Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

To acquire more detailed radiation drive by use of "quasi-steady" approximation in atomic kinetics GUOLI REN, WENBING PEI, KE LAN, PEIJUN GU, XIN LI, Institute of Applied Physics and Compuational Mathematics, HOHLRAUM PHYSICS GROUP, IAPCM TEAM — In current routine 2D simulation of hohlraum physics, we adopt the principal-quantum- number(n-level) average atom model(AAM) in NLTE plasma description. However, the detailed experimental frequency-dependant radiative drive differs from our n-level simulated drive, which reminds us the need of a more detailed atomic kinetics description. The orbital-quantum- number(nl-level) average atom model is a natural consideration, however the nl-level in-line calculation needs much more computational resource. By distinguishing the rapid bound-bound atomic processes from the relative slow bound-free atomic processes, we found a method to build up a more detailed bound electron distribution(nl-level even nlm-level) using in-line n-level calculated plasma conditions(temperature, density, and average ionization degree). We name this method "quasi-steady approximation" in atomic kinetics. Using this method, we re-build the nl-level bound electron distribution (P_{nl}), and acquire a new hohlraum radiative drive by post-processing. Comparison with the n-level post-processed hohlraum drive shows that we get an almost identical radiation flux but with more fine frequency-denpending spectrum structure which appears only in nl-level transition with same n number(n=0) .

Guoli Ren
Institute of Applied Physics and Compuational Mathematics

Date submitted: 10 Jul 2012 Electronic form version 1.4