

Abstract Submitted  
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**Resonance states with unnatural parity in the ( $e^+$ -He $^+$ ) system<sup>1</sup>**

Z.-C. YAN, University of New Brunswick, Canada, Y.K. HO, Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan, ROC — Bhatia and Drachman reported two S-wave resonances in positron scattering by a helium ion (He $^+$ ) [1]. Since then, there has been considerable interest in the investigation of the resonances for this system [2]. In these works resonances with natural parity were investigated. In the present work, we apply the method of complex-coordinate rotation to investigate resonances with unnatural parity in the positron-helium-ion system. We have calculated some  $P^e, D^o, F^e, G^o,$  and  $H^e$  resonance states using highly correlated Hylleraas-type wave functions [3]. While such resonances cannot be reached by positron collision with the ground state helium ion, they can be reached, in principle, by positron scattering with the helium ion in one of its excited states. [1] A. K. Bhatia and R. J. Drachman, *Phys. Rev. A* **42**, 5117 (1990). [2] Y. K. Ho, *Phys. Rev. A* **53**, 3165 (1996); Y. K. Ho and Z.-C. Yan, *Phys. Rev. A* **66**, 062705 (2002); A. Igarashi and I. Shimamura, *Phys. Rev. A* **70**, 012706 (2004); Nobuhiro Yamanaka *et al.*, *Phys. Rev. A* **70**, 062701 (2004). [3] Z.-C. Yan and G. W. F. Drake, *Chem. Phys. Lett.* **259**, 96 (1996).

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