ITER plasma spectra modelling for charge exchange recombination spectroscopy

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One of the primary methods of fusion plasma diagnostics is charge exchange recombination spectroscopy [1]. The CXRS diagnostics is widely used at many modern tokamaks to measure ion temperature, ion density, toroidal and poloidal plasma rotation velocities. CXRS will be one of the most important diagnostics at the ITER tokamak, as it would be used to measure main plasma parameters determining the efficiency of the fusion reaction.

This work describes CXRS-Edge diagnostics development for ITER. The CXRS spectra modelling for ITER tokamak is considered. The main principles of spectra modelling in presence of the diagnostic neutral beam are considered. Simulation of Spectra code [2], created specially for CXRS modelling is described. Spectral profiles, calculated for different ITER scenarios are presented. Figure 1 shows an example of modelled HeII and BeIV spectrum for 0.5 minor radius.

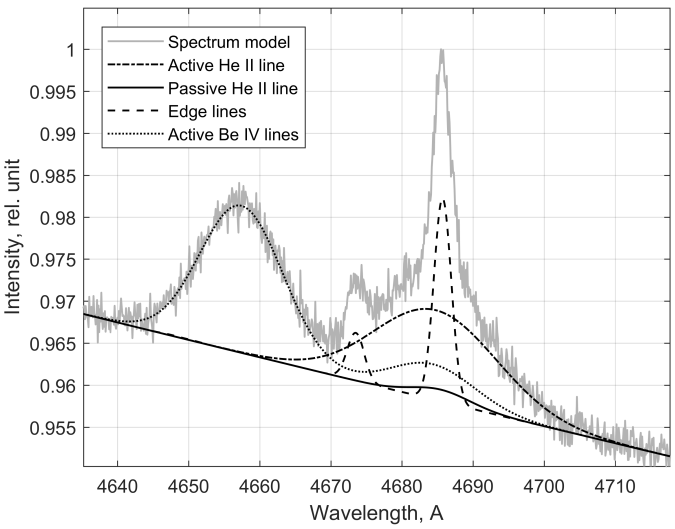

Figure 1: *Modelled HeII and BeIV spectrum for ITER CXRS-Edge. It is a superposion of active HeII CX line, passive HeII CX line, edge lines and BeIV active lines.*

The main challanges of CXRS modelling for ITER are described. It is shown that CXRS-Edge diagnostic on ITER tokamak will allow performing an ion temperature, impurities concentration, toroidal and poloidal rotation velocity measurements in accordance with ITER requirements.

References

[1] R. Fonck et al., Physical Review A, 29, 6 (1984)

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