A high energy peta-watt laser called LFEX (Laser for Fusion EXperiment) has been commissioned at the Institute of Laser Engineering, Osaka University; It consists of a 4-beam and 4-path Nd:glass amplifier system with a 40-cm square aperture in each beam; The design goal of LFEX is to deliver 10-kJ energy in 10-ps width at 1-μm wavelength, while it also delivers 4-kJ energy in 1-ps width; The focusing optics is an off-axis parabola mirror with f/10 speed in each beam. Currently, 3 among 4 beams are in operation, and the fourth beam will be completed in the year of 2014. The focus-ability to diffraction limit and pulse contrast ratio of more than ten billionth are the targets of effort.

The primary purpose of using LFEX is to explore fast ignition concept in the program called Fast Ignition Realization Experiment (FIREX). The goal of its first phase is to demonstrate ignition temperature of 50 million degree, followed by the second phase aiming at ignition-and-burn. After the first phase, LFEX laser will be fully open to the world for basic science study including relativistic plasmas, particle acceleration, radiation damping, and non-linear QED.