

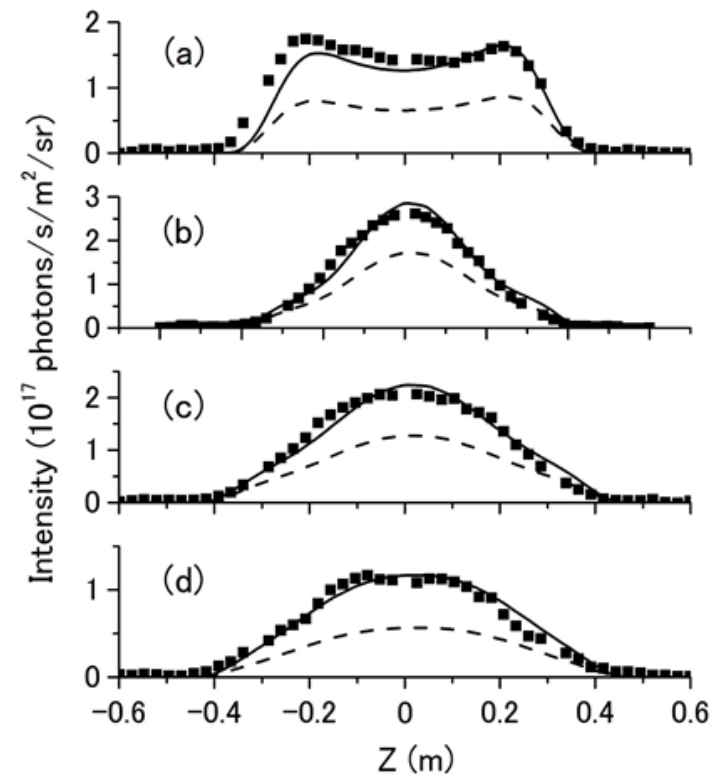
# EX/P8-14: Observation of visible forbidden lines of tungsten highly charged ions in LHD core plasmas and its first application to ion distribution analysis

D. Kato<sup>1,2</sup> et al., <sup>1</sup>NIFS, <sup>2</sup>Dept. Fusion Sci., SOKENDAI

Visible emission lines of highly charged W ions are useful at ITER because the radiation shielding of detectors is not basically necessary by using optical fibers and will give a better understanding of tungsten behaviour because precise spectroscopic measurements are facilitated in the visible region. Visible magnetic-dipole (M1) lines of W ions in the Large Helical Device (LHD) are observed. Based on spatial profiles of an M1 line intensity of  $W^{27+}$ , tungsten ion distributions in LHD core plasmas are quantitatively analyzed using a collisional-radiative model.

## Summary of results:

- 1) Strong enhancement of the M1 line intensity due to proton collisions is predicted by the present calculation.
- 2) Poloidal asymmetry of the tungsten density distribution in the core plasma is inferred.
- 3) Peak tungsten concentration at the plasma center is estimated as high as  $10^{-2}$ . Time variation of the tungsten distribution in the core plasma is observed.



Vertical distributions of line-integrated intensities of  $W^{27+}$  M1 line at (a)  $t = 4.1$ , (b) 4.3, (c) 5.0 and (d) 5.6 s. Tungsten pellet is injected at 4.0 s. Solid squares indicate measurement and solid curves calculations, respectively. Dashed lines are the calculation neglecting proton collision effects.