

Abstract Submitted
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Cryogenic Positron-beam System for Atomic Physics¹ M.R. NATISIN, J.R. DANIELSON, C.M. SURKO, University of California, San Diego — Trapped positron plasmas are routinely used to generate beams that can be used for a wide variety of experiments, such as studies of positron annihilation on molecules.² While current beam generation techniques are sufficient, for example, for the measurement of positron-molecule binding energies, more detailed studies are limited by beam energy resolution. Described here is a new method of positron beam formation using a buffer gas cryogenically cooled to 50 K. Simulations of the beam formation process³ are discussed and used to predict an energy resolution of ≈ 9 meV FWHM; a factor of 5 improvement over current techniques. Various possible physical measurements using this technique are discussed, including the ability to resolve individual vibrational mode features in the molecular annihilation spectra.⁴

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²Gribakin, Young, and Surko, *Rev. Mod. Phys.* **82**, 2557 (2010).

³Natisin, *et. al.*, AIP Conf. Proc. **1521**, 154 (2013).

⁴Jones, *et. al.*, *Phys. Rev. Lett.* **110**, 223201 (2013).

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