

Abstract Submitted  
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**Role of multimode excitations and inelastic escape channels in positron-molecule attachment**<sup>1</sup> C.M. SURKO, Univ. of California, San Diego, J.A. YOUNG, Jet Propulsion Lab — Experiments have shown that positrons, like electrons, can attach a variety of molecules via vibrational Feshbach resonances (VFR). Because of the positron's unique annihilation channel, one can probe particularly short-lived resonances by examining features in the positron energy-resolved annihilation spectra. We discuss here energy-resolved annihilation spectra for a variety of molecules and relate these results to theory [1]. In particular, we examine the role of multi-mode excitations, which are found to produce VFR in a number of small molecules [2] and may participate in the enhancement of single-mode resonances in large molecules [3]. Also discussed is how fluorine substitution in a large hydrocarbons produces a strong inelastic escape channel. This, in turn, limits resonance lifetimes and decreases the magnitudes of the annihilation resonances above the inelastic threshold [3].

[1] G. F. Gribakin & C. M. R. Lee, *Phys. Rev. Lett.*, **97**, 193201 (2006).

[2] J. A. Young, C. M. Surko, G. F. Gribakin, & C. M. R. Lee, *Phys. Rev. A*, in press (2008).

[3] J. A. Young & C. M. Surko, *Phys. Rev. A*, **77**, 052704 (2008).

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