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Photoionization of potassium from the ground and excited states[1]

SWARAJ TAYAL, Clark Atlanta University, OLEG ZATSARINNY, Drake University — The available experimental cross sections for photoionization of neutral potassium from the ground state differ by up to a factor of 2. The theoretical calculations for photoionization of potassium at small energies also differ considerably with each other and from the experimental results. The current calculations do not reproduce accurately the minimum in measured cross sections where short-range correlation and relativistic effects are very important. We have calculated photoionization cross sections from the ground 4s and excited 4p, nd (n=3-5), and ns (n=5-7) states using fully-relativistic approach based on the Dirac-Coulomb Hamiltonian. We use the B-spline box based multi-channel method to generate the target states. The B-spline expansion coefficients have been obtained by diagnoalization of the atomic Dirac-Coulomb Hamiltonian. The photoionization of potassium is strongly effected by core-polarization effects. In our work we provide a detailed study of these effects by including the dipole, quadrupole, and octupole core-polarization to full extent. Our results for phtoionization from the ground and excited states are compared with available measurements and calculation.

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