

§20. Measurement of Circular Polarized Visible Light with a Zeeman Polarimeter in CHS

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We installed a Zeeman polarimeter to measure radial profiles of rotational transform and current density in finite beta plasma. The magnetic field structure such as radial profiles of rotational transform, magnetic shear and magnetic well is considerably modified by finite beta or a net plasma current in the heliotron/torsatron. It is important to measure the rotational transform profile when it is modified by the plasma current[1]. This polarimeter system has successfully been applied to the JIPP T-IIU tokamak, and has achieved high time resolution up to 1.5ms[2].

In CHS, we monitor HeII(4686Å) spectral line emitted from a He-doped plasma through electron impact excitation(shaded area in Fig.1), which is the same approach in JIPP T-IIU. We also use the active beam emission through charge exchange recombination with neutral beam(NBI, dotted area in Fig.1).

Figure 1 shows a schematic drawing of the arrangement of polarimeter system installed in CHS. This system views the almost whole plasma cross section by radially sliding a plane mirror.

As the first step, we have attempted to detect circularly polarized HeII light in CHS. Figure 2 shows an output signal from the Zeeman polarimeter. In this case, HeII spectral lines are detected every 3ms. The solid line also shows Fabry-Perot reference signal. From this signal, we can derive two signals which are left-hand and right-hand circular polarized light to obtain the magnetic field of a line of sight.

Reference

- [1]Toi,k., *et al.*, Plasma Phys. Control. Fusion **36** (1994)A117.

- [2]Kuramoto,H., *et al.*, J.Plasma Fusion Res.**71** (1995)1020.

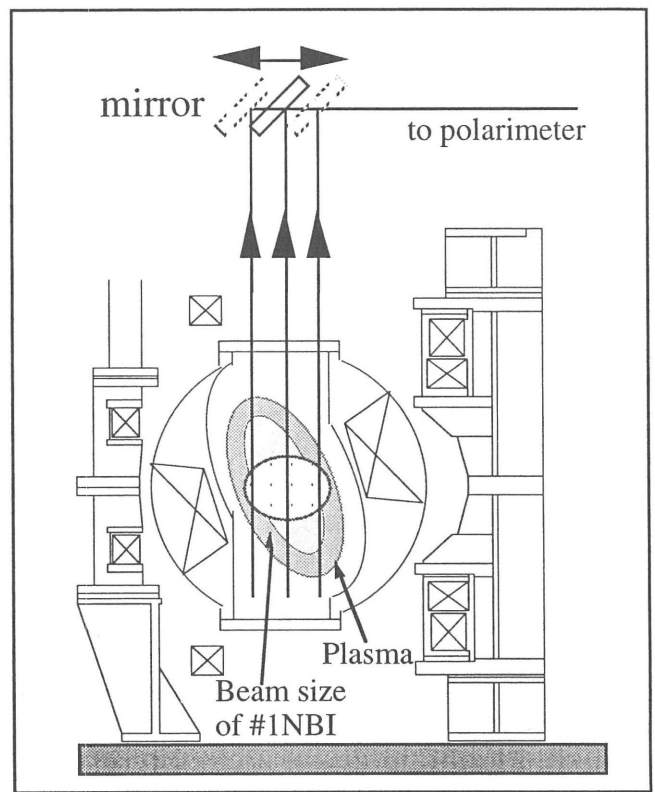


Fig.1 Schematic view of the Zeeman Polarimeter arrangement in CHS.

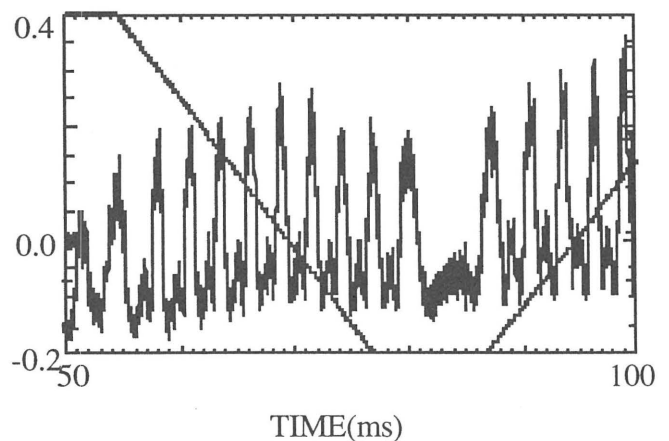


Fig.2 Output signal from the Zeeman Polarimeter.