

Abstract Submitted
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Excited, Resonant, and Unnatural Parity States of Positronic Atoms and Ions¹ MICHAEL W.J. BROMLEY, Department of Physics, San Diego State University, JIM MITROY, Faculty of Technology, Charles Darwin University, KALMAN VARGA, Department of Physics and Astronomy, Vanderbilt University — Calculations have demonstrated that 11 neutral atoms can bind positrons. We report on configuration interaction (CI) calculations that have demonstrated the existence of a $^2P^o$ excited state of e^+Ca , which consists predominantly of a positronium (Ps) cluster orbiting the Ca^+ ion in the $L = 1$ partial wave [1]. This raises the possibility of detecting the formation of positronic bound states by an optical transition to the ground ($^2S^e$) e^+Ca state. The e^+Mg system is shown to lack an equivalent excited state, however, by extracting phase shifts from CI pseudostate energy shifts, we show that the system has a low-energy p shape resonance [2]. Finally, CI and stochastic variational method calculations of annihilation suppressed, unnatural parity $^{2,4}S^o$, states of PsH, LiPs, NaPs and KPs are reported [3,4]. The LiPs system being Borromean in nature.

[1] M.W.J.Bromley and J.Mitroy Phys. Rev. Lett. **97** 183402 (2006)

[2] J.Mitroy and M.W.J.Bromley Phys. Rev. (under review)

[3] J.Mitroy and M.W.J.Bromley Phys. Rev. Lett. (in press)

[4] M.W.J.Bromley, J.Mitroy and K.Varga Phys. Rev. A (in preparation)

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