

WEST VUV spectrometers

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The WEST machine aims at testing actively cooled full W monoblock Plasma Facing Units under long plasma discharge, with thermal loads of the same magnitude as those expected for ITER. For the first operation phase, copper plasma facing components were directly tungsten coated and carbonaceous components were coated with a molybdenum sublayer covered by a tungsten layer. Thirty seconds stable L-mode X-point plasma discharges were routinely performed, including up to 5.5 MW LHCD. During the first plasmas, some runaway electron control issues were the cause of plasma contamination by wall material.

WEST as well as Tore Supra, is equipped with two VUV spectrometers providing plasma impurity measurements. One of these spectrometers has one fixed detector and is viewing the plasma mid plane. The second spectrometer is equipped with two movable detectors. Its support is also movable allowing viewing from the mid plane to the divertor. During the plasma either the support remains fixed at a defined position or it oscillates within two positions of interest. To perform tungsten spectroscopy measurements, various spectral ranges can be selected within the extreme range 1.5 to 68 nm.

In view of a more effective impurity monitoring, a thorough line identification of the VUV spectra has been performed: Copper and Molybdenum line brightnesses have been identified and studied by comparing them with the sources deduced from the visible spectroscopy diagnostics. Silver lines have been identified thanks to an intensive bibliography together with an increased ICRH injected power. Indeed WEST ICRH antennas are silver coated. In carbon environment few lines were present in spectra. In tungsten environment well defined lines (e.g. in the 11.5- 15.5 nm where lines of W^{37+} to W^{45+}) and quasi continua are either well separated or superposed (e.g. the quasi continuum in the 4.5 to 7 nm range with superposed lines of W^{37+} to W^{45+}). Consequently a very big work on line identification remains to do. This includes also understanding plasma phenomena.