ELM Physics in NSTX

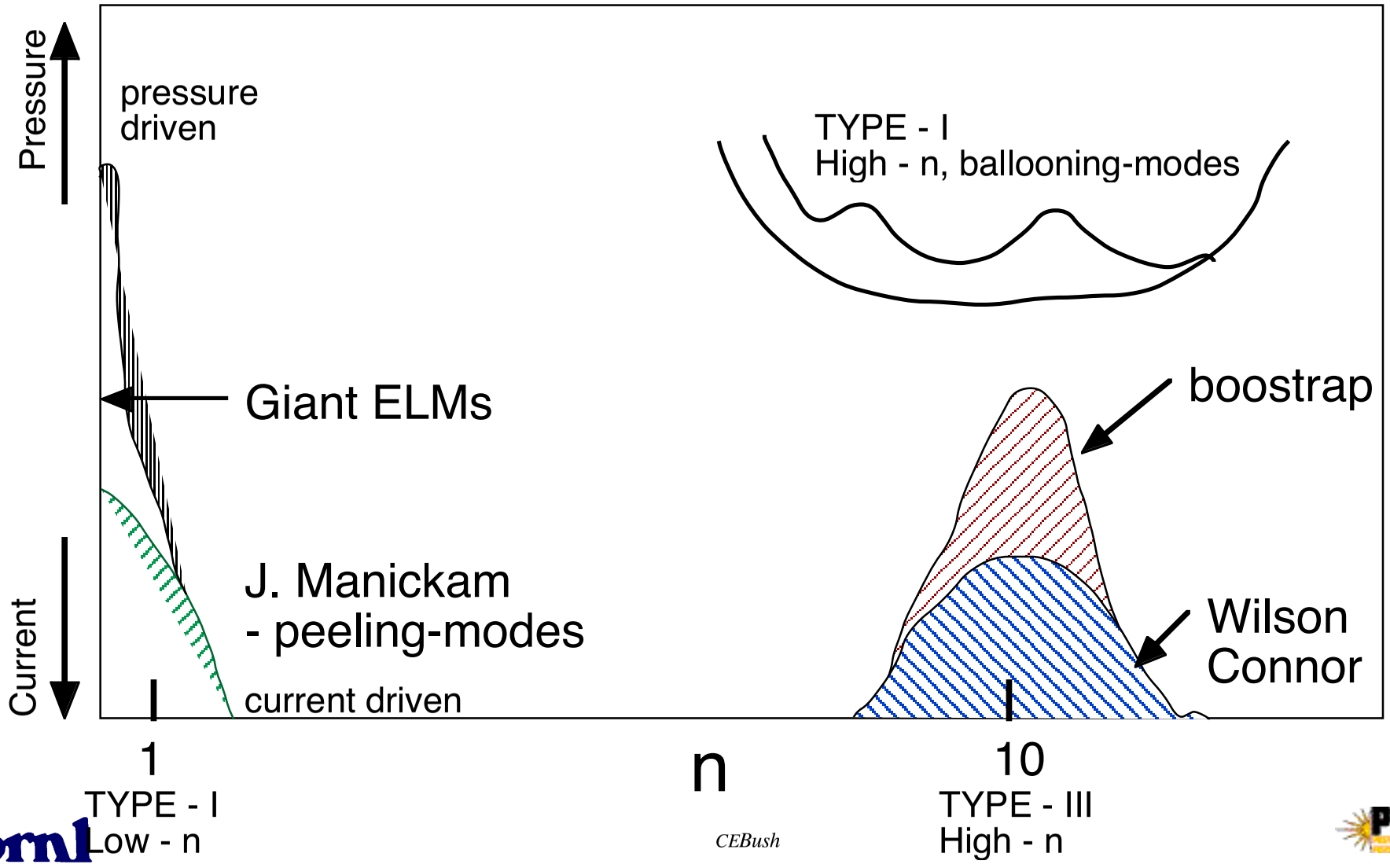
C. E. Bush
Oak Ridge National Laboratory

(1) ELM behavior on NSTX
(2) Diagnostics improved and faster
- Better for stability and other MHD studies

NSTX Research Forum
Princeton Plasma Physics Laboratory
Princeton, September 11&12, 2002

