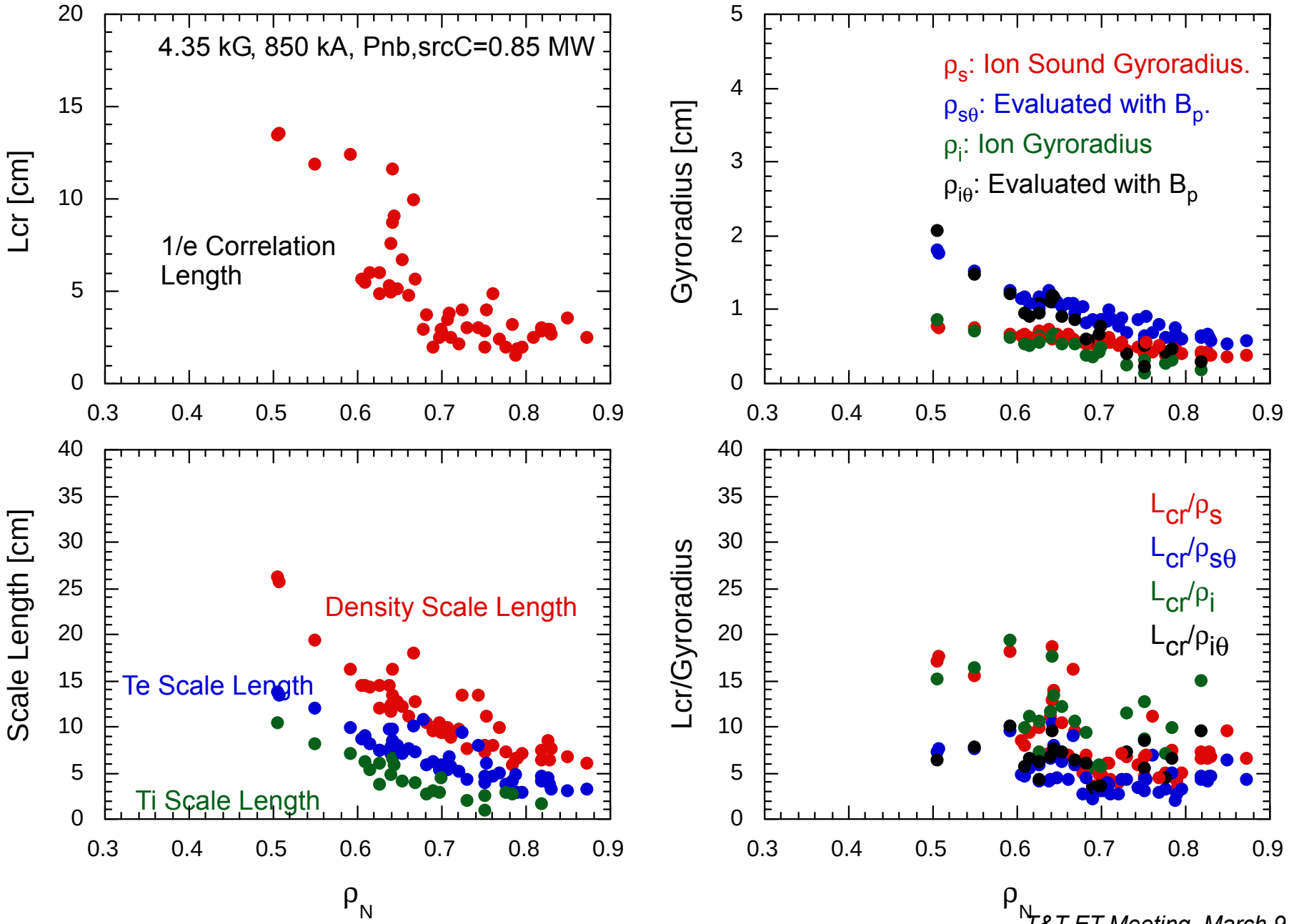
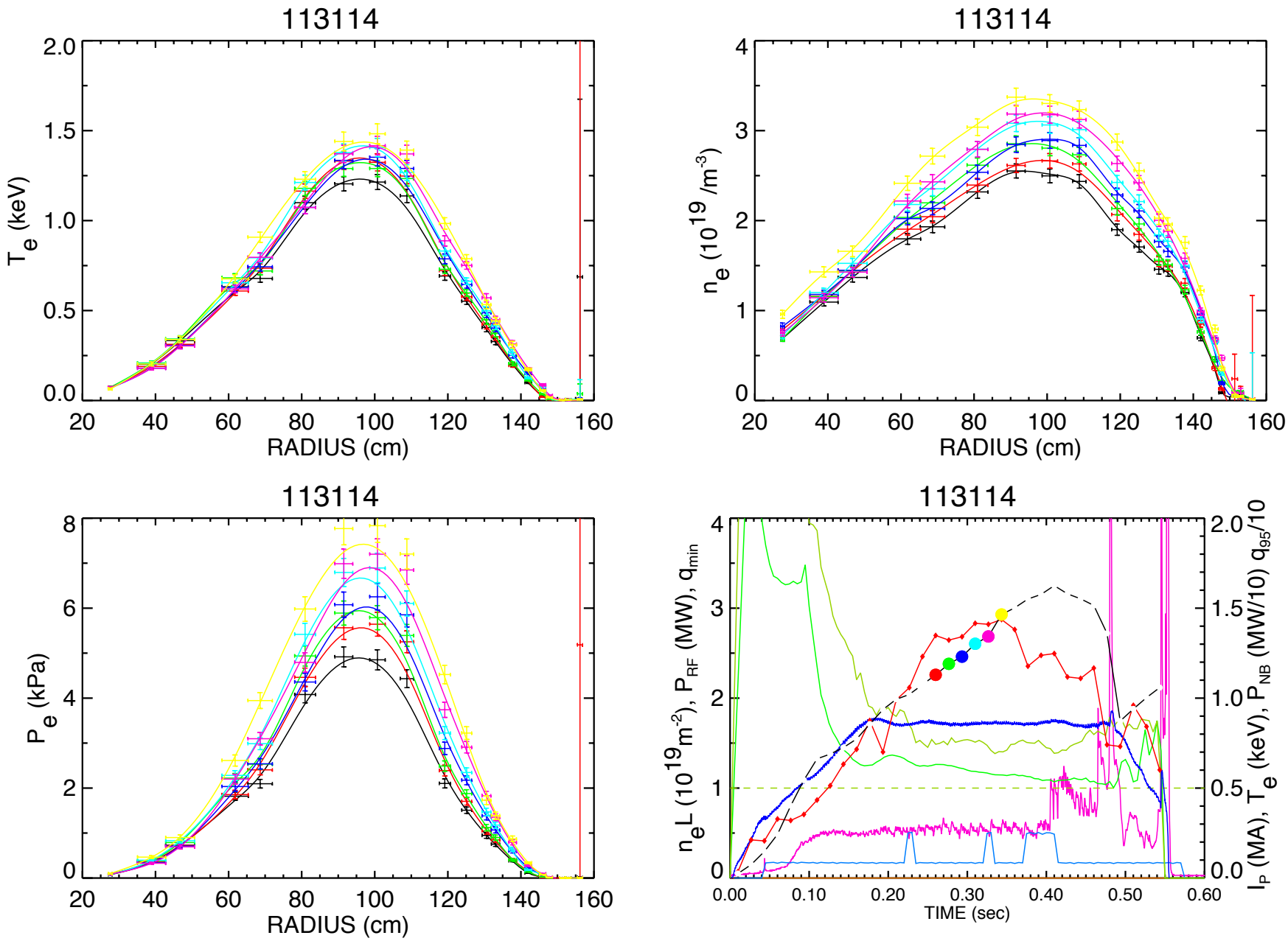
Some Outstanding Issues That Have Been Addressed

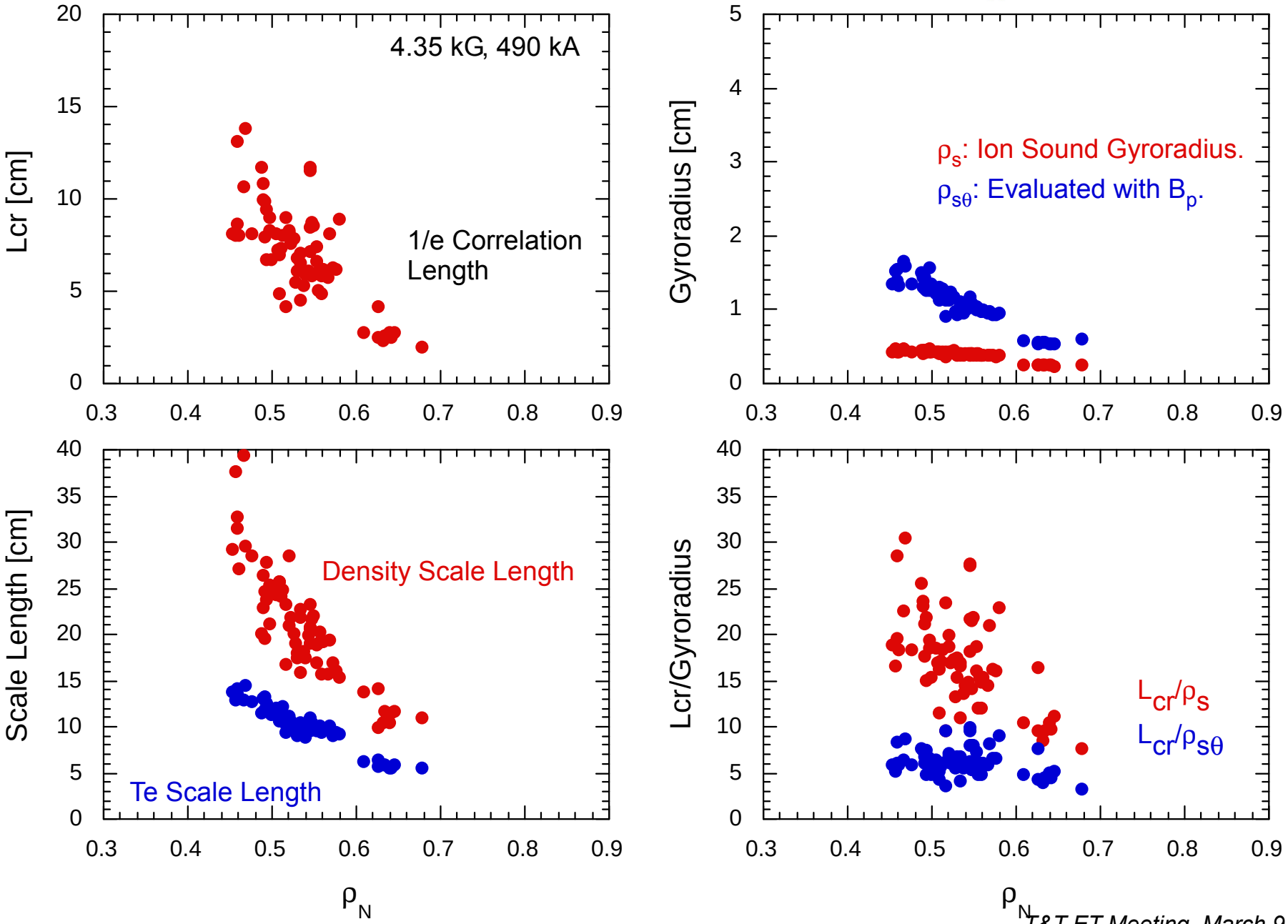
- Some issues regarding the validity of correlation lengths (L_{cr}) have been addressed, giving better confidence in computed L_{cr} values.
  - Are Alfven eigenmodes giving us L_{cr} values that are too large?
    + For NB heated discharges, bursts of AEs correlated with drops in the correlation fringes (behavior can be explained with simple model). L_{cr} values remain similar irrespective of level of activity.
    + L-mode ohmic (He) and ohmic+rf (D) discharges with no AEs show nearly identical correlation length values and radial variation (increasing towards the core).
  - O-X mode conversion.
    + 1D full-wave calculation shows conversion rate of <0.5%.
  - Mismatch of pitch angle and polarization at the edge.
    + Typically <3 degree mismatch for XP-439. (For He shots presented here, 10 degree mismatch equivalent to <1% X-mode).
    + Do not see peak at expected frequency for O-X or X-X correlation.

