Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Time-Resolved Characterization of Hohlraum Radiation Temperature via VISAR Measurement of Quartz Shock Velocity R.E. OLSON, SNL, D.K. BRADLEY, LLNL, G.A. ROCHAU, SNL, G.W. COLLINS, LLNL, R.J. LEEPER, SNL, L.J. SUTER, LLNL — A new technique for time-resolved measurement of hohlraum radiation temperature has been successfully tested in hohlraums with radiation temperatures in the range of 90-170 eV. In these experiments, the hohlraum radiation fields produced ablatively-driven shock waves in quartz samples. A line-imaging velocity interferometer [1] (VISAR) was used to track the quartz shock velocity as a function of time, and an empirical relationship (determined in these experiments) was used to relate the measured shock velocity to the hohlraum radiation temperature. The VISAR results were compared to temperature unfolds of Dante X-ray flux measurements, and to SOP measurements of shock breakout in Al step samples. The experimental results were also compared to the predictions of an integrated 2D rad-hydro code. In these initial tests, a preheat limitation was found for the VISAR technique in hohlraums with temperatures exceeding 170 eV. This limitation is probably related to specific characteristics of the laser hot spots and might be different for other types of hohlraums. The test experiments were done at UR/LLE. The technique should also be useful for hohlraum temperature measurements at other ICF/HED facilities having a VISAR diagnostic capability, such as Z/ZR at SNL or NIF at LLNL. [1] P. M. Celliers et al, Rev. Sci. Instrum. 75, 4916 (2004).

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Date submitted: 14 Jul 2005 Electronic form version 1.4