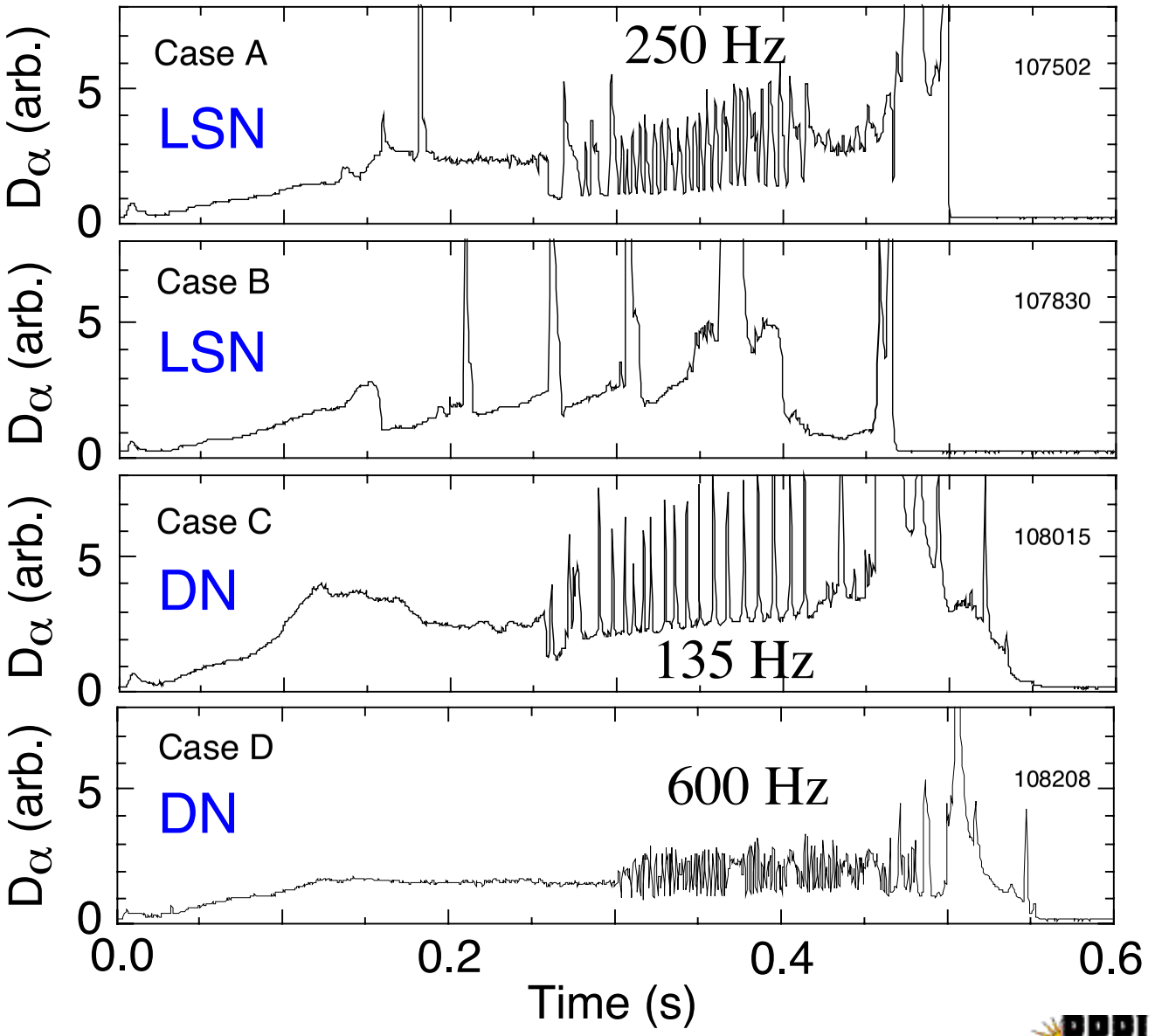
ELM models are the peeling mode and the high n ballooning-mode

- Type I can be low n kink (peeling); Type III, ballooning



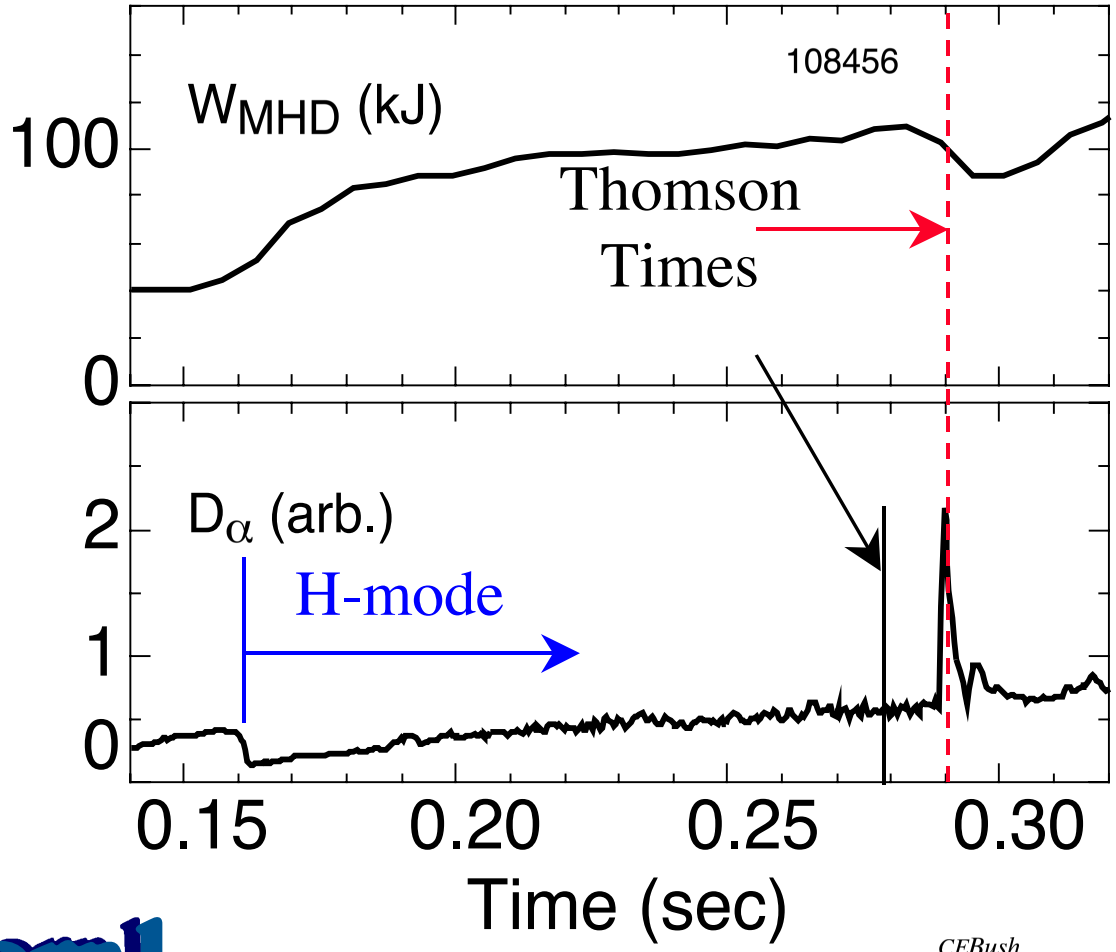
Is the MHD stability and character the same for all ELM types in NSTX?

