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A buffer-gas trap for the NEPOMUC positron beam

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Buffer-gas positron traps (BGT) are invaluable for high-resolution matter-antimatter interaction studies, anti-hydrogen research, and positronium laser spectroscopy. These devices exploit inelastic interactions between positrons and nitrogen molecules to accrue a nonneutral e^+ plasma [1]. We present plans to produce short pulses of very low-energy positrons by installing a BGT at the NEPOMUC positron facility [2].

A two-stage BGT and accumulator has been constructed at MPG-IPP to capture positrons from the 20-eV, remoderated NEPOMUC positron beam [3]. Testing of the traps with electron plasmas is underway. Potential applications for the NEPOMUC BGT include positron-annihilation-induced Auger-electron spectroscopy and production of a very dense positronium gas. Together with a high-field multicell trap [4], the BGT will be a crucial component of the APEX pair-plasma experiment [5], which requires an unprecedented number of low-energy positrons.

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Primary author: DELLER, Adam (IPP)

Presenter: DELLER, Adam (IPP)

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