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Photoionization of Fe^{7+} in the $3p - 3d$ resonance energy region[1]
M.F. GHARAIBEH, U.I. SAFRONOVA, R.A. PHANEUF, E.D. EMMONS, University of Nevada, Reno, A.L.D. KILCOYNE, A.S. SCHLACHTER, Advanced Light Source, LBNL, A. MUELLER, Justus-Liebig-Universit, I.M. SAVUKOV, Los Alamos National Laboratory — Photoionization of Fe^{7+} in the energy range of $3s$ and $3p$ inner-shell excitations were studied using photoion spectroscopy with monochromatized synchrotron radiation. The resonance structure in the range 150 – 180 eV is attributed to $[3s^2 3p^6 3d, 3s^2 3p^6 4s]$ – $[3s^2 3p^5 4s 5s$, $3s^2 3p^5 3d 5s, 3s^2 3p^5 3d 6s$, $3s^2 3p^5 3d 4d, 3s^2 3p^5 3d 5d$, $3s 3p^6 3d 4p]$ transitions. Relativistic many-body perturbation theory was used to evaluate multipole (M1 and E2) matrix elements to obtain lifetimes of the $3s^2 3p^6 3d\,^3D_{5/2}$ and $3s^2 3p^6 4s\ ^2S_{1/2}$ metastable levels. These calculations started from an argonlike closed-shell Dirac-Fock potential. Matrix elements were calculated using both relativistic many-body perturbation theory, complete through second and third orders, and the relativistic all-order method restricted to single and double excitations. To reproduce resonance structure in the photoionization cross section, a large-scale COWAN calculation including about 30 configurations was used.

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