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Hole burning and higher order photon effects in attosecond light-atom interaction FRANCIS ROBICHEAUX, Purdue University, PHILLIP PRICE, University of Connecticut, BEN VAN LINDDEN VAN DEN HEUVELL, L.D. NOORDAM, University of Amsterdam — We have performed calculations of attosecond laser-atom interactions for laser intensities where interesting two and three photon effects become relevant. In particular, we examine the case of "hole burning" in the initial orbital. Hole burning is present when the laser pulse duration is shorter than the classical radial period because the electron preferentially absorbs the photon near the nucleus. We also examine how 3 photon Raman process can lead to a time delay in the outgoing electron for the energy near one photon absorption. For excitation out of the hydrogen $2s$ state, an intensity of 2.2×10^{16} W/cm^2 leads to a 6 attosecond delay of the outgoing electron. We argue that this delay is due to the hole burning in the initial state.

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