Influence of nitrogen seeding on SOL transport during and between ELMs

H.W. Müller[1], A. Herrmann[1], A. Kallenbach[1], A. Kirk[2], T. Lunt[1], V. Rohde[1], and ASDEX Upgrade Team[1]

[1] Max-Planck-Institut für Plasmaphysik, EURATOM-Association, Garching, Germany
[2] EURATOM/UKAEA Fusion Association, Culham Science Centre, Abingdon, UK

In ASDEX Upgrade all plasma facing components have been covered by tungsten. This caused an increased divertor temperature due to a reduced carbon radiation in the plasma edge and SOL. Therefore gases (Ar, Ne, N_2) were added to increase the edge radiation and therefore to reduce the power flux onto the divertor. The gas seeding was feedback controlled to keep the divertor temperature on average at about $5-7\,\mathrm{eV}$. Using N_2 seeding in improved H-mode discharges it was observed that the seeding not only allowed to control the divertor temperature but also the energy confinement was increased by $10-15\%$. The improved energy confinement was accompanied by a higher ELM frequency with a smaller energy loss per ELM.

Altogether we can expect changes in the SOL transport when seeding N_2 compared to unseeded discharges. We use two reciprocating Langmuir probes on the low field side of ASDEX Upgrade as well as probes in the outer limiter to study ELMs and inter-ELM transport in the SOL. The reciprocating probes can be observed by infrared or fast video cameras to determine the power load onto the probes or to visualize filaments. First measurements and an initial investigation of N_2 seeded discharges have already been performed. Comparing seeded and unseeded discharges shows that N_2 seeding reduces the ELM duration and the number of large filaments per ELM. The peak saturation current of the largest filaments seems to stay unchanged with N_2 seeding. Also the radial velocity of the ELM filaments remains about the same. It is still to be investigated if there is a seeding effect on the radial fall off length of the ELM filaments. Close to the limiters, in the far SOL, there is a tendency that N_2 seeding favours smaller filaments in ELMs. The probability of larger filaments in between ELMs is increased with N_2 seeding. But these filaments are much smaller than the big filaments related to ELMs. A more detailed analysis on a larger data base will be presented.