Contribution ID: **112** Type: **Talk (20 min + 5 min discussion)**

A buffer-gas trap for the NEPOMUC positron beam

Thursday, 8 December 2022 17:10 (25 minutes)

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.

This work supported by European Research Council (ERC-2016-ADG No. 741322), U.S. DOE (DE-SC0019271), and the UCSD Foundation.

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Session Classification: Positrons

Track Classification: Positrons