Abstract Submitted
for the APR08 Meeting of
The American Physical Society

Using the Rayleigh-Taylor instability for in situ measurements of thermal conductivity of warm dense matter. DMITRI RYUTOV, Lawrence Livermore National Laboratory, Livermore, CA 94551 — The Rayleigh-Taylor instability of the material with stratified density, temperature, and composition is considered. The variation of composition gives rise to the appearance of modes whose growth rate is directly related to the finite thermal conductivity (D.D. Ryutov, Phys. Plas., v.7 , p. 4797, 2000). It is proposed to use this effect for in situ measurements of thermal conductivity of warm dense matter. Expressions for the growth rate for the general equation of state are derived and the modes that are most convenient for the aforementioned measurements are identified. A desired perturbation can be introduced by machining the package or by using masks during the surface deposition process. To visualize the evolution of the embedded perturbation, higher-Z tracers can be used. A concept of a laser-driven experiment where this approach can be realized is presented. Prepared by LLNL under contract DE-AC52-07NA27344.

Dmitri Ryutov
Lawrence Livermore National Laboratory, Livermore, CA 94551

Date submitted: 11 Jan 2008 Electronic form version 1.4