Triply-excited auto-dissociating resonant states in the positron-helium system[1] Y.K. HO, Institute of Atomic and Molecular Sciences, YE NING, Z.-C. YAN, University of New Brunswick — An example of triply-excited auto-dissociating resonant states in the positron-helium system is when a positron is bound by the doubly-excited $2s^2$ $^1S^e$ state of the helium atom, in a manner similar to that in the positronium-hydrogen system when a positron is bound to the doubly-excited $2s^2$ $^1S^e$ state of the H$^-$ ion [1]. As such states are located in the scattering continua, they would manifest themselves as resonances in positron helium and positronium hydrogen scattering, respectively. In the present work, we have carried out calculations for triply-excited resonances in positron helium scattering. Resonance parameters (both resonance position and width) for some S-wave resonances were obtained by using the method of complex-coordinate rotation [2], and with employing elaborated Hylleraas-type wave functions in which all six interparticle coordinates were included (see [3], for example). For the e$^+$He($2s^2$ $^1S^e$) and e$^+$He($3s^2$ $^1S^e$) resonances, a comparison for our results with those in the literature is made [4]. We have also found some new S-wave resonances that have not been reported in the literature, and our recent findings will be presented at the meeting.

[1] Y. K. Ho, *Phys. Rev. A* **41**, 68 (1990);
[2] Y. K. Ho, *Phys. Rept.* **99**, 1, (1983), and references therein;
[3] Z.-C. Yan and Y. K. Ho, *Phys. Rev. A* **59**, 2697 (1999);
[4] J. Mitroy and J. Grineviciute, *Phys. Rev. A* **88**, 022710 (2013).

Yew Kam Ho
Institute of Atomic and Molecular Sciences

Date submitted: 06 Jan 2014   Electronic form version 1.4