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Multichannel coherence in strong-field ionization[1] ROBIN SANTRA, Argonne National Laboratory, NINA ROHRINGER, Lawrence Livermore National Laboratory — Atomic and molecular ions generated by a strong optical laser pulse are not in general in the electronic ground state. The density matrix for such ions is characterized by the electronic quantum-state populations and by the coherences among the electronic quantum states. Nonvanishing coherences signal the presence of coherent electronic wave-packet dynamics in the laser-generated ions. For noble-gas atoms heavier than helium, the most important channels populated via strong-field ionization are the outer-valence single-hole states with a total angular momentum of $j = 3/2$ or $j = 1/2$. For this case, we develop a time-dependent multichannel theory of strong-field ionization. We derive the ion density matrix and express the hole density in terms of the elements of the ion density matrix. Our wave-packet calculations demonstrate that neon ions generated in a strong optical field (800 nm) are almost perfectly coherent. In strong-field-generated xenon ions, however, the coherence is substantially suppressed.

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