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**Fast Ignition Realization Experiments (FIREX) and Beyond**

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After 50 years journey from the innovation of lasers, controlled ignition and subsequent burn will be demonstrated within a couple of years at the US National Ignition Facility (NIF). Fast ignition has the high potential to ignite a fuel using only about one tenth of laser energy of NIF [1]. One of the most advanced fast ignition programs is the Fast Ignition Realization Experiment (FIREX) [2]. The goal of its first phase is to demonstrate ignition temperature of 5 keV, followed by the second phase to demonstrate the ignition-and-burn. The first experiment of FIREX-I, reported here, gives a confidence that one can achieve ignition temperature at the heating laser energy of 10 kJ. One beam of LFEX laser was equipped with a pair of tiled gratings and successfully compressed to 1.2 ps with the energy of 1 kJ, providing about 1 PW laser power. The first experiment with the LFEX laser was performed using deuterated polystyrene shells with a gold cone. Ion temperatures of the core plasmas were deduced from the observed neutron yield, fuel density and the fuel mass. The result gives a confidence that ion temperature will increase up to the 5-keV level with using sharp rising rectangular laser pulse. Given the demonstrations of the ignition temperature at FIREX-I and the ignition-and-burn at NIF, the inertial fusion research would then shift from the plasma physics era to electric power era. Success of the high power short pulse laser system LFEX also makes us envisage future ultra high intensity lasers, such as, GEKKO-EXA and ELI [3] with sub exa Watt power. Extremely high intensity achieved in such facilities will open up ultra high-field physics.

[1] E.I. Moses, Nucl. Fusion 49(2009)104022.
[2] H. Azechi et al., Nucl. Fusion 49 (2009) 104024.
[3] http://www.extreme-light-infrastructure.eu/what-is-eli.php