Examination of operation of 77-GHz gyrotron for measuring fast ion distribution function for Collective Thomson Scattering in LHD

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To establish a method for suppressing the spurious radiation that interferes with collective Thomson scattering measurements with less degradation of the main mode output power, the frequency evolution and the output power of the megawatt 77-GHz gyrotron were measured during operation under optimized parameters. When an approach using the optimized operational parameters and a PIN switch was applied, the output power increased to 800 kW without any harmful spurious radiation effect as shown in Fig. 1. This operation has been applied, a receiving beam scan was conducted, and we confirmed an expected change in the CTS signal intensity from bulk ion depending on the scattering volume during a receiving antenna angle scan. Now we examine an operation without PIN switch for detecting scattered signal from fast ion.

![Time evolution of (a) RF monitor signal (red solid line) and PIN switch gate timing (black squares); frequency spectrogram around spurious radiation modes of 77-GHz gyrotron operated at (b), (c) $B_c = 3.025$ T, and (d), (e) $B_c = 3.033$ T.](image)