Abstract Submitted
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Multiphoton ionization of xenon in the VUV regime[1] ROBIN SANTRA, ITAMP, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA 02138, USA, CHRIS H. GREENE, Department of Physics and JILA, University of Colorado, Boulder, CO 80309-0440, USA — In a recent experiment at the VUV free-electron laser facility at DESY in Hamburg, the generation of multiply charged ions in a gas of atomic xenon was observed. This paper develops a theoretical description of multiphoton ionization of xenon and its ions. The numerical results lend support to the view that the experimental observation may be interpreted in terms of the nonlinear absorption of several VUV photons. The method rests on the Hartree-Fock-Slater independent-particle model. The multiphoton physics is treated within a Floquet scheme. The continuum problem of the photoelectron is solved using a complex absorbing potential. Rate equations for the ionic populations are integrated to take into account the temporal structure of the individual VUV laser pulses. The effect of the spatial profile of the free-electron laser beam on the distribution of xenon charge states is included. An Auger-type many-electron mechanism may play a role in the VUV multiphoton ionization of xenon ions.

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