Theoretical Electron Impact Ionization, Recombination, and Photon Emissivity Coefficient for Tungsten Ions

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Electron impact ionization (EII), dielectronic recombination (DR) and photon emissivity coefficient (PEC) for tungsten (W) ions have been calculated using flexible atomic code based on fully relativistic *jj*-coupling scheme. Those atomic data for W is necessary for spectroscopic and transport modeling of impurity in a magnetically-confined fusion tokamak since W has been a preferred first wall material in tokamaks.

The calculated EII cross sections for W^{+} [1] and W^{17+} [2] were compared with other experiments and theoretical calculations. The calculated DR rate coefficients for W^{q+} (q = 44 - 46) [3] were compared with other ab-initio calculations and semi-empirical predictions. Uncertainties for calculated energies of levels, cross sections of EII, and rate coefficients of DR coming from orbital sensitivities due to local central potential choices and from configuration mixings are discussed. The calculated PEC for W^{q+} (q=5-48) and some results for its use in a prediction for VUV (λ = 14-22 nm) spectra from a tokamak are presented. The sensitivities of the spectra and fractional abundances for W ions to the underlying DR data set are shown and discussed.

DR rate coefficients for W^{5+} and W^{20+} are in the process of calculation with the same methodology for W^{q+} (q = 44 - 46) and of mutual verification with other previous predictions. The results will be also presented and discussed.

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