Design and Construction of a 21-cell Multicell Trap for Positron Storage

C.J. BAKER, J.R. DANIELSON, N.C. HURST, C.M. SURKO, University of California, San Diego — There are many potential applications of high-capacity and/or portable antimatter traps. We describe the construction (in progress) of a novel multicell Penning-Malmberg (PM) trap designed to store up to $10^{12}$ positrons. The device consists of 21 PM cells (in three banks of 7 cells) within a UHV vacuum system and a 140 mm diameter warm-bore, 5 tesla, magnet. Each cell will use kV confinement potentials and have an azimuthally segmented electrode for diagnostics and plasma manipulation, such as the application of rotating electric fields. An independent, large-diameter master cell will be used to move plasmas, received from a buffer-gas positron accumulator, across the magnetic field to the off-axis cells using autoresonant diocotron-mode excitation. Details of the current design will be presented, as well as scenarios for effective extraction and use of the trapped particles.

1This work supported by the U. S. DTRA.

James Danielson
University of California, San Diego

Date submitted: 11 Jul 2013
Electronic form version 1.4