B.1.7. Atomic Structure Calculations: Radiative and Auger De-Excitation of Hollow Calcium and Argon Atoms—*K.R. Karim* and C.P. Bhalla*

A hollow atom decays in cascades by sequentially emitting electron and photons. The x-ray and Auger spectra obtained in this process contain valuable information about the capture and de-excitation mechanisms. In hollow atoms with many open-shell electron configurations there are a large number of initial states, characterized by the total angular momentum J and parity, that can decay through many different open channels. Detailed theoretical calculations on de-excitation processes of such atoms have been reported only for a few cases in the literature [1-3]. We calculated the Auger and radiative de-excitation rates, x-ray wavelengths and fluorescence yields of hollow argon and calcium atoms with multiple inner-shell vacancies. Among the large number of conceivable initial configuration, we restricted ourselves to 1s $2s^0 2p^n$, 1s $2s^1 2p^n$ and 1s $2s^2 2p^n$ with n=1-6. These states have very short lifetimes, typically of the order of 10^{-15} s and decay predominantly by Auger and E1 radiative transitions.

Calculations of the rates and x-ray energies were performed in the Hartree-Fock atomic model. The possible contributions of the spin-orbit coupling and configuration mixing were included. These results were presented in Publications #59 and 65.

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