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Comparison of positron and electron binding to molecules[1] J.R. DANIELSON, A.C.L. JONES, M.R. NATISIN, C.M. SURKO, University of California, San Diego — Positrons can attach to molecules via Feshbach resonances in which a vibrational mode absorbs the excess energy. Using a high-resolution positron beam, this process has been used to measure positron-molecule binding energies for many chemical species.[2,3] In particular, recent measurements have focused on molecules with large permanent dipole moments (i.e., $\mu > 2.5$ D), including aldehydes, ketones, and nitriles. Positron binding to these molecules is compared to the analogous weakly bound electron-molecule (negative-ion) states, commonly called "dipole-bound" states.[4] Positron binding energies are found to be one to two orders of magnitude larger than those of the negative ions due to two effects: the orientation of the molecular dipole moment allows the positron to approach it more closely; and for positrons, lepton correlations (e.g., via dipole polarizability) contribute more strongly. Comparisons to available calculations will be presented, as will comparisons to binding to molecules with $\mu \sim 0$ (e.g., polarizability bound states).

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[2]G. F. Gribakin, et al., Rev. Mod. Phys. **82**, 2557 (2010).
[3]J. R. Danielson, et al., Phys. Rev. A, in press (2012).
[4]N. I. Hammer, et al., J. Chem. Phys. **119**, 3650 (2003).

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