

Abstract Submitted  
for the DAMOP10 Meeting of  
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**Positron binding to molecules**<sup>1</sup> C.M. SURKO, J.R. DANIELSON, J.J. GOSSELIN, University of California, San Diego — Positron annihilation on molecules as a function of incident positron energy exhibit vibrational Feshbach resonances (VFR).<sup>2</sup> The energy differences between the vibrational modes and the VFR provide a measure of the positron-molecule binding energy,  $\epsilon_b$ . Measurements of  $\epsilon_b$  for 30 molecules are now available from this procedure and from comparison with theoretical spectra in the case of very small binding energies.<sup>2</sup> The dependence of  $\epsilon_b$  on molecular parameters can be expressed as  $\epsilon_b = 12.4(\alpha + 1.6\mu + 2.4N_\pi - 5.6)$  [meV], where  $\alpha$  is the molecular dipole polarizability,  $\mu$  is the permanent dipole moment, and  $N_\pi$  is the number of  $\pi$  bonds in aromatic molecules.<sup>3</sup> Insights into chemical trends from this analysis will be discussed. A key outstanding goal is to measure  $\epsilon_b$  for molecules that are sufficiently small and simple that  $\epsilon_b$  can be calculated theoretically. The empirical formula is used to identify candidate molecules. New measurements of  $\epsilon_b$  for  $\text{CS}_2$  (predicted  $\epsilon_b \gtrsim 40$  meV) will be discussed.

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<sup>2</sup>J. A. Young and C. M. Surko, *Phys. Rev. A* **77**, 052704 and **78**, 032702 (2008).

<sup>3</sup>J. R. Danielson, J. A. Young, and C. M. Surko, *J. Phys. B* **42**, 235203 (2009).

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