

Electron-induced Nuclear Excited State Population Effects on NIF Thulium Radiochemistry

Rob Hoffman, LLNL

Monday, April 15 ❖ 4:00 P.M. ❖ 124 NSH

We explore the inclusion of electron induced plasma modifications to nuclear excited state level populations in the ablator region of the NIF Rev5 ignition capsule. Two such processes, NEEC and NEET (along with photo-absorption), can populate low-lying nuclear excited states of each isotope in a Thulium radiochemical reaction network. Also included are plasma modifications to the internal conversion rates that de-populate these same states. We will demonstrate the influence these processes have on Thulium nuclear level populations and compare them to the competing influence attributed to various neutron-induced reactions during the temperature-density evolution of the Rev5 capsule for two fuel loadings: DT (leading to simulated ignition), and pure DD.

Lawrence Livermore National Laboratory is operated by Lawrence Livermore National Security LLC for the U.S. Department of Energy National Nuclear Security Administration under Contract DE-07NA27344. Lawrence Livermore National Laboratory P.O. Box 808, Livermore, CA 94551-0808