

§10. ECH Plasma Production

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For the first plasma production, the focal points are set on 3.75 m just to coincide with magnetic axis. The magnetic field was selected as 1.5 Tesla on the magnetic axis so that the resonance for 84GHz crosses the magnetic axis in the vertically elongated cross section where the antenna is located. Plasma production at second harmonic resonance was very sensitive to the combination of the resonance position (i.e. magnetic field strength), focal position, and the magnetic axis position. The maximum stored energy of each shot attained in the second harmonic heating condition as well as the case of fundamental off axis resonance is shown in Fig.1. In the fundamental off-axis case, plasma production is observed as far as the resonance exists inside the last closed flux surface anywhere in the vacuum vessel even without the ray passing the resonance with one path. The sensitivity of the magnetic field in the second harmonic heating as contrast to that in the fundamental heating might stem from the difference of the break down and build up mechanism between fundamental and second harmonic resonance during the initial plasma production.

Most of the shot during the second experimental campaign are performed under the magnetic field on the magnetic axis at 1.5 Tesla. The magnetic field strength is tried to increase up to 2.75 Tesla at the magnetic axis of 3.6 m. Although the fundamental resonance layer passes only edge plasma confinement region and

even with the injected ray does not pass through the resonance as shown in the Fig. 2a), appreciable plasma production is observed. The electron temperature profile tends to be hollow in these situations. The electron temperature profiles measured by the Thomson scattering are shown in Fig. 2b) for several time slices.

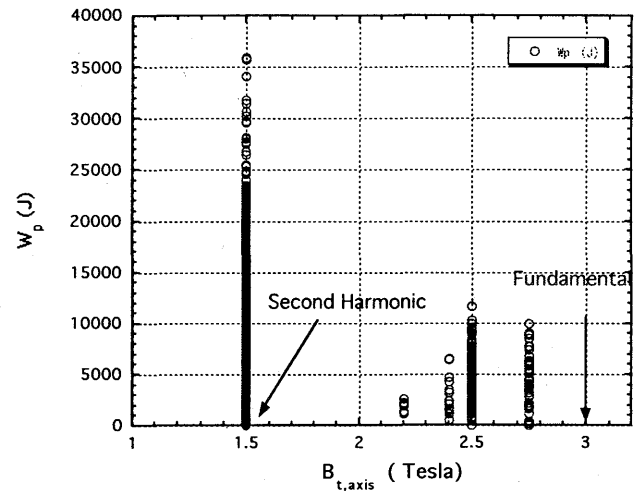


Fig.1 The dependence of the stored energy on the magnetic field for ECH plasma during second cycle experimental campaign.

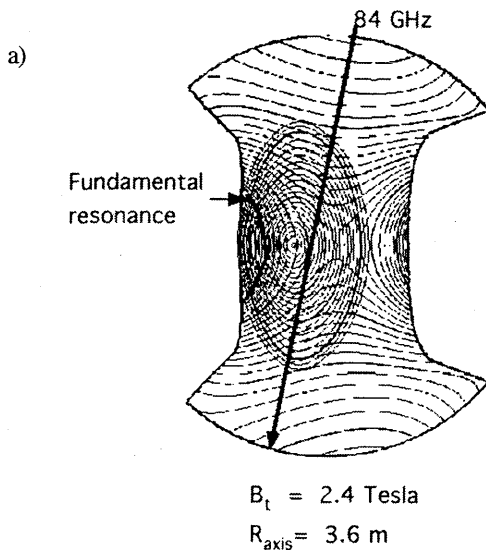


Fig.2. a) The relation between fundamental off axis resonance layer and the ray path for the case of 2.4 Tesla at Raxis = 3.6 m.

b) Electron temperature profile for the off-axis fundamental heating. The ray path in this case does not cross the fundamental resonance.

