

HTPD 2018



Contribution ID : 128

Type : not specified

12.53 Nd:YAG laser Thomson scattering diagnostics for laboratory magnetosphere

Wednesday, 18 April 2018 20:31 (120)

Stable confinement of high-beta (local electron $\beta \sim 1$) is demonstrated with high-energy electrons ($T_e > 10$ keV) by an X-ray measurement in the RT-1 magnetospheric plasmas. A new Nd:YAG laser Thomson scattering (TS) system has been developed to investigate the mechanism of the high-beta plasma formation in the RT-1. The designed parameters for the TS system is $10 \text{ eV} < T_e < 50 \text{ keV}$ and $n_e > 1.0 \times 10^{17} \text{ m}^{-3}$. In order to obtain the sufficient amount of scattered light for the low-density plasmas, we adopted the long scattered length (60 mm) and a bright optical system with both large collection window ($\Phi=260 \text{ mm}$) and large collection lens ($\Phi=300 \text{ mm}$). The system employs a Nd:YAG laser of 1.2 J (oscillation frequency: 10 Hz) with a scattering length of 60 mm (scattering angle: 90 degrees). Scattered light is collected by one set of lens ($f/2.0$, $NA = 0.145$) with a solid angle of $\sim 68 \text{ mstr}$ and guided to an interference filter polychromator through an optical fiber bundle. As a test measurement and calibration, the Raman scattering signals were successfully obtained in N_2 gas. We found that the collection optics realizes a sufficient signal-to-noise ratio above $n_e \sim 10^{17} \text{ m}^{-3}$. We also observed that the spectrum of TS light changes with the RT-1 plasma parameters.

Primary author(s) : KENMOCHI, Naoki (Graduate School of Frontier Sciences, The University of Tokyo)

Co-author(s) : NISHIURA, Masaki (Graduate School of Frontier Sciences, The University of Tokyo); YOSHIDA, Zensho (Graduate School of Frontier Sciences, The University of Tokyo); YAMADA, Ichihito (National Institute for Fusion Science); FUNABA, Hisamichi (National Institute for Fusion Science); SUGATA, Tetsuya (Graduate School of Frontier Sciences, The University of Tokyo); NAKAMURA, Kaori (Graduate School of Frontier Sciences, The University of Tokyo); KATSURA, Shotaro (Graduate School of Frontier Sciences, The University of Tokyo)

Presenter(s) : KENMOCHI, Naoki (Graduate School of Frontier Sciences, The University of Tokyo); NISHIURA, Masaki (Graduate School of Frontier Sciences, The University of Tokyo); YOSHIDA, Zensho (Graduate School of Frontier Sciences, The University of Tokyo); YAMADA, Ichihito (National Institute for Fusion Science); FUNABA, Hisamichi (National Institute for Fusion Science); SUGATA, Tetsuya (Graduate School of Frontier Sciences, The University of Tokyo); NAKAMURA, Kaori (Graduate School of Frontier Sciences, The University of Tokyo); KATSURA, Shotaro (Graduate School of Frontier Sciences, The University of Tokyo)

Session Classification : Session #12, Wednesday Night Poster Session