Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Argon-Doped Capsule Implosion Experiments on the Shenguang-II Laser Facility[1] ZHIMIN HU, JIAMIN YANG, JIYAN ZHANG, WENYONG MIAO, JIABIN CHEN, GUOHONG YANG, SHAOEN JIANG, YONGKUN DING, BAOHAN ZHANG, Laser Fusion Research Center, China Academy of Engineering Physics — Argon is often doped in the hydrogen isotope capsule as the tracer for diagnosing the status of the hot spot in inertial confinement fusion implosion experiments. Implosion performance could be affected by the doped argon. For instance, it could bring about the concentration of the heavier argon ions in the center of hot spot, thus degrading the implosion performance. Moreover, implosion mix could be investigated by doping heavier elements in hydrogen isotope capsule, and the atomic-mix effects have been investigated in the pioneering studies. In this talk, we present the performance of argon-doped implosion experiments, in which D-D reaction was used for the substitute of D-T fuel. The experiments were conducted on the Shenguang-II laser facility. The doping-fraction of argon was set as 1%, 2% and 10% (atomic fraction). The temperature and density of electrons are determined by the K-shell emission spectra of the highly-ionized argon. The size of hot spot was recorded by a time-resolving x-ray monochromatic imaging system. The neutron yield were detected by both BF_3 and scintillator detectors. A strong correlation between argon x-ray line intensity and neutron yields have been found in the experiments, and the convergence ratios deduced from the hot-spot imaging agree well with numerical simulation for the difference doping fraction which brings about the change of the equations of states and radiative opacity.

[1]NSFC grant under contract No. 11675158

Zhimin Hu
Laser Fusion Research Center, China Academy of Engineering Physics

Date submitted: 11 Jul 2017 Electronic form version 1.4