SEMIEMPIRICAL CALCULATION OF GF VALUES FOR ALL ELEMENTS

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I have set up a web/ftp site cfaku5.harvard.edu with all my old atomic data and data from the literature. I will add new data as they are produced and checked. I have begun to update my old calculations for the iron group and to add the lighter and heavier elements. I am also doing the higher ions up through zinc. As the new calculations accumulate I will publish CD-ROMs with the output files of the least-squares fits to the energy levels, energy level tables, with E, J, identification, strongest eigenvector components, lifetime, A sum, C_4, C_6, Landé g. There will be electric dipole, magnetic dipole, and electric quadrupole line lists. Radiative, Stark, and van der Waals damping constants and Landé g values are automatically produced for each line; hyperfine and isotopic splitting when the data exist. Eigenvalues are replaced by measured energies so that lines connecting measured levels have correct wavelengths. Most of the lines have uncertain wavelengths because they connect predicted rather than measured levels. Laboratory measurements of gf values and lifetimes will be included. Examples:

Ni I mostly based on Litzén, Brault, and Thorne (1993)

Configurations	Parameters	Free params	Levels	Known levels
46 even/48 odd	2446/2996	33/33	3203/4800	130/153

	Elec dipole	Mag dipole	Quadrupole
Total lines saved	330698	67879/159052	453222/929693 (will edit)
Between known levels	8346	2227/5272	3776/7539

Isotopic components	^{58}Ni	^{60}Ni	^{61}Ni	^{62}Ni	^{64}Ni
Fractional abundances	.6827	.2790	.0113	.0359	.0091

There are measured splittings for 326 lines from which I determined 131 energy levels relative to the ground. These levels are connected by 11670 isotopic lines. Hyperfine splitting was included for ^{61}Ni but only 6 levels have been measured which produce 4 lines with 38 components. A pure isotope laboratory analysis is needed. The lifetimes and gf values are compared to laboratory values. Ni features are considerably improved in solar spectrum calculations.

Co I based on Pickering and Thorne (1996) and on Pickering (1996)

Configurations	Parameters	Free params	Levels	Known levels
31 even/32 odd	1446/1762	27/26	3546/5870	139/223

	Elec dipole	Mag dipole	Quadrupole
Total lines saved	1727909	396172/602204	1218017/2468342 (will edit)
Between known levels	15178	3498/11733	5094/15568

^{59}Co is the only stable isotope. Hyperfine constants have been measured in 297 levels which produce 244264 component lines.