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Binding energy calculations for e^+Li and e^+Na[1] JANINE SHERTZER, College of the Holy Cross, S.J. WARD, University of North Texas — In order to calculate the binding energy of e^+Li and e^+Na, we treat the positronic ions as effective three-body systems. The interaction between the electron/positron and the ionic core is described by the Peach model potential. This $l-$independent parametric model potential yields energy levels which are in excellent agreement with measurements of the alkali spectra. Although the model potential gives rise to a spurious 1s state for Li (and spurious 1s, 2s, 2p states for Na), these states are easily identified. The wave function associated with the true physical ground state has the correct nodal structure in the radial coordinate. For the effective three-body system, there is a series of spurious states which are also easily identified by the nodal structure and the value of $\langle r_- \rangle$. In practice, we never calculate these states, but search for solutions using a Rayleigh quotient iteration method with a starting eigenvalue slightly less than the ground-state energy of the alkali atom. Our results for e^+Li are in good agreement with previous calculations using the exact Hamiltonian and an adiabatic hyperspherical calculation. For e^+Na, this is the first non-adiabatic calculation for the binding energy.

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