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Modeling enhancement and suppression of vibrational Feshbach resonances in positron annihilation on molecules[1] J.R. DANIELSON, M.R. NATISIN, A.C.L. JONES[2], C.M. SURKO, University of California, San Diego — Experiments have shown that positrons can attach to molecules via vibrational Feshbach resonances,[3] leading to increased annihilation rates, the magnitudes of which depends upon molecular structure.[4] Presented here is a simplified rate-equation model that has recently been constructed to describe the competition between annihilation while the positron is attached to the molecule, positron ejection from the entrance state, and diffusion of the vibrational energy to multimode states followed by similar ejection due to vibrational deexcitation.[5] The latter process can lead to either suppression or enhancement of the annihilation depending on whether the coupled vibrations are more strongly or weakly coupled to the positron continuum. This model elucidates the role that mode coupling can play in determining resonant annihilation amplitudes. Simple limits are obtained and compared with experimental results for selected molecules.

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