“Type I” ELM Observations

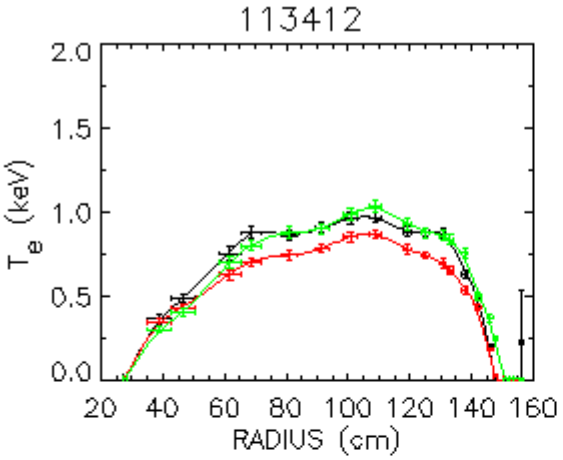
- time scales consistent with MHD/parallel transport time, not diffusive transport time (avalanche process?)

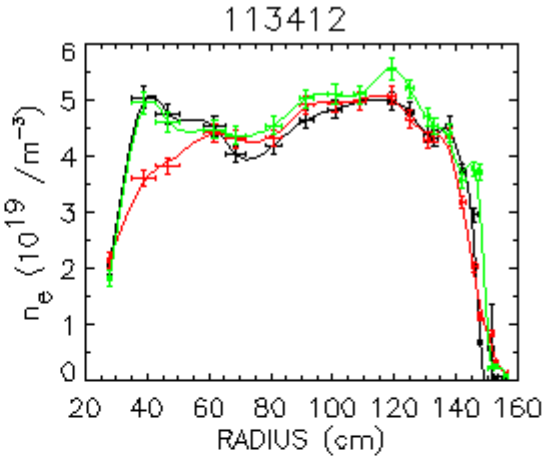
- no evidence of internal reconnection or inversion on SXR data

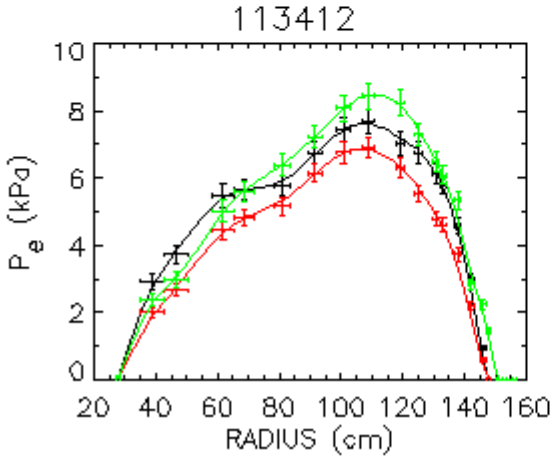
- crash appears at edge and propagates radially inward, this has been seen on both 2D tomographic reconstruction and 1D 2-color reconstruction

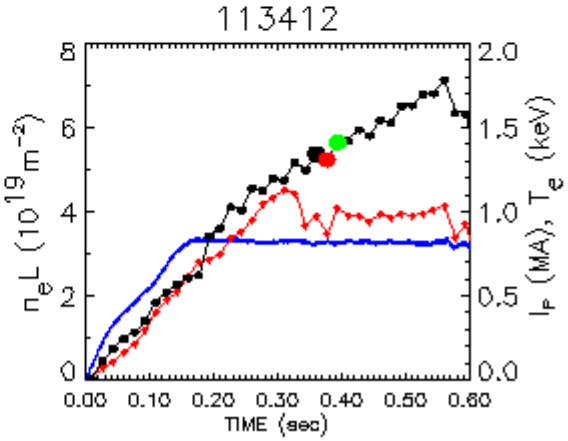
- no evidence of coherent pre-cursor, post-cursor on core SXR data

- density profile can remain unaffected during event


113412
$T_e$ (keV)
RADIUS (cm)

