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Active Control of Power Exhaust in Strongly Heated ASDEX Upgrade Plasmas RALPH DUX, ARNE KALLENBACH, MATTHIAS BERNERT, THOMAS EICH, CHRISTOPH FUCHS, LOUIS GIANNONE, ALBRECHT HERRMANN, JOSEF SCHWEINZER, WOLFGANG TREUTTERER, Max-Planck-Institut für Plasmaphysik, EURATOM Association, Garching, Germany, ASDEX UPGRADE TEAM — Due to the absence of carbon as an intrinsic low-Z radiator, and tight limits for the acceptable power load on the divertor target, ITER will rely on impurity seeding for radiative power dissipation and for generation of partial detachment. The injection of more than one radiating species is required to optimise the power removal in the main plasma and in the divertor region, i.e. a low-Z species for radiation in the divertor and a medium-Z species for radiation in the outer core plasma. In ASDEX Upgrade, a set of robust sensors, which is suitable to feedback control the radiated power in the main chamber and the divertor as well as the electron temperature at the target, has been developed. Different feedback schemes were applied in H-mode discharges with a maximum heating power of up to 23 MW, i.e. at ITER values of P/R (power per major radius) to control all combinations of power flux into the divertor region, power flux onto the target or electron temperature at the target through injection of nitrogen as the divertor radiator and argon as the main chamber radiator. Even at the highest heating powers the peak heat flux density at the target is kept at benign values. The control schemes and the plasma behaviour in these discharges will be discussed.

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