

Addendum to “Elastic scattering of low-energy electrons by OCS”

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In a previous publication [Phys. Rev. A **70**, 062711 (2004)] we presented results for electron collisions with OCS molecules. We found a Π shape resonance and discussed the existence of an s -wave virtual state through the analysis of the scattering length. The existence of the Π shape resonance has been reported by other theoretical and experimental studies, and the existence of an s -wave virtual state has been suggested by an experimental study. In this Addendum we show that besides the Π shape resonance and the s -wave virtual state, this molecule also presents a Ramsauer-Townsend minimum around 1 eV.

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In Ref. [1] we presented results of our calculations on electron collisions with OCS molecules. The cross sections were obtained with the Schwinger multichannel method [2,3] at the static-exchange-polarization approximation. We found a Π shape resonance, which had been reported by other theoretical and experimental studies (see Ref. [1] for references), and also discussed the existence of an s -virtual state through the analysis of the scattering length, which we found to be negative ($-4.73a_0$) [1]. We needed to calculate first the s -wave eigenphase for energies close to zero in order to obtain the scattering length [4]. In doing this, we missed the change of sign (zero crossing) of the s -wave eigenphase around 1 eV, shown in Fig. 1, which indicates the existence of a Ramsauer-Townsend minimum. The fact that the s -wave eigenphase increases for energies close to zero also indicated the existence of the virtual state. We also show in this figure the cross section for the Σ symmetry. There is a sharp increase near zero energy (the virtual state) and a minimum around 1 eV (the Ramsauer-Townsend minimum).

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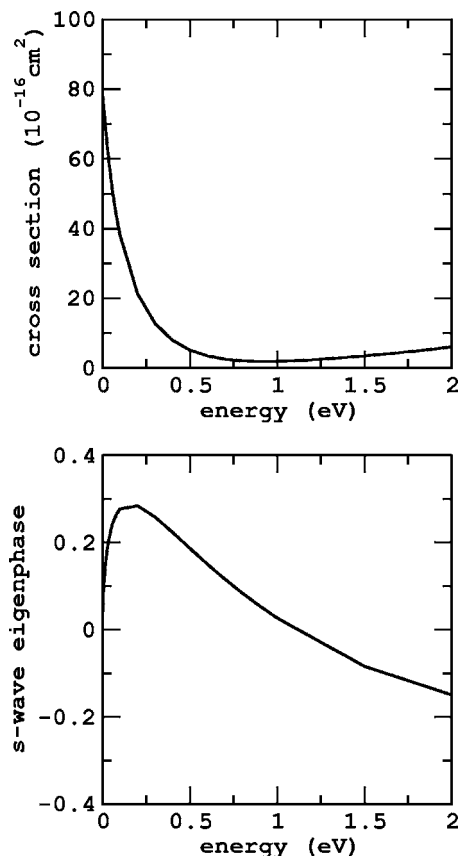


FIG. 1. Upper panel: Σ integral cross section for OCS; lower panel: s -wave eigenphase.

[1] M. H. F. Bettega, M. A. P. Lima, and L. G. Ferreira, Phys. Rev. A **70**, 062711 (2004).

[2] K. Takatsuka and V. McKoy, Phys. Rev. A **24**, 2473 (1981).

[3] K. Takatsuka and V. McKoy, Phys. Rev. A **30**, 1734 (1984).

[4] M. A. Morrison, Phys. Rev. A **25**, 1445 (1982).