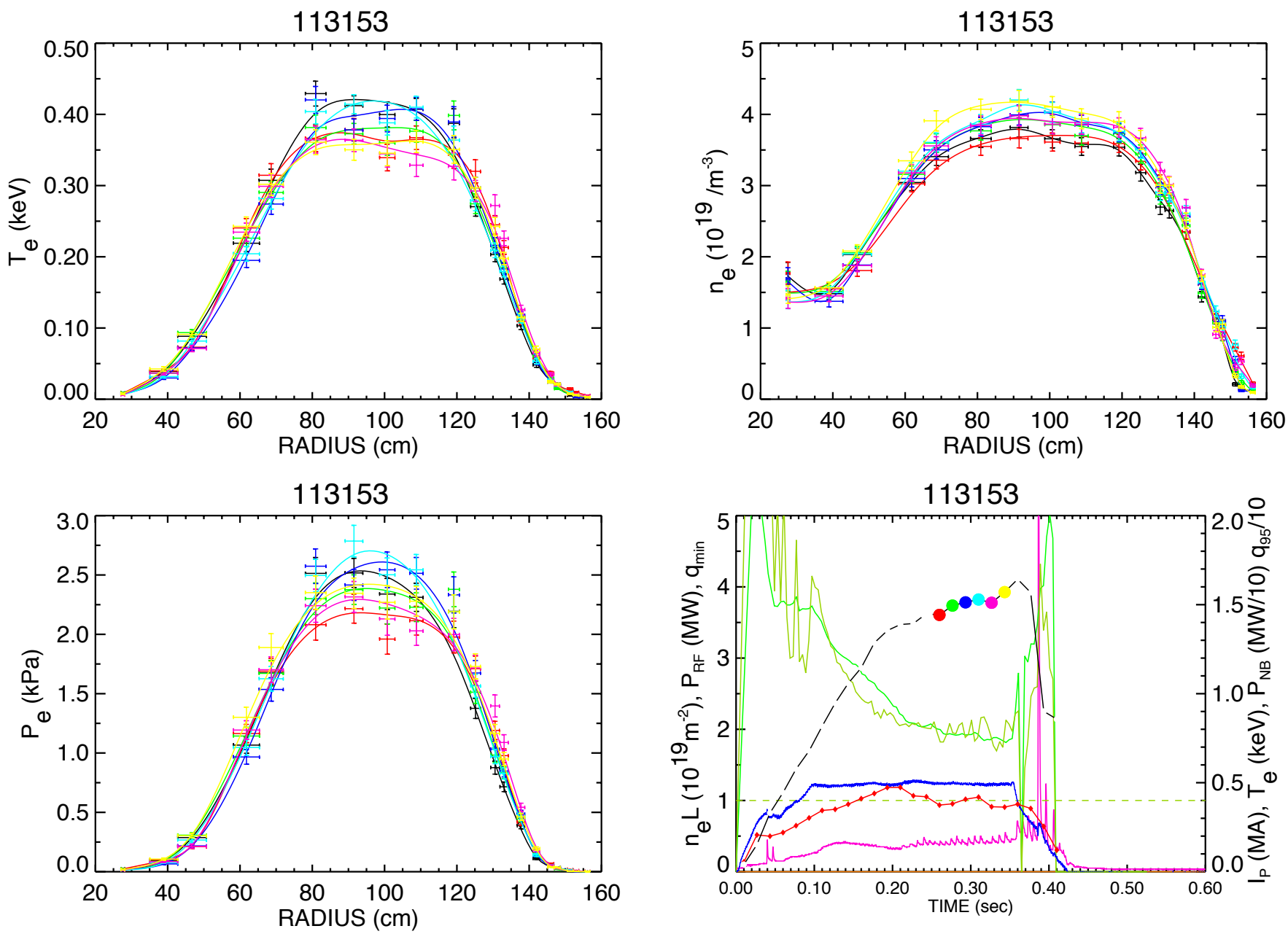
Correlation Lengths for All Three Discharge Conditions Increase Towards the Core (XP-439)



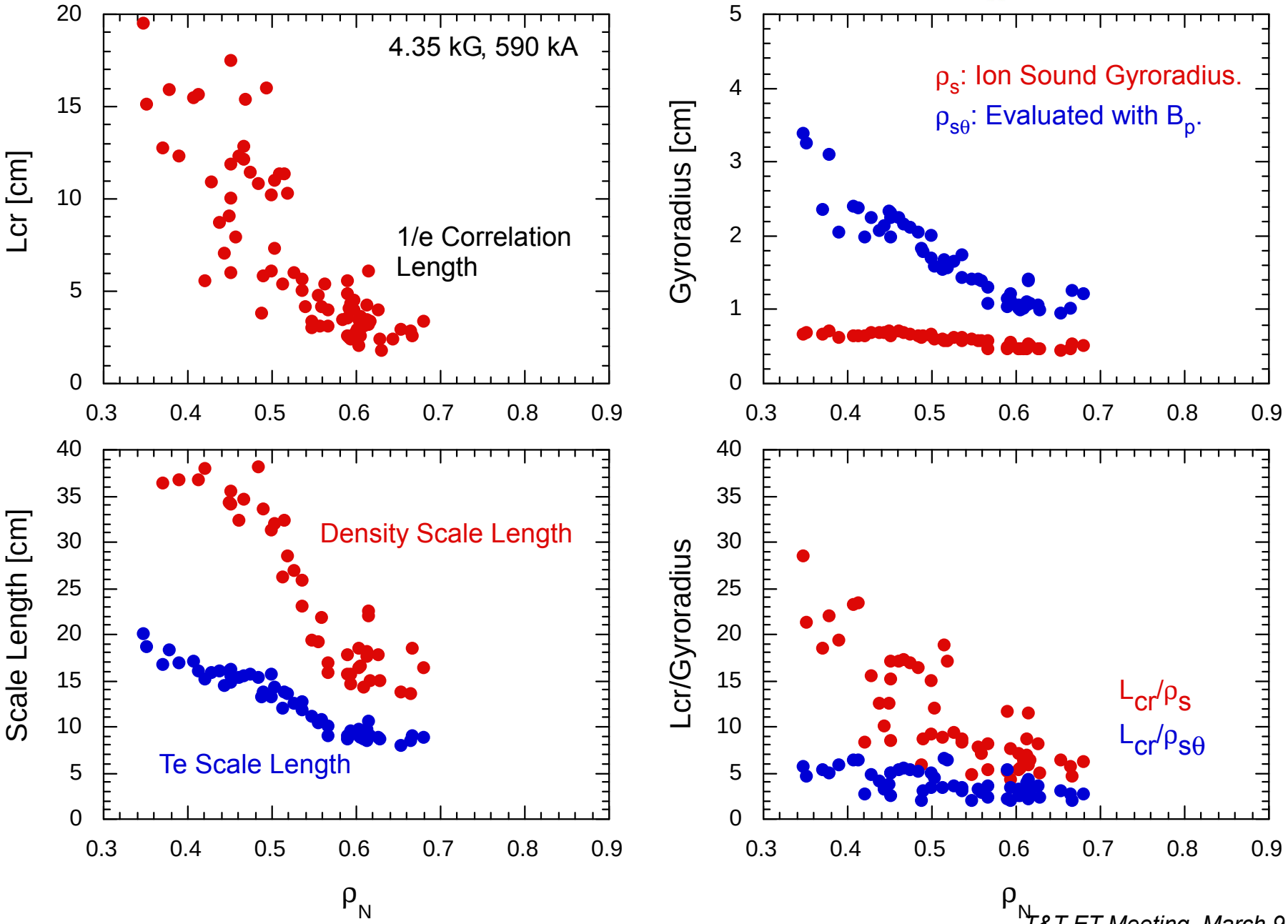

113114
T_e (keV)
RADIUS (cm)
113114
n_e (10^{19} /m^{-3})
RADIUS (cm)
113114
