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Photon Scattering from Alkali Atoms: Rayleigh, Raman, and Photoionization Processes[1] ADAM SINGOR, DMITRY FURSA, Curtin University, KEEGAN MCNAMARA, ETH Zurich, IGOR BRAY, Curtin University — Photoionization, Rayleigh and Raman scattering cross sections are of interest for modelling radiative transport, opacities and Raman spectroscopy. We have extended two methods previously developed for photon scattering on hydrogen to scattering on quasi one-electron atoms. These methods are valid for incident photon energies both below and above the ionization threshold. The first of these two methods is the principal value (PV) method, which involves the direct calculation of dipole matrix elements and principal value integration to deal with pole terms that arise for incident photon energies above the ionization threshold. The second method, the complex scaling (CS) method, utilises analytic continuation of the radial coordinates into the complex plane to avoid pole terms from the continuum entirely and does not rely on exact solutions to the Hamiltonian. We present cross sections for Rayleigh, Raman scattering and photoionization for the alkali atoms lithium, sodium, potassium, rubidium and caesium. The importance of relativistic effects and core polarization to correctly calculating the position of the Cooper-Seaton minimum as well as their overall effect on the cross sections is investigated.

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