Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Size distribution of microclusters in laser-irradiated plasmas
MIKHAIL TUSHENTSOV, BORIS BREIZMAN, XIAOHUI GAO, ALEXEY AREFIEV, Institute for Fusion Studies, The University of Texas at Austin — Laser interactions with a mixture of a gaseous plasma and microclusters depend strongly on the cluster-size distribution, which is usually difficult to measure directly. We present a new approach for recovering the cluster-size distribution from time-resolved measurements of the absorbed energy in a pump-probe experiment. The pump pulse ionizes microclusters to a peak density that exceeds the critical plasma density for the probe pulse. The existence of plasma resonances enhances the energy absorption for individual clusters. As a cluster expands, its peak density decreases and the resonance eventually disappears. The expansion time is shorter for smaller clusters than for larger ones, which makes the absorbed energy dependent on the cluster-size distribution. We can then find the cluster-size distribution by matching a convolution of the distribution with a single cluster absorption curve to the measured absorption. We demonstrate feasibility of this technique by analyzing the data from recent pump-probe experiments at the University of Texas.

Alexey Arefiev
Institute for Fusion Studies, The University of Texas at Austin

Date submitted: 25 Aug 2009 Electronic form version 1.4