

# H-mode Pedestal Evolution in ELMy and ELM-free discharges in NSTX

A. Diallo et al.

**Goal:** Understand pedestal parameter dynamics during the inter-ELM phase, expand to the behavior of fluctuations, and compare to theory predictions.

## Key Elements:

### I. Inter-ELM dynamics of pedestal parameters are consistent with peeling ballooning model

Height vs. width and comparison with other tokamaks (data acquired and analyzed)

Pedestal height clearly saturates late in the ELM cycle contrasting observation made in other tokamaks.

Maximum pressure gradient saturates early in ELM cycle:

Experimental observations  $\Delta = c \sqrt{\beta^{\text{ped}}}$ , where  $c = 0.17$  for NSTX, 0.1 for MAST and 0.06 for DIID.

Width-height correlation predicted by EPED (for high aspect ratio tokamaks) [extension to NSTX under development]

Edge Fluctuations decrease prior to onset ELM: No evidence of KBM onset (analysis performed)

Using BES, reflectometry in the pedestal region, a decrease of fluctuations is observed prior to the onset of ELM.

First inter-ELM resolved-fluctuation measurements.

Use of simulation/modeling to determine stability regions

Apply linear analysis GS2 to determine the stability diagram during ELM cycle (analysis underway)

Evaluation of the stability using ELITE during the last part of the ELM cycle.

### II. Estimate of inter-ELM phase transport coefficients

Evolution of effective  $\chi$  and D during the inter-ELM phase (TRANSP and SOLPS analysis underway)

Testing paleoclassical model to determine electrons  $\chi$ ?

### III. Pedestal parameter scalings at the “onset” of ELM with $I_p$ , $B_t$ , and triangularity ( $\delta$ ):

Width, and height scale with  $I_p$  and  $\delta$  predicted by the ELITE simulations

On NSTX  $(I_p)^2$  dependence of  $P_{\text{ped}}$  is observed similar to JT60 U and C-Mod.

Scaling with  $B_t$  (XPI Ixx data early in the 2011 campaign)

Increase of  $P_{\text{ped}}$  with average  $\delta$

Need to determine the width scaling with  $B_t$  and average  $\delta$ ?

### IV. Compare inter-ELM pedestal parameters evolutions with those of ELM-free regimes

Previous observations show a wide pedestal width in the ELM free regime.

Pedestal width-height correlation (analysis will be using 2009 and 2010 ELM-free discharges)

**Summary:** Inter-ELM dynamics qualitatively consistent with peeling ballooning model. Connection to theory in progress....