Hyperspherical hidden crossing calculation of Ps formation in low-energy e$^+$-Na collisions S.J. WARD, University of North Texas, J. SHERTZER, College of the Holy Cross — The hyperspherical hidden crossing method (HHCM) can provide important insight into scattering processes. Previously, we have used the HHCM to calculate the Ps(1s)-formation cross section in low-energy e$^+$-H [1] and e$^+$-Li [2] collisions. Here we apply the HHCM to low-energy e$^+$-Na collisions. We use the Peach model potential and treat e$^+$e$^-$Na$^+$ as an effective three-body system. We calculate the Ps(1s)-formation cross sections for $0 \leq L \leq 3$ and compare our results with a hyperspherical close-coupling calculation [3]. The HHCM provides an explanation for the small S-wave Ps(1s)-formation cross section. The S-wave Stückelberg phase is close to π for the three collision systems due to destructive interference between the two amplitudes that correspond to different paths leading to Ps(1s) formation.

[1] S. J. Ward, J. H. Macek, and S. Yu. Ovchinnikov, Phys. Rev. A **59**, 4418 (1999); S. J. Ward and J. Shertzer (unpublished).
[2] S. J. Ward and J. Shertzer, Phys. Rev. A **68**, 032720 (2003); **75**, 012713 (2007).
[3] Anh-Thu Le, M. W. J. Bromley and C. D. Lin, Phys. Rev. A **71**, 032714 (2005); Anh-Thu Le (private communication).

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