The MCHF/MCDHF Collection of transition data

C. Froese Fischer,[1] D. Kelleher,[1] G. Tachiev,[2]

[1] *National Institute of Standards, Gaithersburg, USA*
[2] *Florida Internation University, Miami, USA*

Charlotte.Fischer@nist,gov

Domain : Astrophysics

The MCHF/MCDHF Collection (http://atoms.vuse.vanderbilt.edu) is an online database of energy levels, lifetimes, transition data, and some g_j factors. All results are derived from theory that includes relativistic effects. The types of transitions are E1, E2, M1, and occasionally higher multipoles. The labels for energy levels currently are designated only in LSJ coupling and are computer generated from the wave function composition. When conflicts arise, a detailed analysis is performed. Two views are supported in the database. In the first, results are presented in terms user selected tables, whereas in the second, the user may select energy levels and transitions between levels, according to nuclear charges along an isoelectronic sequence. In this view, energy levels are compared with tabulations found in ASD (http://physics.nist.gov/cgi-bin/AtData/main_asd) (Version 2) and the discrepancies between length and velocity forms of the transition probabilities are reported. This tool has been found to be extremely valuable for the over-all evaluation of theoretical data. Most results were computed with extensive correlation using Breit-Pauli theory that includes low-order relativistic effects. Calculations based on multiconfiguration Hartree Fock theory were for iso-electronic sequences with 3-18 electron and usually ten or more ions [1, 2]. For a few atoms non-orthogonal spline methods have been applied capable of determining many states of a Rydberg series [3]. For more highly ionized systems, some multiconfiguration Dirac-Hartree-Fock results have been performed. New results for the Al-like sequence will be described and data for Ar XII and Ar XIV will be evaluated.

[1] C. Froese Fischer and G. Tachiev, At. Data Nucl. Data Tables, **87**, 1 (2004).
[2] C. Froese Fischer, G. Tachiev, and A. Irimia, At. Data Nucl. Data Tables (in press).
[3] O. Zatsarinny and C. Froese Fischer, J. Phys, B: **i35**, 4669 (2002).