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Measured effect of radiation trapping on He I line intensity ratio technique used for estimating electron density and temperature[1] DAISUKE NISHIJIMA, ERIC HOLLMANN, UCSD — He I line intensity ratios are commonly used to estimate electron density, n_e, and temperature, T_e, in helium plasmas. Previously, UV radiation trapping has been invoked to obtain better agreement on n_e and T_e with other diagnostics. In the linear divertor simulator PISCES-A we have experimentally confirmed radiation trapping of the He I UV resonance transition (1^1S - 3^1P: 53.7 nm) from the radial profile of He I visible line emission (2^1S - 3^1P: 501.6 nm), which has the same upper state as 53.7 nm; and also from the radial profile of plasma radiated power measured with an AXUV photodiode array. The radiation trapping effect has been implemented into a collisional-radiative code by using the optical escape factor method. n_e and T_e derived from He I line intensity ratios (667.8nm/728.1nm and 728.1nm/706.5nm) calculated with the modified code agree well with those from probe measurement at neutral pressure of above a few mTorr. The discrepancy at low pressure may be due to the presence of nonthermal electrons.

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Daisuke Nishijima
UCSD

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