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# Hard X-ray measurement in the scrape off layer in the TST-2 spherical tokamak

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Lower hybrid wave (LHW) has been proved to be a reliable wave to drive plasma current. In the university of Tokyo, TST-2 spherical tokamak was devoted to study LHW current drive, and it is crucial to understand the behavior of fast electrons in plasma. In TST-2 it was suggested that there are abundant fast electrons in the scrape off layer (SOL) according to the proposed RF-induced transport model [1]. The purpose of this research is the direct measurement of fast electrons distribution function via hard X-rays (HXRs) measurement to verify the proposed model. This measurement is achieved by inserting a metallic target in SOL and by measuring HXRs generated by the fast electrons hitting the target. Now the metallic target in 10 mm width, 90 mm long had been inserted into SOL (Fig. 1). HXRs was measured by a detector with LYSO scintillator covered by lead shield having a Ø2 mm collimator at the front. In the present stage, the temporal evolution of HXRs measurement was examined by switching between different LHW scenarios. In Fig. 2, significant HXRs of about 50 keV was measured only when top-launch antenna was used, though outboard antenna sustained plasma in both cases. It may indicate completely different fast electron distribution between these two scenarios. In this presentation, HXRs measurement under different LHW scenario respect to insertion of target plate will be presented to clarify behavior of fast electrons.

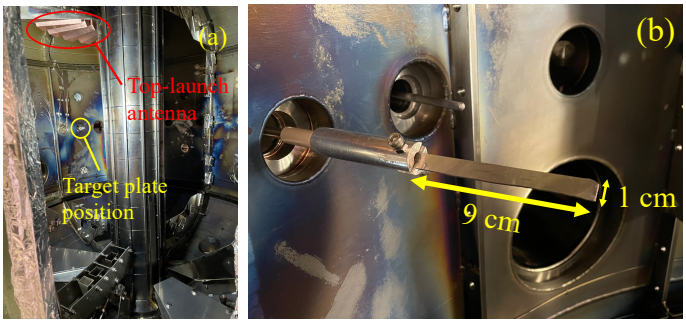


Fig. 1 Photographs of inside view of the TST-2 vacuum vessel showing the target position (a) and the target (b)

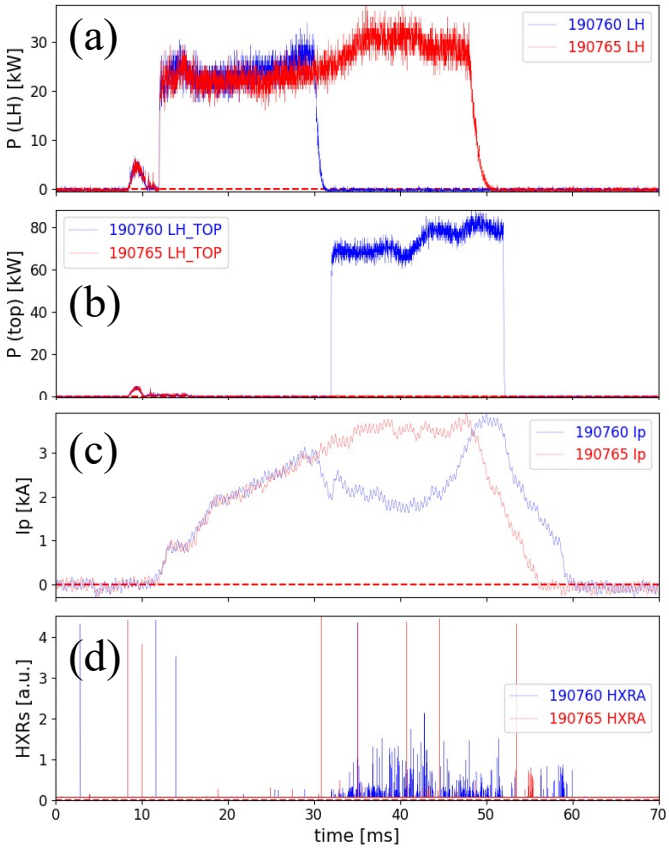


Fig. 2 Waveforms for two discharges: one with top launch antenna (blue), and the other with outboard launch antenna alone (red). Outboard LHW power (a), top launch LHW power, plasma current Ip (c) and HXR detector signals (d) are shown

[1] A. Ejiri *et al.*, Plasma Fusion Res. 17, 1402037 (2022)