C-MOD/MAST/NSTX small ELM regime comparison

XP review

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Amanda Hubbard *(MIT PSFC)*, Rajesh Maingi *(ORNL)*,
Hendrik Meyer *(UKAEA)*

Aims

- **Establish dimensionless pedestal comparison with small ELMs between MAST/NSTX/C-MOD**
  - Only three of the 4 parameters q_{95}, ν_{ped}^*, β_{ped}, and ρ_{ped}^* can be held constant due to different R/a.
  - Perform a two point scan in β_{ped} and ρ_{ped}^*.

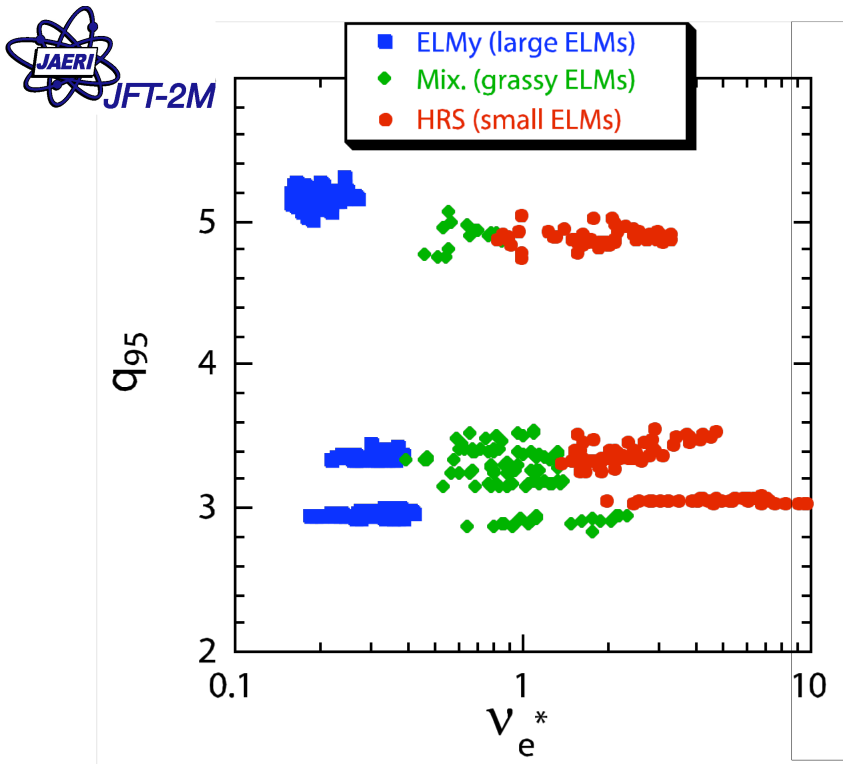
- Identify **similarities and differences between the regimes**:
  - Is the type-V ELM regime (NSTX) similar to EDA or HRS-mode on C-MOD and JFT-2M? To the C-Mod 'small ELM' regime at higher P?
  - All 3 experiments have diagnostics to measure edge fluctuations and pedestal profiles; may also help to understand **pedestal width scaling.**

