Abstract Submitted
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Measuring ion flow velocity toward negatively biased electrode using optical vortex beams[1] SHINJI YOSHIMURA, National Institute for Fusion Science, KENICHIRO TERASAKA, Kyushu University, MITSUTOSHI ARAMAKI, Nihon University — We have been developing a new diagnostic method for measuring ion flow velocity using Laguerre-Gaussian beams, which is known as optical vortices. To measure ion velocity toward a negatively biased electrode immersed in a plasma by conventional laser-induced fluorescence (LIF) method, a laser path perpendicular to the electrode is indispensable. However, a path parallel to the electrode can be chosen when the propagation mode of light is converted into optical vortices, where an atom feels an additional Doppler effect in the azimuthal direction. Although the azimuthal Doppler shift is generally small compared with the longitudinal one, it may deform the shape of the LIF spectrum in case of high ion flow velocity with a focused higher order optical vortex beam, which is numerically shown in ref [1]. A proof-of-principle experiment using a liner ECR plasma device, HYPER-I, is now underway, where the optical vortex beam of which topological charge is ten is produced by the holographic method using a spatial light modulator. Some initial results on modification of the LIF spectrum due to the azimuthal Doppler shift will be presented at the conference.

[1] S. Yoshimura et al., Jpn. J. Appl. Phys. **59**, SHHB04 (2020).

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