Abstract Submitted
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Resonances in positron-molecule annihilation[1] J.A. YOUNG, C.M. SURKO, Univ. of California, San Diego — The positron (antiparticle to the electron) has unique interactions with matter. In atoms and molecules, it is attracted to the electrons and can annihilate to form gamma radiation. Using monoenergetic positrons from a trap-based beam, we have measured the positron-on-molecule annihilation rates as a function of positron energy [1,2]. In many molecules, we observe greatly increased annihilation at a fixed energy below the vibrational mode energies.This enhancement is due to quasi-bound positron states populated via vibrational Feshbach resonances (VFR). The resonant annihilation peaks grow exponentially with molecular size. In this paper, we discuss the latest data on positron capture and annihilation in small molecules, and we present new data on the effect of molecular temperature on annihilation rates. Finally, we relate the data to models of VFR and discuss the role of intramolecular vibrational energy distribution in the annihilation process.

[1] S. J. Gilbert, *et al.*, *Phys. Rev. Lett.*, **88**, 043201 (2002).
[2] L. D. Barnes, *et al.*, *Phys. Rev. A* **67**, 032706 (2003).

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