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10.50 Spectroscopy accompanied by a versatile gas injection system in the divertor plasma of the experimental campaign OP1.2 at Wendelstein 7-X

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For the stellarator W7-X, spectroscopic systems detecting line radiation of light impurities and hydrogen from near UV to near IR for quantitative studies at two different divertors have been prepared. These systems comprise of various spectrometers with cooled CCD cameras as well as photomultipliers with interference filters for fast measurements (up to 100 kHz). At both positions, a versatile gas injection system has been installed for a wide range of applications. Trace amounts of helium for local measurement of ne and Te profiles using the line ratio method were routinely carried out. Perturbative impurity gasses (neon and nitrogen) were injected to study e.g. active radiation cooling in the divertor region or hydrogen for fuelling and studies of detached plasmas. During first part of OP1.2 strong heat flux reduction to the divertors has been observed for some hydrogen plasma conditions suggesting a completely detached plasma state. The capability of active control the detachment plasma conditions by local gas injection was investigated experimentally. Some results are shown pointing out possible scenarios for detachment optimization by feedback controlled gas injection which is planned for the upcoming second part of OP1.2.

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