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LETTER TO THE EDITOR

Reply to "Comment on 'Calculations of energies of intrashell doubly excited states of beryllium-like ions' "

Z Chen and C D Lin

Department of Physics, Kansas State University, Manhattan, KS 66506 USA

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Abstract. The energy positions of $1s^2 3l3l'$ resonances of C^{2+}, O^{4+} and Ne^{6+} ions are recalculated using two-electron basis functions constructed from eigenstates of the one-electron model Hamiltonian. The results are in good agreement with the new calculations of Macias *et al* and Bachau *et al.*

In a recent paper, Chen and Lin (1989) calculated the resonance energies of $1s^2 3l3l'$ states of C^{2+}, N^{3+}, O^{4+} and Ne^{6+} ions. For some of the lower states, it was pointed out that their results were in disagreement with the previous results of Martin *et al* (1988). In the letter by Bachau *et al* (1990), the discrepancy was attributed to the use of two-electron basis functions built from hydrogenic orbitals adopted by Chen and Lin (1989). It was argued that to project out the open channels appropriately the two-electron basis functions should be constructed from the eigenstates of the one-electron model Hamiltonian.

We have recalculated the energies of these states using two-electron basis functions constructed from the eigenstates of the one-electron Hamiltonian. The results for the two lowest $1s^2 3l3l'\ ^1S^e$ and $1s^2 3l3l'\ ^3P^o$ states are shown in table 1, together with the

Table 1. Comparison of the present results with the calculations of Macias *et al* (1989), Chen and Lin (1989) and Martin *et al* (1988) for the energies of $1s^2 3l3l'$ states of Be-like C, O and Ne ions. The binding energies are given in eV (1 au = 27.2116 eV).

	States	a	b	c	d	e
C^{2+}	$(2,0)\ ^1S^e$	47.37	47.40	47.48	47.74	47.08
	$(0,0)\ ^1S^e$	41.92	41.98	41.86[f]	41.82	41.91
	$(2,0)\ ^3P^o$	45.98	45.85	45.95	46.12	45.84
	$(0,0)\ ^3P^o$	40.90	41.18	41.10	40.84	41.18
O^{4+}	$(2,0)\ ^1S^e$	107.95			108.33	107.54
	$(0,0)\ ^1S^e$	99.18			99.00	99.18
	$(2,0)\ ^3P^o$	105.73			105.82	105.53
	$(0,0)\ ^3P^o$	97.67			97.58	97.96
Ne^{6+}	$(2,0)\ ^1S^e$	193.09	192.74	192.70	193.16	192.28
	$(0,0)\ ^1S^e$	180.78	180.74	180.50	180.46	180.45
	$(2,0)\ ^3P^o$	189.78	189.48	189.62	189.81	189.53
	$(0,0)\ ^3P^o$	178.58	178.98	178.82	178.70	178.99

[a] Present results.
[b] Macias *et al* (1989), using the pseudopotential-Feshbach approach.
[c] Macias *et al* (1989), using the conventional-Feshbach approach.
[d] Chen and Lin (1989).
[e] Martin *et al* (1988).
[f] This state was listed at 41.96 eV in Bachau *et al* (1990).

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newer calculations of Macias *et al* (1989) and Bachau *et al* (1989) and the older ones of Chen and Lin (1989) and Martin *et al* (1988). We first note that the present results are in good agreement with the newer ones of Macias *et al* (1989) and Bachau *et al* (1989). The early larger discrepancy between Chen and Lin (1989) and Martin *et al* (1988) is partly due to the lack of convergence in the results of Martin *et al* (1988). Comparing the difference between the present results and the early ones by us shows that the use of two-electron basis functions constructed from eigenstates of the one-electron model Hamiltonian only has an effect for lower-Z ions such as C^{2+}. For the higher Z ions our previous results remain essentially unchanged.

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