Tungsten Spectroscopy at W7-X: Diagnostics, Models, and Applications

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This work reports on recent developments on the spectroscopic analysis of Tungsten emission lines over a wide spectral range from ultra-violet to high-resolution x-ray data of various spectrometers [1,2] at the magnetically confined fusion Stellarator experiment Wendelstein 7-X [3].
A new method for an absolute calibration of X-ray spectrometers using well defined impurity injections [4,5], line identifications of highly resolved W^{41+}-W^{46+} spectra (Fig.1), as well as validations of W rate coefficients through diagnostics cross calibrations will be discussed in detail.

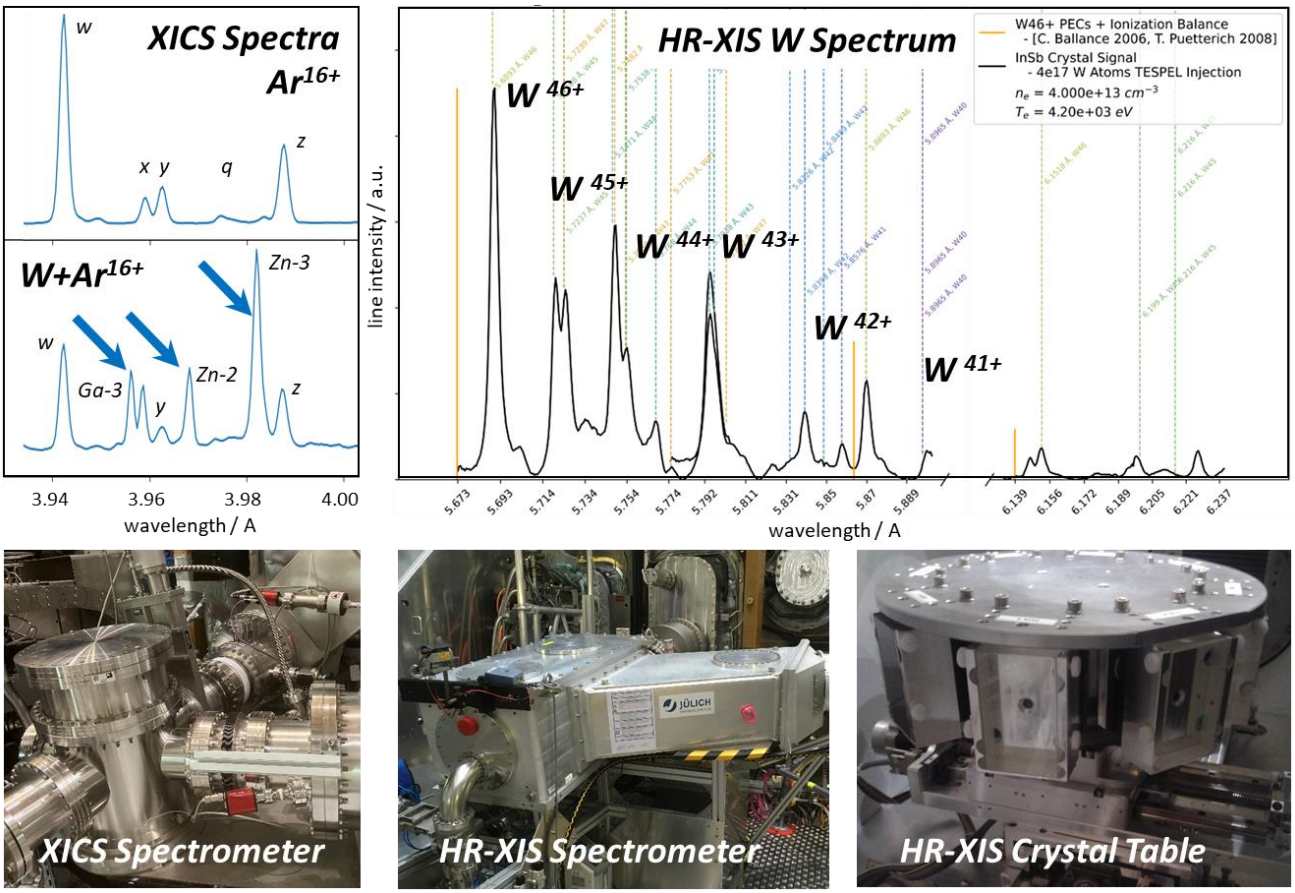

Fig.1: High resolution tungsten spectra observed at W7-X with imaging spectrometers XICS and HR-XIS [1] after tungsten injections via laser blow off and solid pellet injections into high electron temperature plasmas.

[1] A. Langenberg, N.A. Pablant, Th. Wegner *et al*. Review of Scientific Instruments **89**, 10G101 (2018)
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