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 \( \text{W}^{27+} \), 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 \( \text{W}^{27+} \) 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.