P_e (kPa)
RADIUS (cm)
113114
n_eL (10^{19}m^{-2}), P_{RF} (MW), q_{min}
I_P (MA), T_e (keV), P_{NB} (MW/10) q_{95}/10
TIME (sec)

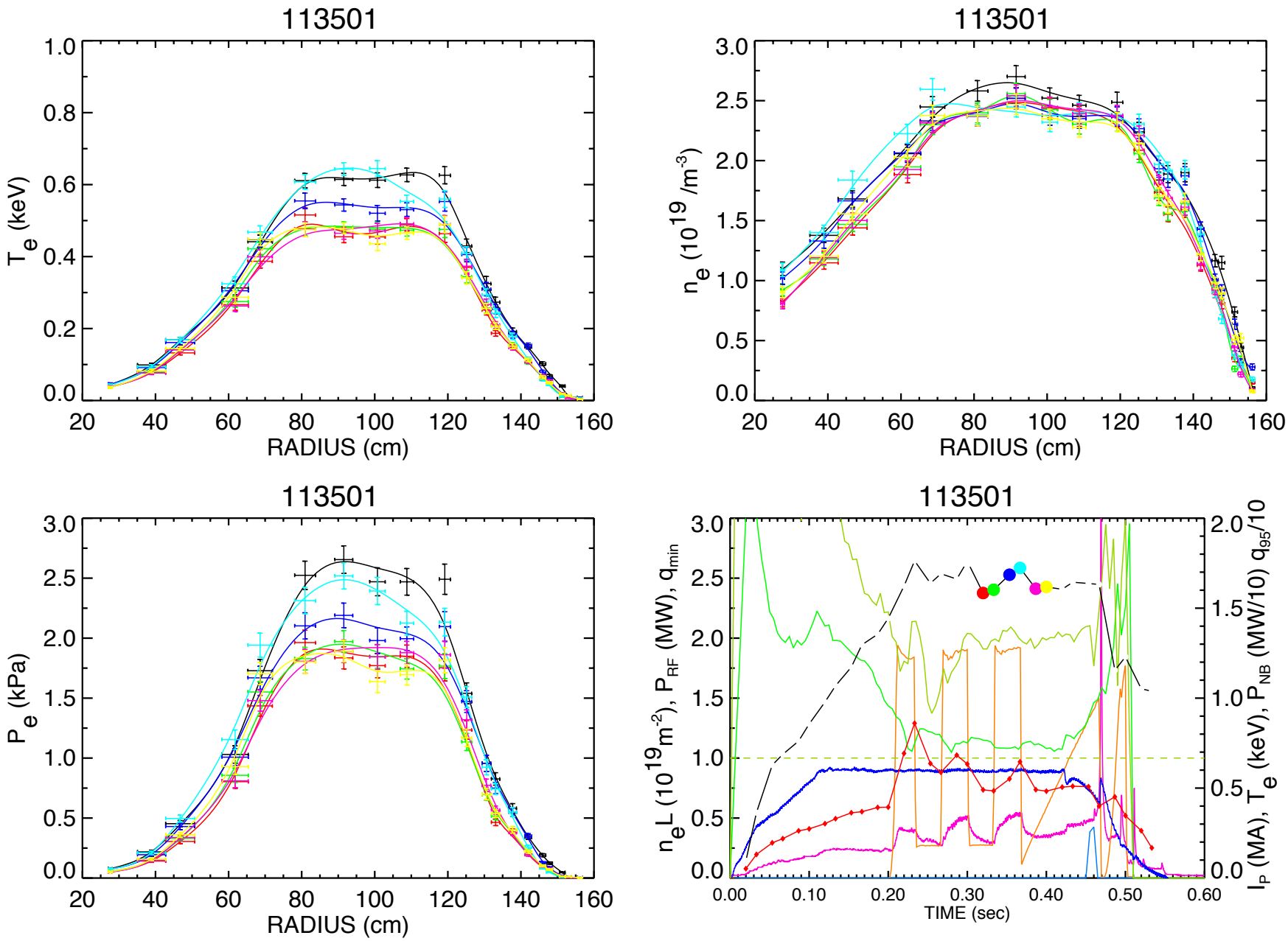
Correlation Lengths for All Three Discharge Conditions Increase Towards the Core (Ohmic He)




