

# FIR laser interferometer

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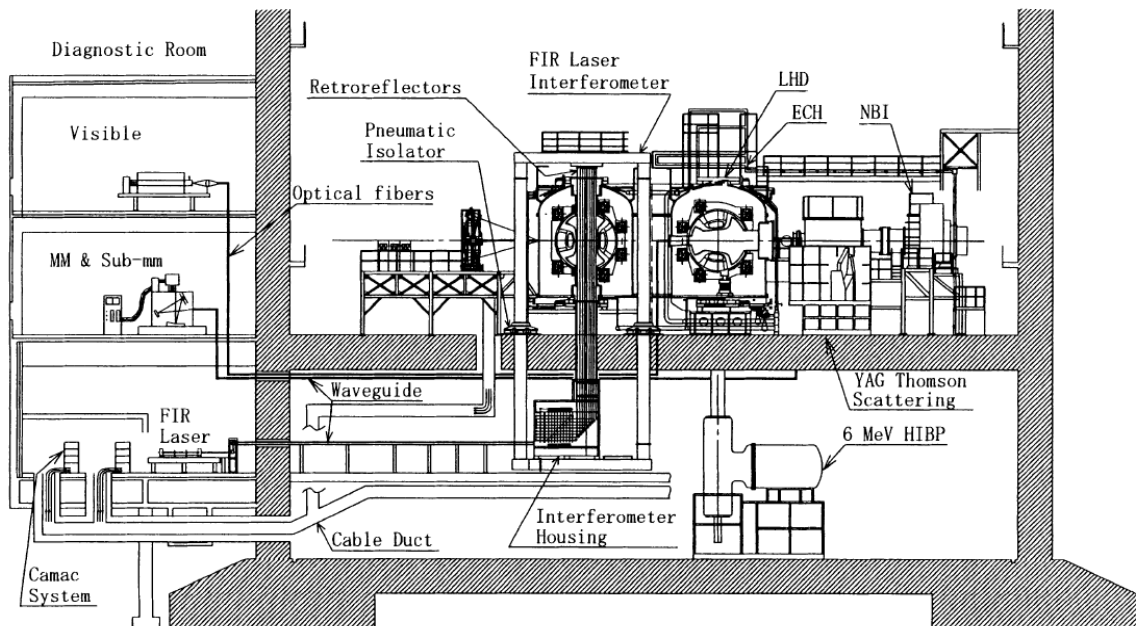
## 1. Objective

Measurements of the line averaged electron density and the electron density profile.

## 2. Apparatus

### 2.1. Optical system

- Laser source: CH<sub>3</sub>OH laser (wavelength: 119  $\mu$ m, output power: 100 mW)
- Michelson interferometer
- Heterodyne interferometer (a beat frequency of 1 MHz)
- Beam transmission length from the laser to interferometer: 50 m
- Location: 8.5 U/L port
- 13 channel (Beam separation: 9 cm, beam width 5 cm)



*Fig. 1. FIR laser interferometer on LHD*

### 2.2. Resolution

- Time resolution: 10  $\mu$ s
- Line density resolution: a line averaged density of  $5.6 \times 10^{16} \text{ m}^{-3}$  (a line density resolution of  $1.0 \times 10^{17} \text{ m}^{-2}$ ; the path length in a plasma is 1.86 m)

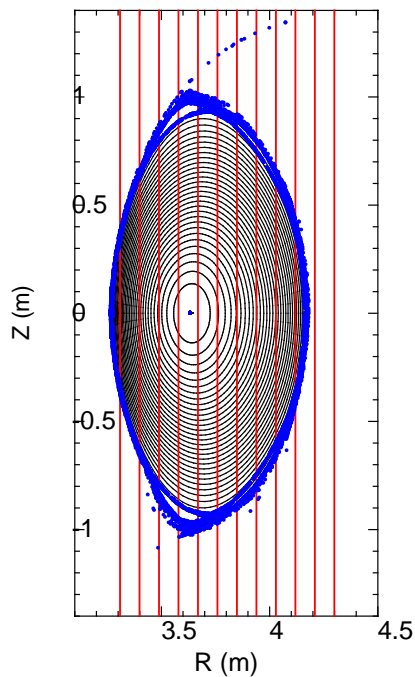


Fig. 2. Measurement chords of FIR laser interferometer (plasma:  $R_{ax}=3.60$  m)

### 3. Operation

Available in all discharges without special requests

### 4. Available data

#### 4.2 Kaiseki-data server

fir\_nel: all line integrated density data at every 0.1 ms

fir\_call: all line integrated density data at every 10 ms

fir\_reff: reconstructed electron density profile (horizontal axes are the major radius and the effective radius)

### 5. Remarks

When fringe jump happens, the density profile data is not provided.

### References

[1] T. Akiyama *et. al.*, Fusion Science and Technology **58**, 352 (2010).

