Abstract Submitted
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Measurement of New Features in Positron-molecule Annihilation Spectrum Using a High-Resolution Positron Beam.[1] J. R. DANIELSON, M. R. NATISIN, S. GHOSH, C. M. SURKO, Univ of California - San Diego — Experiments have shown that the low-energy (sub-eV) annihilation spectra of positrons on molecules is dominated by relatively sharp features that have been identified as vibrational Feshbach resonances.[2] The ability to resolve these features is limited by difficulties encountered in creating beams with sufficiently narrow energy spreads. Recently, we have demonstrated the operation of a cryogenic, buffer-gas trap, with total beam energy spreads as low as 7 meV FWHM and temporal spreads of sub-microsecond duration.[3] Here, experiments are presented using the narrow energy spread beam to measure positron annihilation energy spectra with enhanced energy resolution. New features are observed, including the identification of resonances due to IR-inactive vibrational modes.[4] Attempts to directly measure the effect of overtone and combination modes,[5] will also be reported, as will a discussion of the current limits to the measurements and prospects for the future.

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[2]Gribakin, et al., Rev. Mod. Phys. **82**, 2577 (2010).
[3]Natisin, et al., Appl. Phys. Lett. **108**, 024102 (2016).
[4]Natisin, et al, Phys. Rev. Lett., **119**, 113402 (2017).
[5]Gribakin, et al., Phys. Rev. A, **96**, 062709 (2017).

James Danielson
Univ of California - San Diego

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