

A buffer-gas trap for the NEPOMUC high-intensity low-energy positron beam

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Pair plasmas are comprised of positive and negative charges of equal mass. The APEX experiment is being developed to confine an electron-positron pair plasma in the magnetic field of a levitated dipole [1]. In excess of 10^{10} positrons will be needed to fill the trapping volume, which will require new advances in positron accumulation. The invention of the buffer-gas positron trap in the 1980s [2] revolutionized the field of low-energy antimatter physics. These devices exploit inelastic collisions between positrons and nitrogen molecules to capture and collect the former. We present our plans to install a buffer-gas trap at the world-leading low-energy positron facility, the NEPOMUC [3]. We aim to accumulate nonneutral plasmas that contain hundreds of millions of positrons every 60 s. Ultimately, these will be stacked in a separate storage device [4]. Beyond pair plasma experiments, an intense trap-based positron beam will also facilitate new applications. For example, the background-free measurement of positron-annihilation-induced Auger-electron spectra.

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