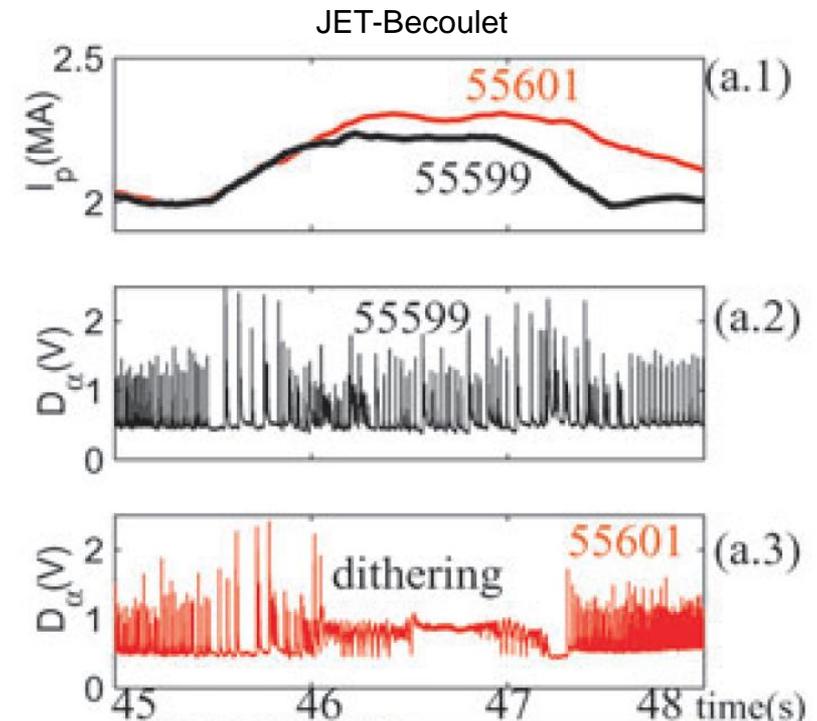
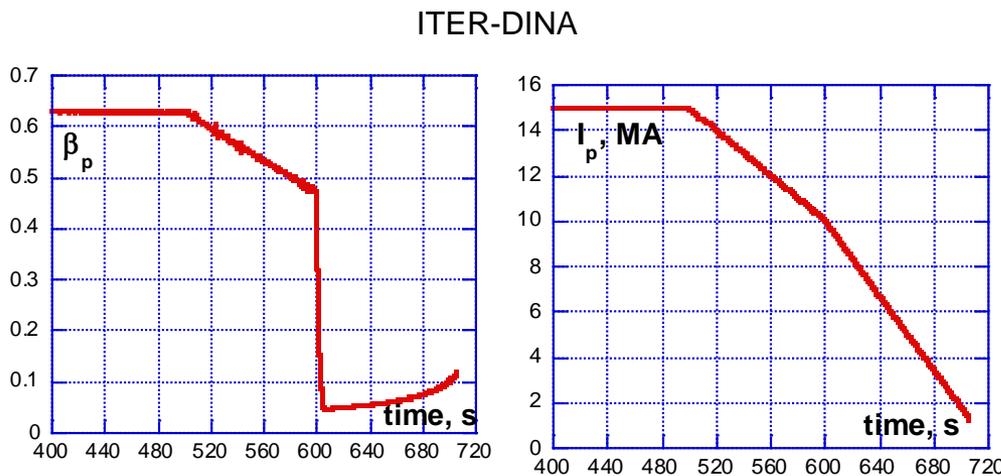


# **Access and sustainment of H-mode confinement in ramped phases of ITER scenarios**

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# H-mode access/sustainment during current ramp up/down phases (I)

- ITER  $Q_{DT} = 10$  scenarios are designed with H-mode access for  $I_p$  ramp-up phase, ie  $I_p < 15$  MA, and sustainment of H-mode for ramp-down phase
- Power requirements for H-mode access and sustainment in these phases assumed to be similar as for stationary  $I_p$  conditions
- Changing edge current by ramps is well known to have effects on H-mode plasma behaviour → consequences for requirements in ITER ?
- Assessment of H-mode access and sustainment requirements in  $I_p$  ramping phases for ITER-like current ramps is required to determine viability of scenarios



## Experimental plan

Plasma conditions in NSTX with  $q_{95}$  as low as possible ( $\sim 6$ ) as high as possible  $I_p$  and  $\delta \sim 0.5$  SN plasmas with favourable grad-B drift

1. Determine H-mode threshold for  $\sim$  fixed  $\langle n_e \rangle / n_{GW}$  and three ramp-up speeds (around ITER-like) with  $I_p$  near flat top value
2. Determine H-mode threshold for  $\sim$  fixed  $\langle n_e \rangle / n_{GW}$  and three ramp-up speeds (around ITER-like) with  $I_p$  at  $\sim$  half of flat top but  $\langle n_e \rangle > n_{e,min}$
3. For ITER-like ramp-up with transition  $I_p$  at  $\sim$  half of flat top and  $\sim$  fixed  $\langle n_e \rangle / n_{GW}$  determine power requirements to keep plasma in H-mode ( $P_{input} \sim I_p$ , constant, etc. ?)
4. Repeat at different  $\langle n_e \rangle / n_{GW}$  for ITER-like ramp with  $I_p$  at half of flat top
5. Starting from plasma in Type I ELMy H-mode assess power requirements to keep H-mode in ramp-down with three ramp-down speeds (constant shape) ( $P_{input}$  down in steps or  $P_{input} \sim I_p$ , etc.)
6. Repeat experiment (H-mode access in ramp-up and sustainment in ramp-down) at lower field