

## §10. Study of Impurity Ion Radiation Intensity in the GAMMA 10 Plasma

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Time and space resolved spectroscopic measurements of impurity ion radiation spectra give us a lot of important information, such as time and space variations of plasma density, electron and ion temperatures, etc. After comparing the collisional-radiative model (CR-model)<sup>1)</sup> calculation results for impurity ion line radiation intensities and those measured by spectroscopic method, we can obtain the impurity ion densities, electron density and electron temperature. The aim of this study is to construct the database for plasma spectroscopic diagnostics in the fusion plasmas.

CR-model calculation codes for carbon and oxygen ions developed at NIFS were used in this study.<sup>1)</sup> These codes include the efficiencies for electron impact ionization, excitation, recombination and de-excitation. In the previous reports,<sup>2-4)</sup> we used CR-model calculation

code for CII and CIII ions in order to obtain the time dependent CII and CIII ion density radial distributions. We calculated the effect of plasma confinement time for CR-model calculation. We calculated the time dependent population densities of each excited states of CII ion. Figure 1 shows the time dependence of CII ion population densities. This shows that the population density of meta-stable state is effective for CII ion density in the quasi-steady state. Then it is important to consider the confinement time of the plasma for using the CR-model calculation results to the plasma spectroscopy. Then we try to study the confinement time for CR-model calculation.

### Reference

- 1) Kato, T., et al.: Fusion Eng. Des., **34-35** (1997) 789.
- 2) Yoshikawa, M., et al. ; Annual Report of NIFS, April 2000-March 2001 (2001) 388.
- 3) Yoshikawa, M., et al.: Annual Report of NIFS, April 2001-March 2002 (2002) 374.
- 4) Yoshikawa, M., et al.: Annual Report of NIFS, April 2002-March 2003 (2003) 380.
- 5) Yoshikawa, M., et al.: Transactions of Fusion Science and Technology, **43** (2003) 189.

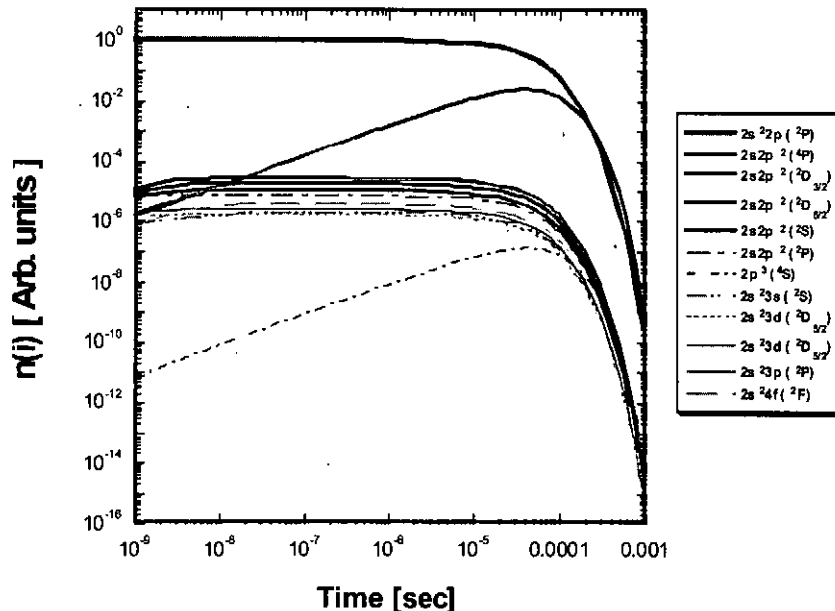


Fig. 1. Time dependence of CII population density.