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Propensity rules and interference effects in laser-assisted photoionization of noble gases and closed-shell negative ions[1] JAN MARCUS DAHLSTRM, MATTIAS BERTOLINO, DAVID BUSTO, FELIPE ZAPATA, Lund University — We investigate the angle-resolved photoelectron spectra from laser-assisted photoionization, where an atom is photoionized by a field in the XUV range with an additional laser field in the IR range which *dresses* the atom, $A + \gamma_{\mathrm{XUV}} \pm q\gamma_{\mathrm{IR}} \rightarrow A^+ + e^-$, for helium and neon atoms using an *ab initio* method based on time-dependent surface flux and configuration interaction singles. We have found an interplay between a radial propensity rule and an angular interference effect to interpret the angular probability distribution (PAD) of the photoelectron, in which we find a different number of minima comparing absorption and emission processes with the magnetic quantum number resolved. In the low-energy limit the propensity rule explains why there is a difference between the PADs for absorption and emission processes in the continuum. In the high-energy limit, however, the PAD is mostly explained by the interference effects of partial waves, as expected from the soft-photon approximation. We further compare the results obtained in atoms to those in closed-shell negative fluorine ion where the remaining neutralized target exerts only a short-range potential, as opposed to the long-range Coulomb potential from ionized atoms.

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