Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Particle Monte Carlo Transport in HYDRA[1] S.M. SEPKE, M.V. PATEL, M.M. MARINAK, M.S. MCKINLEY, M.J. O'BRIEN, R.J. PROCASSINI, Lawrence Livermore National Laboratory — Accurate simulation of diagnostics for thermonuclear burn requires detailed modeling of the spatial and energy distributions of particle sources, in-flight reaction kinematics, and Doppler effects. In the ALE multiphysics code HYDRA, this is now achieved using a new Monte Carlo particle transport package based on LLNL's Arrakis library. It tracks neutrons, gammas, and light ions on 2D quadrilateral and 3D hexahedral meshes. Neutrons and gammas track using the latest LLNL nuclear data; light ions undergo continuous slowing down with corrections for Fermi degeneracy, small angle Coulomb deflections at track end points, nuclear collisions, and direct Coulomb collisions with plasma ions. The package agrees well with idealized analytical problems as well as high resolution diffusion burn ICF capsule and hohlraum simulations as shown and achieves run times commensurate with production requirements. An overview of the charged particle physics models used is given.

[1]This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

Scott Sepke
Lawrence Livermore National Laboratory

Date submitted: 13 Jul 2010 Electronic form version 1.4