MBPT RESULTS FOR $\Delta n=0$ ELECTRIC DIPOLE TRANSITIONS

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To identify spectra of Planetary Nebulae which usually have many atomic lines one needs very accurate theoretical atomic data.

Recently quasi-degenerate many-body perturbation theory (MBPT) for effective Hamiltonian proposed by I. Lindgren was adopted to calculate the energy levels for open-shell atoms [1]. We continue the applications of this method to the investigation of the electric dipole transitions. The computer programs to generate radial and spin-angular parts of matrix elements of effective Hamiltonian and transition operator have been worked out. The energy levels of the configurations considered were calculated in the complete model space. The first order relativistic corrections were taken into account in the Breit-Pauli approximation. The Table presents wavelengths $\lambda(A)$, absorption oscillator strenghts f (in the length form) and ratios of line intensities $I(^1P - {}^1D)/I(^1P - {}^1S)$ for $1s^22s2p^5\ {}^1P - 1s^22s^22p^4\ {}^1D$ (a) and $1s^22s2p^5\ {}^1P - 1s^22s^22p^4\ {}^1S$ (b) transitions in various approximations.

	Exp [2]	MBPT		Recommended [3]	MCDHF [4]
		First order	Second order		
Ne III					
$\lambda_a(A)/\lambda_b(A)$	379/428	349/382	381/429	372/417	351/384
f_a/f_b	0.194/0.078	0.368/0.146	0.337/0.129	0.271/0.110	0.377/0.150
I_a/I_b	20.8	15.1	16.7	15.5	15.1
Mg V					
$\lambda_a(A)/\lambda_b(A)$	277/312	261/288	278/313	274/308	262/289
f_a/f_b		0.289/0.120	0.273/0.108	0.227/0.098	0.294/0.122
I_a/I_b		14.7	15.8	14.6	14.6

Disagreement between experimental [3] and our second order values of oscillator strengths is expected to reduce in accounting for correlation corrections in matrix elements of electric dipole transition operator.

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