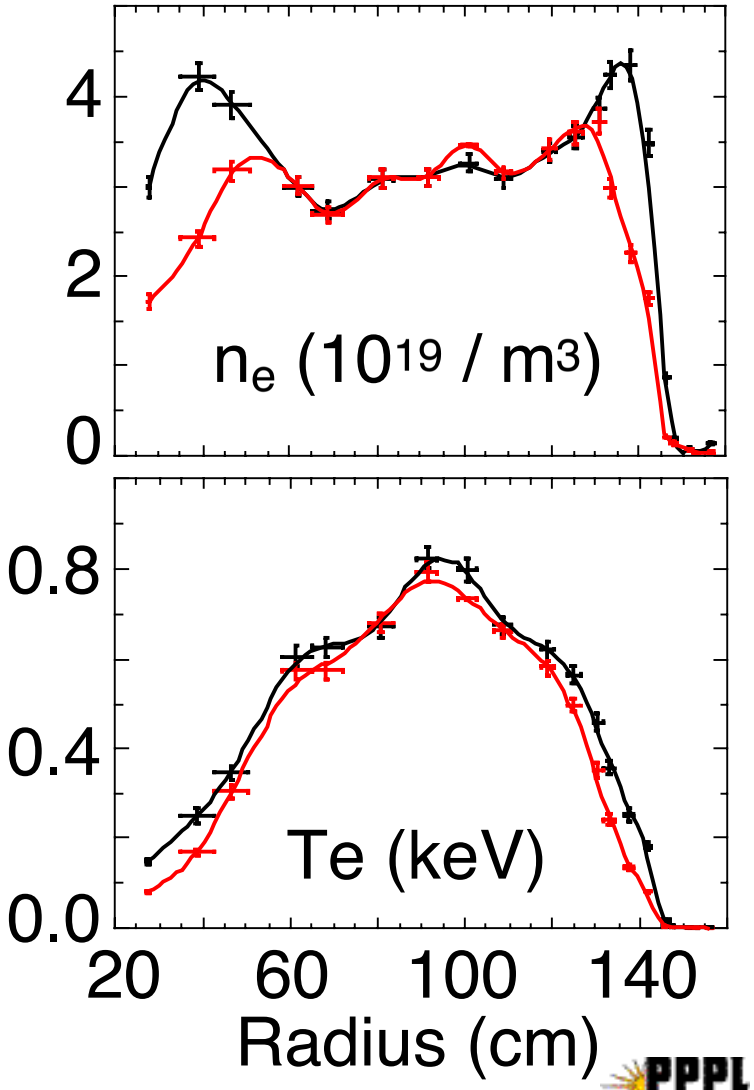
- From Grassy to Giant ELMs to ELM-Free
- ELMs w/DN and LSN
- ELMs w/NBI and RF
- Precursors? -Possibly seen by GPI
- Frequency: from < 135 Hz to > 600 Hz



Stability and Large ELMs: Is there also a variety of large ELMs?

- Effect to r/a ~ 0.4, edge Δne/ne > 50 % observed. Can return to sustained L-mode.





Studies and Measurements

ELM Stability:

- Test theory for ELM trigger - Combined ∇p and J(edge) / n-number

  - MSE or calculate bootstrap from edge n_e, T_e, T_i profs.

  - Mode number of any precursors - Magnetics, USXR, other?

- *New* - possible precursor detection using GPI

ELM MHD characteristics:

- Fast n_e, T_e, T_i measurements ⇒ across ELM (Thomson, CHERS, and edge scanning reflectometer)
- Fast magnetics ⇒ Reconstruct equilibrium