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Plans for storing an unprecedented number of positrons[1] MARTIN SINGER, IPP, STEPHAN KOENIG, University Greifswald, JAMES R. DANIELSON, UCSD, PATRICK STEINBRUNNER, IPP, CLIFFORD M. SURKO, UCSC, LUTZ SCHWEIKHARD, University Greifswald, THOMAS SUNN PEDERSEN, IPP, APEX COLLABORATION — The APEX collaboration aims to create the first magnetically confined, low-temperature pair plasma with a spatial dimension of several Debye lengths so that collective behavior will be observable. A major limiting factor for this project is the scarcity of positrons, even at the NEPOMUC, the most intense positron source today. A crucial challenge is the accumulation of large numbers of moderated positrons. A device is needed which is capable of storing up to 10^{11} positrons at low-temperatures ($\sim 0.05\,\mathrm{eV}$) for long times ($\geq 1\,\mathrm{hour}$). A possible solution is the multi-cell Penning-Malmberg trap (MCT) concept, which separates the space charge of the positrons into multiple radially arranged Penning traps. We present first measurements with electrons stored in a single Penning trap and plans for the development of a dedicated MCT. With the single Penning trap the plasma diagnostics and manipulation techniques were tested, which are crucial for the operation of an MCT. These techniques include the measurement of the plasma parameters and the controlled off-axis displacement of the plasma. The MCT will be used to confine plasmas simultaneously in different off-axis cells, and to investigate the confinement as well as different injection and ejections schemes.

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