Abstract Submitted
for the GEC08 Meeting of
The American Physical Society

Effect of multiphoton ionization of metastable and ground-state molecules in laser Thomson scattering diagnostics A. KONO, K. FUKUYAMA, M. ARAMAKI, Nagoya University — In laser Thomson scattering diagnostics of low temperature plasmas, the probe laser beam is focused to obtain a sufficient signal to noise ratio, and the laser energy density in the focal region is very high. Therefore, one must be certain that possible electron production due to multiphoton ionization is negligible in comparison with the unperturbed plasma electron density. We are carrying out a systematic study of determining multiphoton ionization efficiency in the focal region of frequency-double Nd:YAG laser (532 nm). The laser beam is focused between the electrodes of a small dc-biased parallel-plate probe, whose current due to the collected charge arising from multiphoton ionization is detected by a digital oscilloscope. Preliminary results indicate the following. For 200-mJ laser pulse focused with a f=400 mm lens, metastable Ar atoms are ionized with a high probability, while no significant ionization occurs for ground-state Ar atoms. Ground-state O_2 molecules give rather large multiphoton ionization signal and Thomson scattering measurements for medium pressure (1>Torr) O_2 plasma would require careful control of laser energy density in the focal region. Measurements for other gases are in progress.

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Date submitted: 13 Jun 2008 Electronic form version 1.4