Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Spherical nanoplasmas irradiated by intense x-ray sources JOANA MARTINS, GoLP/CFP, Instituto Superior Tecnico, Portugal, FABIO PEANO, Dipartimento di Energetica, Politecnico di Torino, Italy, MARTA FAJARDO, RICARDO FONSECA, LUIS SILVA, GoLP/CFP, Instituto Superior Tecnico, Portugal
— Clusters exposed to ultra-short ultra-intense infra-red laser pulses can undergo a Coulomb explosion. Using two sequential pulses it is possible to control the dynamics of the explosion, and to produce multibranch structures in the phase space (shock shells). In x-ray irradiated clusters, the electron excursion length in the radiation field is shorter than the typical cluster dimension, and a pure Coulomb explosion is difficult to achieve. The initial cluster dynamics is mainly determined by the electron distribution function generated by ionization. Using particle-in-cell simulations performed with OSIRIS 2.0 coupled with an x-ray ionization code, we have studied the role of ionization in the expansion dynamics and shock shell formation in clusters irradiated by intense x-ray pulses (e.g. XFEL and LCLS sources). Our results show that under suitable conditions, the dynamics of the cluster expansion can be controlled, and shock shell formation with intense x-ray sources is possible using pulse sequences with different intensities, thus opening the way to phase space control of the expansion of nanoplasmas with x-ray sources.

Luis Silva
GoLP/CFP, Instituto Superior Tecnico, Portugal

Date submitted: 21 Jul 2006 Electronic form version 1.4