this design and practical limits on positron accumulation, will be discussed.

* This work is supported by the National Science Foundation and the Defense Advanced Research Projects Agency.

1. C. M. Surko and R. G. Greaves, *Phys. Plasmas* **11**, 2333 (2004), and references therein.
2. C. M. Surko and R.G. Greaves, *Rad. Phys. and Chem.* **68**, 419 (2003).
3. J. R. Danielson and C. M. Surko, *Phys. Rev. Lett.* **94**, 035001 (2005); and this conference.