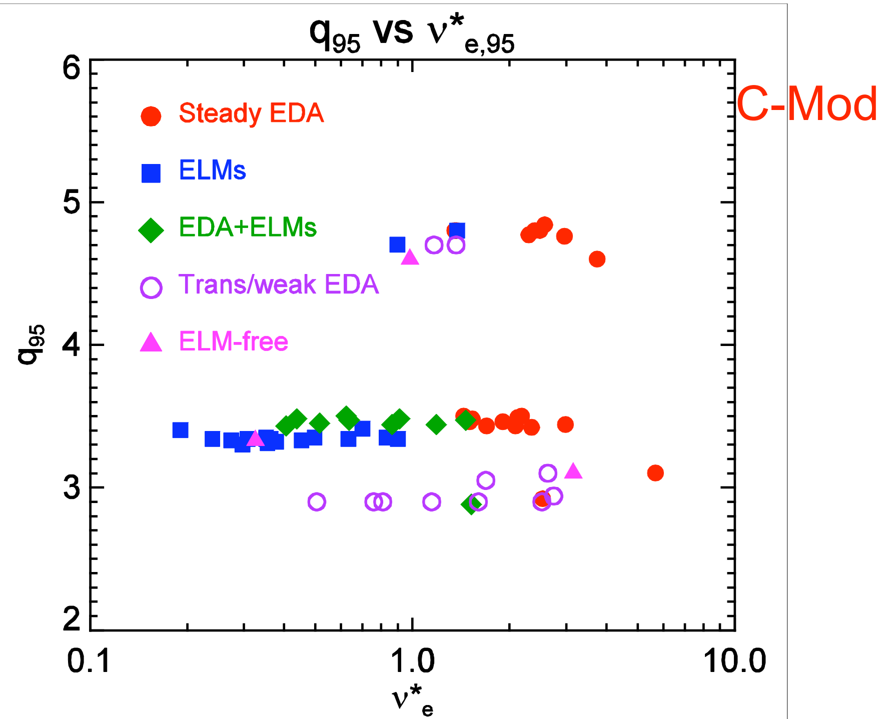
- This experiment corresponds to ITPA proposal PEP-16, from the pedestal ITPA topical group and approved at the recent IEA workshop in San Diego.
  - Follows a successfully completed comparison (PEP-12) which established similarity between C-Mod EDA and JFT-2M HRS regime at higher R/a and identified q_{95}, ν^* as key parameters.

NSTX

Alcator C-Mod

Background (PEP-12): H-mode operating spaces in q_{95} vs ν^* on C-Mod (R/a~3) and JFT-2M (R/a~5) proved very similar

