

Abstract Submitted
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New structures observed in the positron annihilation spectra of ring-alkane molecules.¹ S. GHOSH, J. R. DANIELSON, C. M. SURKO, University of California San Diego — Annihilation spectra for molecules as a function of positron energy are typically dominated by relatively sharp features that have been identified as vibrational Feshbach resonances (VFR) involving fundamental modes.² The VFR spectral width is expected to be determined by the positron energy distribution (FWHM ~ 36 meV). This is found to be true for some molecules, including small alkane chains. However, for cyclo-alkanes and larger chain alkanes, the observed spectra are significantly broader than that expected for fundamental vibrations. Details of the measured beam distribution will be presented along with measurements of spectral widths for a range of ring and chain alkanes. Preliminary results for cyclopentane using a new high-resolution cryogenic beam (FWHM ~ 20 meV)³, show the broad resonance separates into two distinct peaks, one of which is not due to any known fundamental vibration. Possible physical interpretations of the observed broadening and identification of the new peak will be discussed.

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²Gribakin, et al., *Rev. Mod. Phys.* **82**, 2557 (2010).

³Natisin, et al., *Appl. Phys. Lett.* **108**, 024102 (2016)

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