

The Beams and Applications Seminar Series

Interaction of intense laser pulses with nano-clusters

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Bldg. 401, room B2100
Friday, June 4, 1:30 pm
Host: Y. Li, ASD

Atoms or molecules exhibit short-range attractions for one another owing to Van der Waals forces. Under rapid cooling, such as in nozzle ejection of a gas puff into vacuum, hundreds to a few tens of millions of atoms can aggregate together to make nano-scale clusters, typically of diameter less than a few hundred angstroms. Recently, there has been great interest in the interaction of intense laser pulses with clusters. If an intense, ultrashort laser pulse is focused in a gas of clusters, the clusters can be instantaneously heated to temperatures up to $\sim 10^8$ K - many times hotter than the sun - and they explode violently. Such high temperatures make laser-heated clusters a copious source of X-rays, and the speeds of the ions thrown off by the explosion are high enough that nuclear fusion can occur from the collisions. Although the explosion details affect most of the applications of the laser-cluster interaction, only recently --in our lab--has the explosion dynamics been measured with femtosecond resolution. An interesting and practical implication of our measurements is that a gas of exploding clusters causes strong self-focusing of intense laser pulses. In general, our results illustrate how high energy density femtosecond plasma physics at the nanoscale affects what at first appears to be a conventional laser- gas-phase interaction.

For more information visit

<http://www.aps.anl.gov/asd/physics/seminar.html>

Visitors from off-site please contact Yuelin Li
(ylli@aps.anl.gov, 630-252-7863) to arrange for a gate pass.

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