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Interaction of coherent VUV radiation with xenon clusters¹ ZACHARY WALTERS, Department of Physics and JILA, University of Colorado at Boulder, ROBIN SANTRA, Argonne National Laboratory, Argonne, Illinois 60439, USA, CHRIS H. GREENE, Department of Physics and JILA, University of Colorado, Boulder, Colorado 80309-0440, USA — When a short, intense laser pulse interacts with an atomic cluster, the atom-laser interaction is greatly enhanced by the high density of atoms within the cluster, while the finite size of the cluster prevents energy from escaping the interaction region. Thus hot, dense plasmas can form which can in turn alter the form of the laser-cluster interaction. We present a model of the laser-cluster interaction which takes atomic structure into account, using non-perturbative R-matrix techniques to calculate inverse bremsstrahlung and photoionization cross sections for Herman-Skillman atomic potentials. We describe the evolution of the cluster under the influence of the processes of inverse bremsstrahlung heating, photoionization, collisional ionization and recombination, and expansion of the cluster. We compare results with the experiments of Wabnitz *et al* [Nature 420, 482 (2002)] and Laarmann et al. [Phys. Rev. Lett. 95, 063402 (2005)].

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