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# Fast Ignition Experiments and Intense Hard-X-Ray Harsh Environment

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Fast ignition (FI) experiments have been performed at the Institute of Laser Engineering, Osaka University by using Gekko-XII laser for implosion and LFEX laser for fast heating of fuel targets. In FI experiment with intense heating laser irradiation (>10^19 W/cm2), most of heating laser energy is converted to that of hot electrons with energy ranging well up to several 10 MeV. Intense hard x-rays (or so-called “γ rays”in terms of the photon energy) are generated from hot electrons via Bremsstrahlung in the target material. Such high-energy photons are a real threat as intense background signals to the x-ray and neutron diagnostics. Neutrons generated via (γ,n) reactions taking place in and around the target chamber are also a threat to the neutron diagnostics. We found that FI experiments are in such a γ-ray and neutron harsh environment, and evaluated those conditions which have never been experienced in conventional laser-plasma experiments. We have developed many new plasma diagnostics that are compatible with such a γ -ray and neutron harsh environment. FI physics- and integrated-experiments have been successfully performed with those improved plasma diagnostics with much better accuracy than in the previous experiments even in such a γ-ray and neutron harsh environment. These works are also useful as test pilot experiments for future experimental fusion reactors in which much more harsh environment is anticipated.

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