

(EX/P6-25) Development of impurity seeding and radiation enhancement in the helical divertor of LHD



- Impurity seeding for the reduction of the divertor heat load was conducted in the LHD using Ne and Kr puffing. Enhanced radiation loss and reduction of the divertor heat load were observed without significant changes in stored energy and line averaged density.
- $P_{\text{rad}}/P_{\text{heating}} \sim 52\%$ was achieved by the Ne seeding in $n_{e,\text{bar}} = 1.3 \times 10^{19} \text{ m}^{-3}$ with confinement degradation less than 20 %.
- The localized supplemental radiation was observed along the helical divertor X-points (HDXs) in the Ne seeded plasma. This tendency was similar to the radiation structure simulated by the EMC3-EIRENE code. On the contrary, the supplemental radiation area of the Kr seeded plasma moved from the HDXs to the core plasma. High-valent Kr ions are considered to be the dominant radiators from the plasma core region.
- The operation condition of the combination seeding of Ne and Kr should be investigated and optimized to achieve $P_{\text{rad}}/P_{\text{heating}} \sim 80\text{-}90\%$ for DEMO reactors.

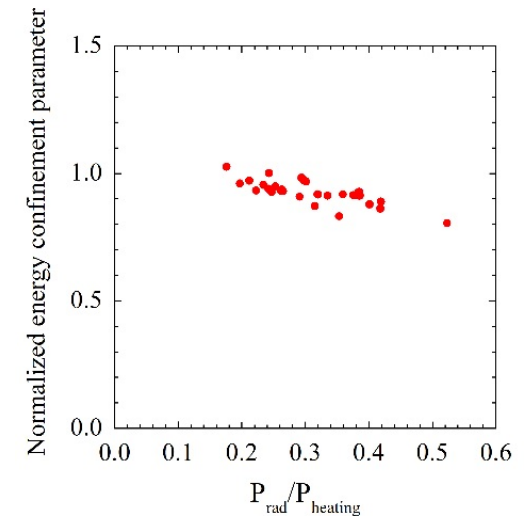
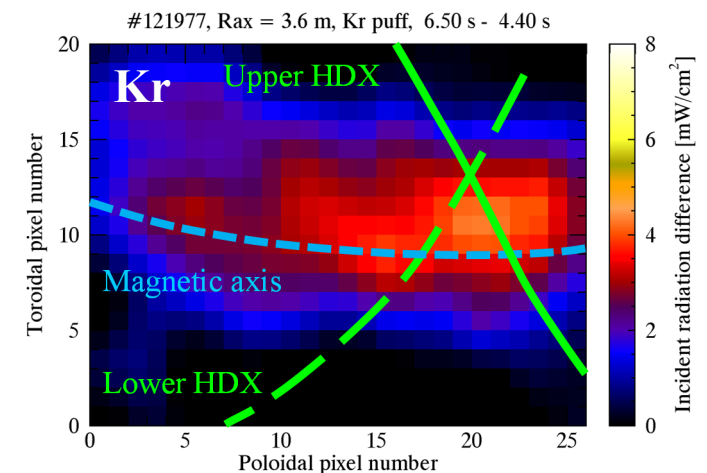
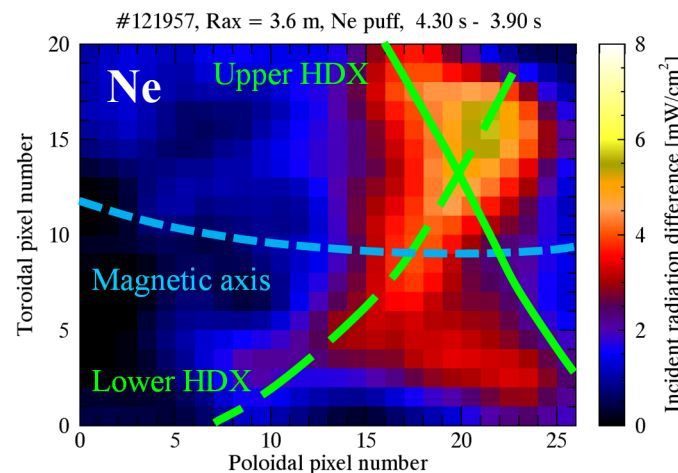


FIG. Energy confinement parameter in detached plasmas vs. the radiated power fraction after detachment in the Ne seeding discharges.



Observed enhancement of the radiation between after and before impurity seeding.