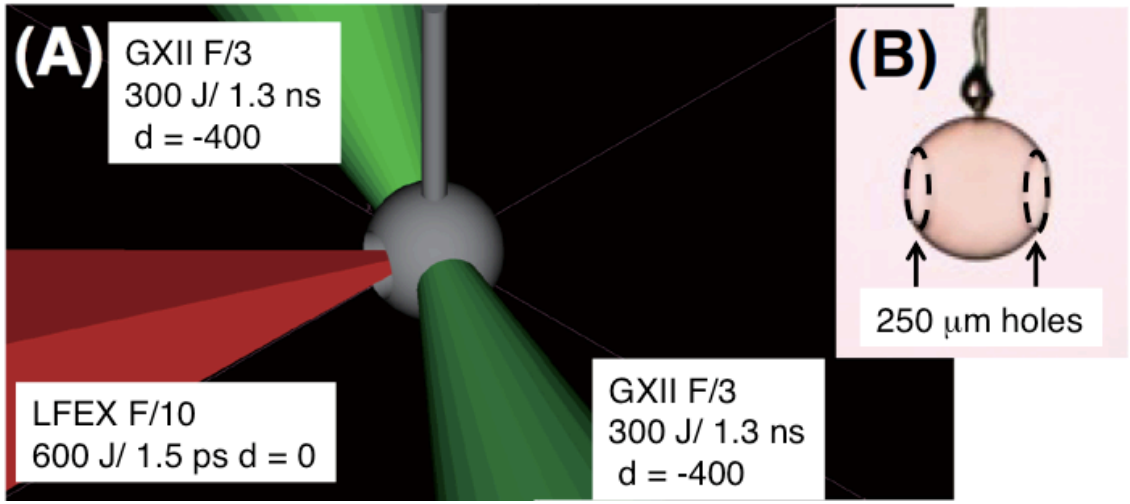
1000x enhancement of fusion reaction in relation to fast-ion heating induced by a direct-irradiating fast-ignition scheme

Primary authors: MORI Yoshitaka (GPI, JAPAN)

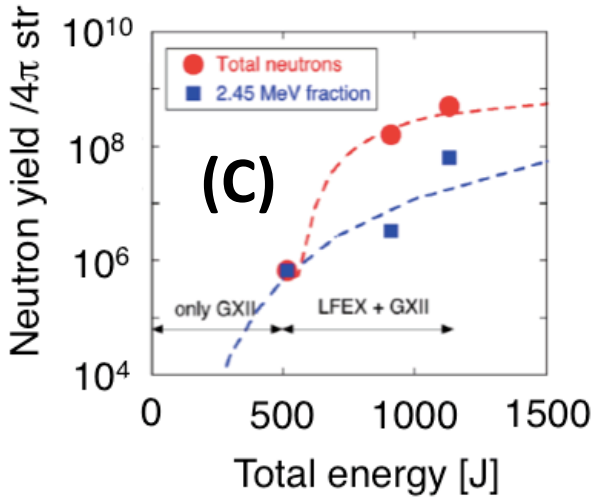
(i) We performed a new-scheme fast-ignition which includes ***direct ion heating of an imploded core***.

(ii) The Laser for Fast Ignition Experiment (LFEX) directly heats a pre-imploded core, enhancing *D*(*d; n*)3*He*-reacted neutron (DD neutron) yields by a factor of 1000 (5×10^8 n/4π sr), the best ever obtained in fast-ignition scheme. The core temperature increased by a factor of two, i.e., from 0.8 keV to 2 keV. The thermal fusion neutron yield also breaks the record.

(ii) To heat the imploded core, we found that, in addition to fast electrons, we can expect ***the heating effect from fast ions*** those are not included in previous experiments. These results indicate that we should pay more attention to the direct-irradiating fast-heating scheme.



(A) CD shell target is counter-imploded by two beams from the GXII and 79◦-side heated by the LFEX. (B) Shell with a hole for LFEX introduction and a hole for preplasmas ventilation.



(C) Neutron yields from Scintillator 1 as a function of LFEX + GXII lasers energy.