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Progress toward positron accumulation for use in pair plasmas
E.V. STENSON[1], U. HERGENHAHN, H. NIEMANN, N. PASCHKOWSKI, T. SUNN PEDERSEN, H. SAITOH, J. STANJA, Max Planck Institute for Plasma Physics, G.H. MARX, L. SCHWEIKHARD, Ernst Moritz Arndt University of Greifswald, C. HUGENSCHMIDT, Technische Universität München, J.R. DANIELSON, C.M. SURKO, University of California, San Diego — A Positron-Electron Experiment (APEX) is being developed to create and investigate magnetically confined matter-antimatter pair plasmas in the laboratory. These plasmas, whose oppositely charged species have precisely equal mass, have long been a topic of theoretical and astrophysical interest. The accompanying Positron Accumulation Experiment (PAX) comprises a series of non-neutral plasma traps. PAX will provide a bridge between the parameters of the NEPOMUC (Neutron-Induced Positron Source Munich) beam, from which APEX will receive its positrons, and the parameters needed to achieve at least 10 Debye lengths within APEX's flux surfaces. Presented here is an overview of work from the PAX team. Topics include the following: diagnostics for non-neutral plasmas, including a comparison of phosphor luminescence in response to electrons versus positrons, as well as work on a nonperturbative potential probe; progress to date on injection into and trapping within various sub-components of the experiment (buffer gas trap, accumulator, and high-field trap); and a discussion of design considerations for the next-generation, multi-cell trap to be built for the high-field magnet.

[1]on behalf of the APEX/PAX team and collaborators

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