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Numerical Studies of Accumulation and Improved Confinement of Positrons in APEX S. NISSL, E.V. STENSON, J. HORN-STANJA, U. HERGENHAHN, T. SUNN PEDERSEN, Max Planck Institute for Plasma Physics, H. SAITOH, University of Tokyo, C. HUGENSCHMIDT, M. SINGER, TU München, M. STONEKING, Lawrence University, J.R. DANIELSON, University of California, San Diego — The APEX (A Positron-Electron Experiment) collaboration has the goal to create a magnetized low temperature electron-positron plasma in a magnetic dipole trap. Such a plasma, also called pair plasma, is predicted to have unique characteristics and excellent stability properties due to the equal masses of the participating species. Because the biggest obstacle to producing a low-Debye-length plasma is the number of available positrons, a prerequisite is an efficient positron injection scheme. After multiple iterations of the electrode structure of the experiment and optimization of the applied biases, is has been shown that up to 100% of the NEPOMUC positron beam can indeed be injected. Simulations have shown that the longest measured confinement times (>1s) are limited by positrons hitting the plates that are used to drift-inject the positrons into the dipole field. Further simulations have not only shown that these plates can be shortened without sacrificing the injection efficiency but also suggest that stacking of multiple positron pulses is feasible.

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