FORBIDDEN LINE EXCITATION DATA FOR CERTAIN CORONAL LINES

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Abstract. Plasma diagnostics of the active corona require data on transition probabilities and collision cross sections for relevant coronal emission lines. Atomic parameters pertaining to a number of coronal transitions have been derived as follows:

Ion	Con-fig.	λ (Å)	A (s^{-1})	Ω	Ion	Con-fig.	λ (Å)	A (s^{-1})	Ω
S II	$2p$	7536	20.817	0.1178	Ni XVI	$3p$	3600.9	190.80	0.170
Ca XIII	$2p^4$	4086.5	315.7	0.1140	Ni XV	$3p^2$	8024.2	22.121	0.249
K XI	$2p^5$	4256	231.13	0.1093			6701.9	55.820	0.038
Mn XIII	$3p$	6535.4	31.922	0.2270	Cr IX	$3p^4$	4451	4.308	0.112
Fe XIV	$3p$	5302.9	60.056	0.1950	Fe X	$3p^5$	6374.5	69.149	0.286
Co XV	$3p$	4351.4	108.16	0.1851	Ni XII	$3p^5$	4232.3	235.26	0.219

We have calculated and tabulated occupation numbers of the upper excited levels and corresponding emissivities as a function of electron density and temperature following a procedure similar to that of Zirker (*Solar Phys.* **11**, 68, 1970). These numbers almost certainly represent lower limits to the quantities involved since at coronal temperatures one must consider collisional excitation to high permitted levels from which cascade can occur, dielectronic recombination of the pertinent ions, and subsequent decay to the level involved, and also collisional excitation and ionization which serve to remove ions from the level considered. A rigorous calculation would require accurate knowledge of all relevant transition probabilities, collision cross sections, and dielectronic recombination parameters. The effects are more severe at the higher densities and can be estimated only when we know the necessary parameters. The present numbers may prove useful for lower densities and temperatures and higher stages of ionization.

Gordon Newkirk, Jr. (ed.), Coronal Disturbances, 155.