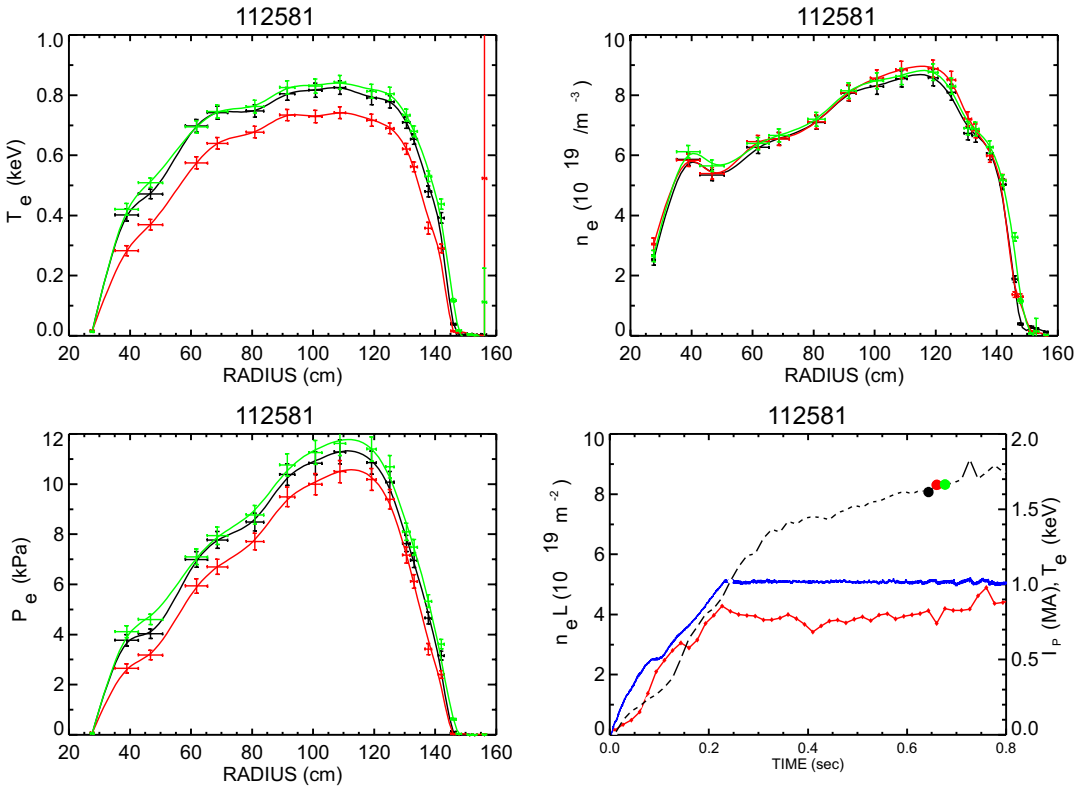

113412
$n_e$ ($10^{19}$ /$m^{-3}$)
RADIUS (cm)

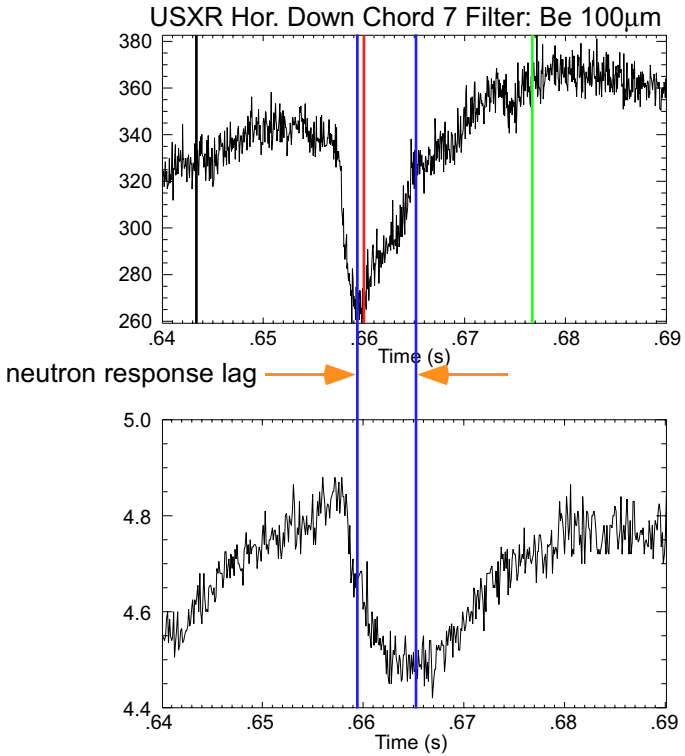

113412
$P_e$ (kPa)
RADIUS (cm)


113412
$n_e L$ ($10^{19} m^{-2}$)
$I_P$ (MA), $T_e$ (keV)
TIME (sec)

# Type I ELM often Accompanied by Global $T_e$ Perturbation

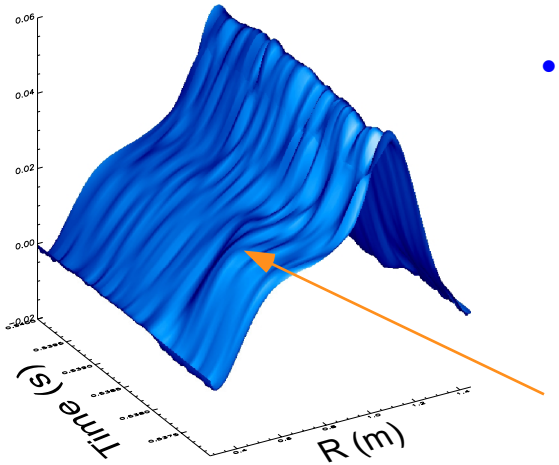
- Thompson measures drop in $T_e(r)$ on the order of 10-20%
  - $n_e$ measured before, during, and after ELM shows little change (slight peaking?)
  - Neutron response lags $T_e$ profile (decline by ~1ms, minimum by ~5ms)
  - Not all $T_e$ perturbations reach core (e.g. shot 113665 @ 0.377s, 112581 @ 0.537s)



# Preliminary Analysis Indicates Intensity Crash Begins at the Inboard of the Plasma Volume

Reconstructed midplane intensity




- ELM erodes "bump" at inboard of plasma
  - Perturbation reaches $\psi_N \sim 0.25$ (0.7m inboard, 1.27m outboard)
  - Neutron flux drops ~1-3%

- Delay of outboard crash indicates fast poloidal transport
  - ~50μs lag consistent with parallel transport times
  - Cross-field transport appears slower, ~ few hundred μs

- Caveat
  - Spatial resolution limited by spline knots
  - Time resolution limited by SNR (~50μs)
  - More events need to be analyzed