B.2. Electron-Ion Scattering—*C.P. Bhalla and S.R. Grabbe*

The theoretical studies of electron-ion elastic and inelastic differential cross sections are closely related to the experimental program, which is described in detail in Section A.2. The present calculations were performed with the R-matrix approach [1] to obtain the transition matrices, which were used to obtain the differential elastic and inelastic cross sections for electron-ion collisions. As an example, Fig. 1 contains a three-dimensional plot of DCS for excitation of F^{8+} by electron impact. The electron scattering model [2] was used to obtain the double differential electron emission cross sections in ion-atom collisions. The results were presented in Publications #12, 16, 17, 60, 64, 66, 68.

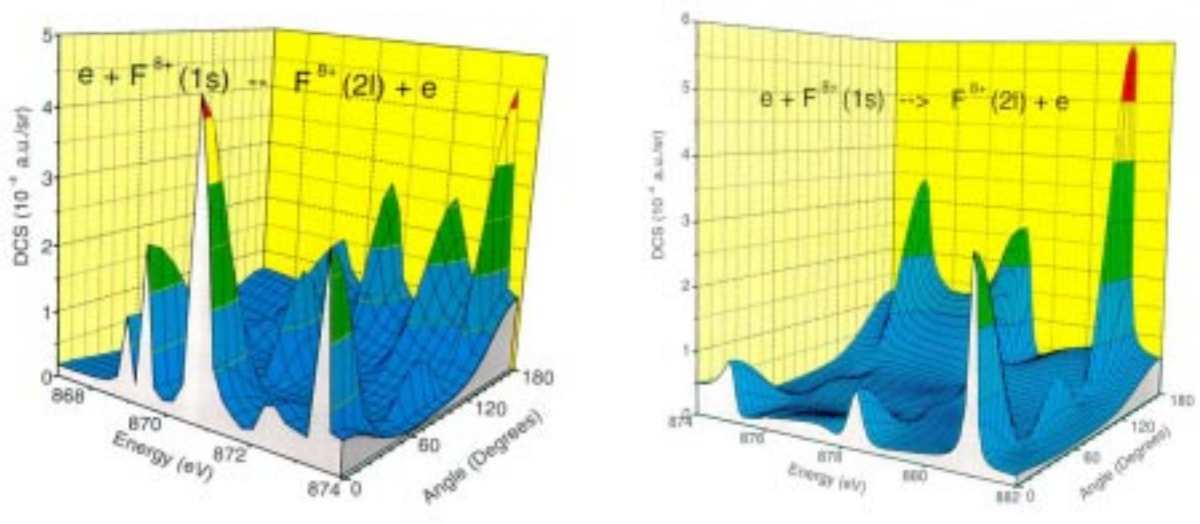

Figure 1. Differential inelastic cross sections in a.u./sr versus electron energy in Rydbergs and scattering angle for 1s→2s and 2p excitations. The contributions of the doubly excited autoionizing states ($3\ell 3\ell'$) give pronounced structure. (Left) Energy: 868 – 874 Ry (Right) Energy: 874-882 Ry

Theoretical results for L-shell X-ray differential cross sections and polarizations in the electron energy region where the double excited autoionizing states contribute significantly to the DCS and the linear polarization were completed for an angle of 90° with respect to the electron beam direction. The particular X-ray transition considered is from the $1s^2 3p\ ^2P_{3/2}$ excited state to the ground state of Fe^{23+}. The calculations were performed with the close coupling R-matrix computer programs including the relativistic effects. The lowest 13 lithium-like states were included to represent the target in the R-matrix internal region.

The results were presented in Publication #60.

References

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