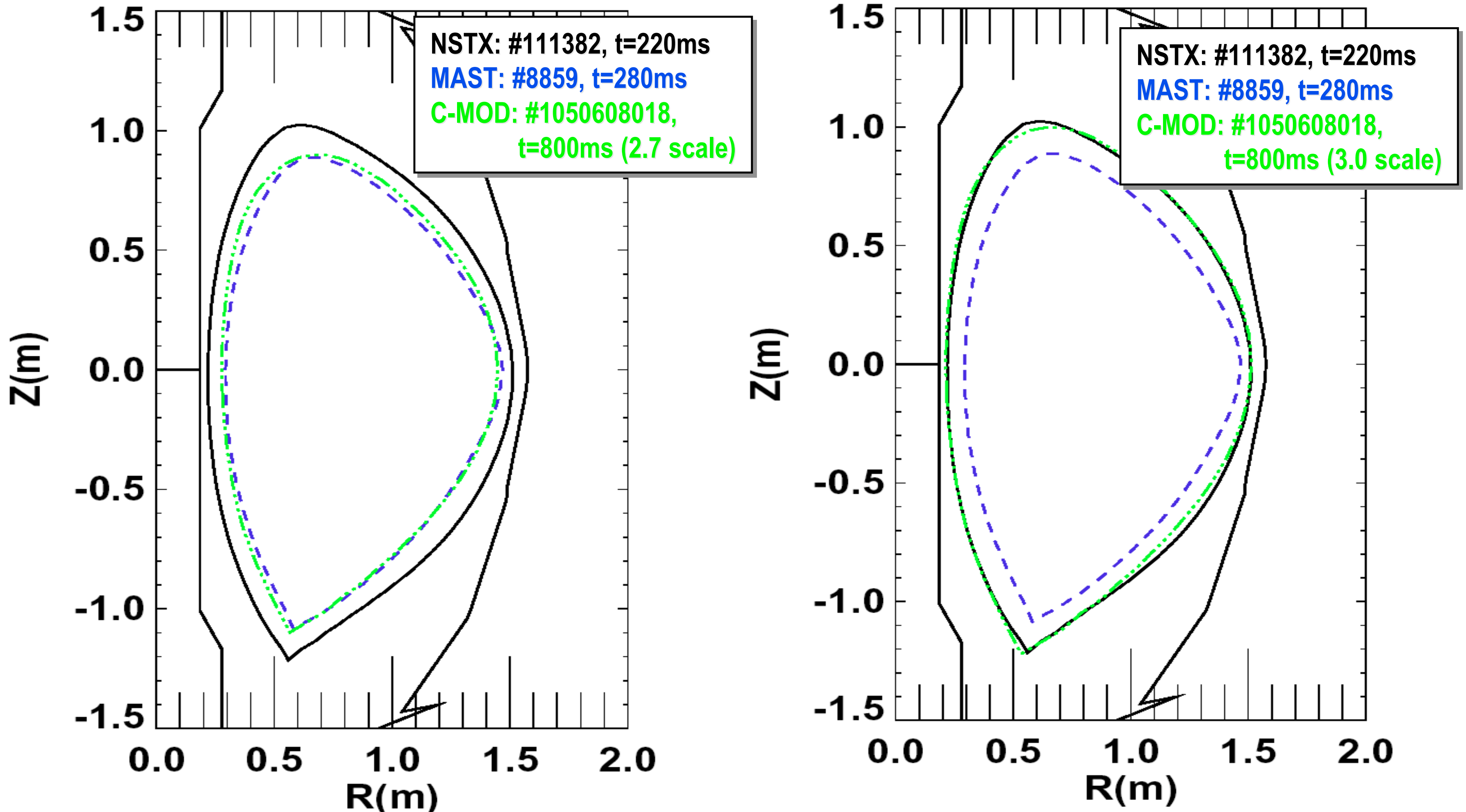




Hubbard, Kamiya et al, H-mode workshop 2005, Russia

- Steady EDA or HRS regime at high ν^* (> 1.5).
- ELMy regime with low D_α at low ν^* (<0.4).
- Some overlap in ELM, H-mode types at intermediate ν^*:
  'Mixed' or EDA+ELM regime at higher β, ELMy at lower β on C-Mod.

Shape match identified in 2005



Approximate target parameters for '06 expts

	MAST	C-MOD	NSTX
T_e^{ped}	0.15 keV	0.53 keV	**0.15 keV**
n_e^{ped}	2.6e19 m^{-3}	4.5e20 m^{-3}	**2.6e19 m^{-3}**
B_t	0.6 T	5.4 T	**0.55 T**
I_p	1 MA	0.6 MA	**0.8-1 MA**
q_{95}	5-6	5-6	**5-6**
R_0	0.85 m	0.7 m	**0.85 m**
a	0.6 m	0.2 m	**0.6 m**
β_{ped}	~0.65 %	~0.65 %	**~0.65 %**
ρ_{ped}^*	0.004-0.007	0.004-0.007	**0.004-0.007**
ν_{ped}^*	0.5-3	0.5-3	**0.5-3**

NSTX

Alcator C-Mod

Run Plan – one day

Run plan:

1. Reproduce target shape with rtEFIT from #111382 at 0.22 sec (κ=1.7, δ=0.45, drsep = -1 cm), at higher I_p ~ 1.0 MA and B_t ~ 0.55 (q_{95}~5.5-6). The high B_t is needed to get target β_{ped} within the C-MOD range, and the high I_p is needed to get target q_{95} and reasonable T_{ped} for target ν^* ~ 1. Baseline discharge will have 2 NBI sources. (5-10 discharges)

2. Vary the β_{ped} value by doing an NBI scan from 1 to 3 NBI sources; we expect 1-2 sources will yield the target β_{ped} value. Use NBI modulation as needed to obtain finer control over P_{in} and therefore T_{ped}, β_{ped} and ν^* (3-5 discharges)

3. Attempt to control the density ramp in NSTX, either by controlling the gas fueling and/or by using Lithium, if available. Adjust B_t to 0.5 T, 0.45 T if needed, reducing I_p to maintain constant q_{95} This will give more independent control over T and n, allowing us to decrease ν^* and increase ρ^*_{ped} for given β_{ped}, mapping out more of the operational space and increasing overlap with C-Mod discharges. (5-10 discharges)

- In all of these discharges, attention will be paid to obtaining good pedestal profiles and fluctuation data, so that regimes and parameters can be clearly distinguished.