A Study of tungsten spectra using Large Helical Device and Compact Electron Beam Ion Trap in NIFS

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Tungsten spectra have been observed from Large Helical Device (LHD) and Compact electron Beam Ion Trap (CoBIT) in wavelength range of visible to EUV. An impurity pellet (cylindrical carbon with tungsten) is injected to LHD plasmas for observing the tungsten spectra. Radial profiles of EUV spectra from highly ionized tungsten ions have been measured and analyzed with impurity transport simulation code to examine the ionization balance determined by ionization and recombination rate coefficients. In order to observe the tungsten spectra from lower-ionized stages, which can give useful information on the tungsten influx in fusion plasmas, the ablation cloud of the impurity pellet is directly measured with visible spectroscopy. A lot of spectra from neutral and singly ionized tungsten are observed and some of them are identified. A magnetic forbidden line from highly ionized ions of high-Z elements including tungsten observed from LHD plasmas has been analyzed for reconstruction of the atomic structure model in addition to the diagnostic use for D-T burning plasmas. The EUV spectra of tungsten ions, e.g., $W^{+24\text{-}26}$, measured from LHD plasmas are compared with those measured from plasmas of CoBIT with monoenergetic electron beam (≤2keV). The data are analyzed with collisional-radiative model.