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Discoveries and developments in support of electron/positron pair plasmas. E. V. STENSON, J. HORN-STANJA, H. SAITOH, S. NIßL, U. HERGENHAHN, T. SUNN PEDERSEN, MPI for Plasma Physics, M. R. STONEKING, Lawrence U., M. SINGER, M. DICKMANN, S. VOHBURGER, C. HUGENSCHMIDT, TUM, L. SCHWEKHARD, U. of Greifswald, J. R. DANIELSON, C. M. SURKO, UCSD — Novel techniques being developed by the APEX/PAX (A Positron Electron eXperiment/ Positron Accumulation Experiment) project are presented. These are crucial steps ib enabling the creation and confinement of an electron-positron pair plasma in the magnetic field of a levitated dipole. A high flux (10^8/s) of low-energy positrons (< 20 eV) has been produced and characterized at the NEPOMUC positron source at FRM-II in Munich, leading to nearly 100% injection of positrons into a dipole magnetic field. Luminescent responses to positrons and electrons have been measured for several phosphors, increasing their utility for both positron beam and plasma diagnostics. Compared to other levitated dipoles, APEX will be much smaller, requiring the solution to a complex optimization problem. Proof-of-principle tests are in progress to verify both the levitation feedback system and cold-head cooling. Finally, several future projects with linear positron traps will be discussed. One extends the capabilities of NEPOMUC by efficient generation of pulsed beams; another seeks to accumulate record numbers of positrons.

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