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Photoionization of potassium-like transition metal ions: Ti$^{3+}$ to Fe$^{7+}$
A.M. SOSSAH, H.-L. ZHOU, S.T. MANSON, Georgia State University — Photoionization cross section calculations are performed on potassium-like transition metal ions (Ti$^{3+}$, V$^{4+}$, Cr$^{5+}$, Mn$^{6+}$ and Fe$^{7+}$) using both non-relativistic (LS-coupling) and relativistic (Breit-Pauli) $R$-matrix methods for the ground ($[Ne]3s^23p^63d^2D_e^3=^2$) and the first excited ($[Ne]3s^23p^63d^2D_e^5=^2D_{5/2}$) states of each of the five ions. Photon energies up to the first 3p ionization threshold are considered. The results show that for Ti$^{3+}$, the cross sections are dominated by the giant ($3p \rightarrow 3d$) resonances which are analyzed and identified, while for the four other ions (V$^{4+}$, Cr$^{5+}$, Mn$^{6+}$ and Fe$^{7+}$), the $3p \rightarrow 3d$ resonances lie below the ionization threshold, and the cross sections are dominated by $3p^53d\ ns$ and $3p^53d\ nd$ Rydberg series of resonances. Comparison of the Ti$^{3+}$ results with available theoretical and experimental data shows good agreement. This work is supported by DOE and NSF.

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