Resonant positron annihilation in the small molecule limit\(^1\) C.M. SURKO, J.A. YOUNG, University of California, San Diego — Energy-resolved measurements of positron-on-molecule annihilation have established the existence of vibrational Feshbach resonances (VFR) in alkanes and other large molecules \([1,2]\). Large annihilation rates occur whenever the incident positron energy is close to a vibrational mode energy minus the binding energy. Recently, Gribakin and Lee developed a quantitative model which successfully describes this process in halogen substituted methanes \([3]\). In this paper, we further examine VFR for small molecules. Using a cold positron beam from a Penning-Malmberg trap, we measured the energy resolved annihilation spectra of CD\(_3\)Cl, methanol, H\(_2\)O, and CO\(_2\) and compared them to the predictions of the model. The presence or absence of resonances in these molecules is also discussed. CD\(_3\)Cl is compared to previous measurements of CH\(_3\)Cl. Since both should have identical binding, this provides a stringent test of the model.

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