Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

**Three-Dimensional Density Measurement by Time-Gated Neutron Imaging of Imploded ICF Capsules** MICHAEL MORAN, JEFFREY KOCH, Lawrence Livermore National Lab, CARLOS BARRERA, EDWARD MORSE, University of California, Berkeley — Recent neutron imaging systems[1] have produced a sequence of improving images of the spatial distribution of neutron emission from confinement fusion capsules with neutron yields less that $10^{14}$. Higher neutron yields at the National Ignition Facility and LMJ raise the prospect of neutron imaging methods that probe the physics of the burning capsule. For example, a set of three time-gated images that select different portions of the 14-MeV spectral peak can produce spatial temperature maps of a burning target.[2] Simultaneous images of temperature and neutron emission can be combined to infer the source density distribution by using Abel inversion, a method that has been used in x-ray imaging.[3] A test of this method, based on Gaussian radial temperature and density profiles, indicates that uncertainty in the inferred density varies linearly with uncertainties in the temperature and emission measurements. This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.
References: [1] L. Disdier, et. Al., Rev. Sci. Instrum. 75, 2134 (2004) [2] D.C. Wilson et.al., Rev. Sci. Inst. 74, p. 1705 (2003). [3] J.A. Koch, et.al., J. Quantit. Spectros. & Rad. Trans. 88, p. 433 (2004).

Michael Moran

Date submitted: 27 Sep 2005 Electronic form version 1.4