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Observation of visible forbidden lines of tungsten highly charged ions in LHD core plasmas and its application to ion distribution analysis

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Visible emission lines of tungsten ions are useful for analysis of tungsten ion distributions at ITER because the radiation shielding of detectors is not basically necessary by using optical fibers. Here we report the result on observation of visible magnetic-dipole (M1) lines of highly-charged tungsten ions in the Large Helical Device (LHD) with tungsten pellet injection and its first application to the ion distribution analysis. Based on the measured spatial profile of the M1 line intensity, (i) radial distributions of W^{27+} ions in LHD core plasmas are elucidated using an originally developed collisional-radiative model and (ii) strong enhancement of the M1 line intensity due to proton collisions is predicted by the present calculation.

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