# 30pP22

## GAMMA 10/PDXにおけるマイクロ波干渉計を用いた ダイバータ模擬プラズマの電子密度計測

## Electron density measurement of divertor simulation plasma using a microwave interferometer in GAMMA 10/PDX


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The new interferometer system is applied to measure electron line-averaged density inside the divertor simulation experimental module (D-module) on GAMMA 10/PDX. We have developed a 60-GHz interferometer with a new receiver array called a local oscillator integrated antenna array (LIA). An outstanding feature of LIA is that it incorporates a frequency quadrupler integrated circuit for a local oscillator (LO) supply to each channel. This enables simple and uniform LO supply to the receiver array using only a 15-GHz LO source and a coaxial cable transmission line instead of using an expensive 60-GHz source, LO optics, and a waveguide transmission line as shown in Fig. 1.

$H_2$ gas injection experiment was carried out on D-module to study divertor detachment. The $H_2$ gas was injected in D-module at 0.3 s before the plasma discharge with gas puffing duration of 0.75 s. The plenum pressure was set from 200 to 1000 mbar. Standard hot-ion mode plasma was produced by ICRF waves (RF1 and RF2) at the upstream region of the central cell. The additional heating of RF3 was applied during t=300-400 ms at the east anchor region. Figure 2(a) shows the time behaviors of the line density measured by the interferometer with different plenum pressure.

Electron density roll over indicating plasma detachment has been observed on the target plate by a Langmuir probe together with electron temperature decrease below 5 eV with increasing the gas plenum pressure as shown in Fig. 2(b) (electron density as the open square) and Fig. 2(c) (electron temperature). In the present study line-averaged density roll over was clearly observed inside the target plates by the interferometer as well as shown in Fig. 2(a) (the closed circle).

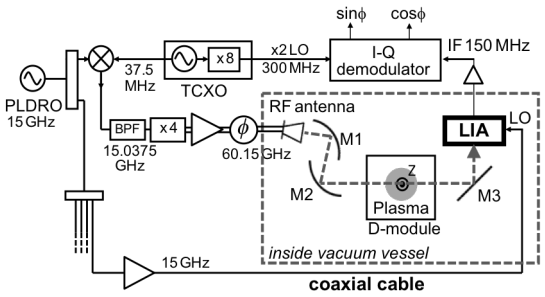


Fig. 1 Newly developed interferometer system with LIA.

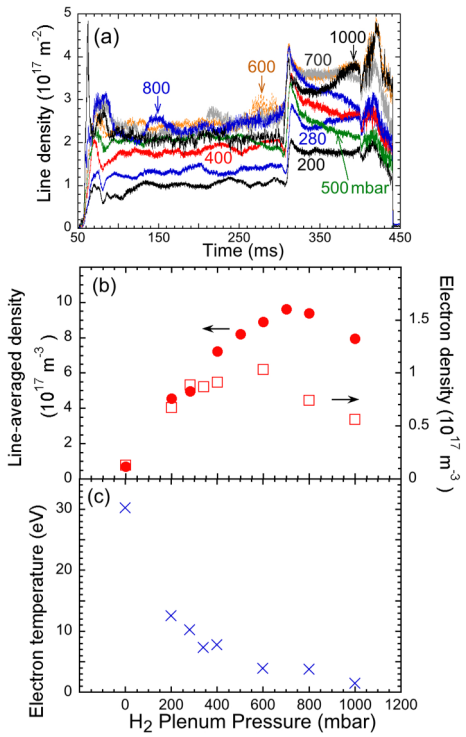


Fig. 2 (a) Time behavior of line density obtained by the interferometer. $H_2$ plenum pressure dependence of (b) line-averaged electron density, electron density, and (c) electron temperature.