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OV/4-2: Present Status of Fast Ignition Realization Experiment and Inertial Fusion Energy Development

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Controlled thermonuclear ignition and subsequent burn will be demonstrated in a couple of years on the central ignition scheme. Fast ignition has the high potential to ignite a fuel using only about one tenth of laser energy necessary to the central ignition. This compactness may largely accelerate inertial fusion energy development. One of the most advanced fast ignition programs is the Fast Ignition Realization Experiment (FIREX). The goal of its first phase is to demonstrate ignition temperature of 5 keV, followed by the second phase to demonstrate ignition-and-burn. The second series experiment of FIREX-I from late 2010 to early 2011 has demonstrated a high ($\approx 20\%$) coupling efficiency from laser to thermal energy of the compressed core, suggesting that one can achieve the ignition temperature at the laser energy below 10 kJ. Given the demonstrations of the ignition temperature at FIREX-I and the ignition-and-burn at the National Ignition Facility, the inertial fusion research would then shift from the plasma physics era to power generation era.

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