113153
T_e (keV)
RADIUS (cm)
113153
n_e (10^{19} /m^{-3})
RADIUS (cm)
113153
P_e (kPa)
RADIUS (cm)
113153
n_eL (10^{19}m^{-2}), P_{RF} (MW), q_{min}
I_P (MA), T_e (keV), P_{NB} (MW/10) q_{95}/10
TIME (sec)

Correlation Lengths for All Three Discharge Conditions Increase Towards the Core (RF Heated)

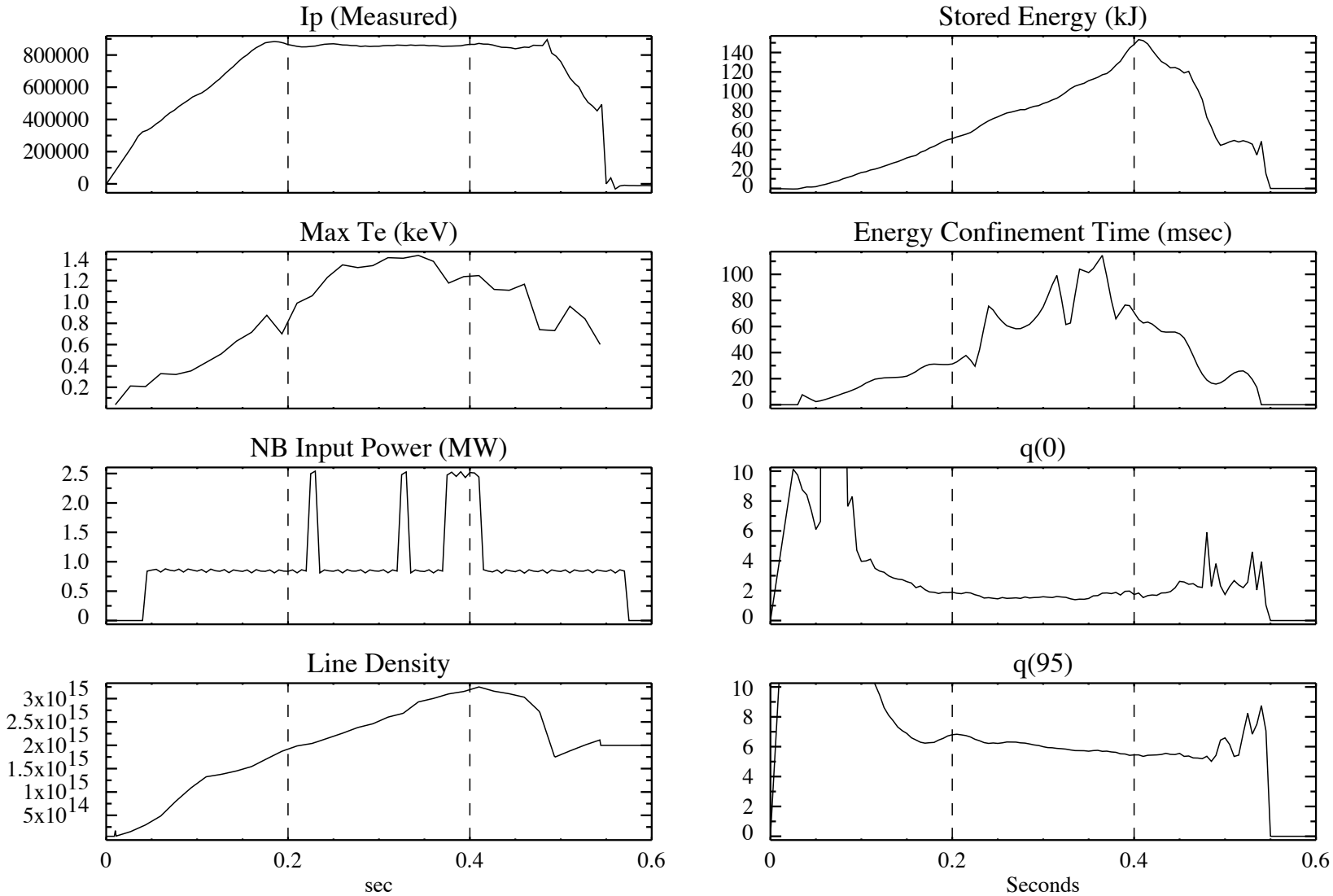



113501
T_e (keV)
RADIUS (cm)
113501
n_e (10^{19} /m^{-3})
RADIUS (cm)
113501
P_e (kPa)
RADIUS (cm)
113501
n_eL (10^{19}m^{-2}), P_{RF} (MW), q_{min}
I_P (MA), T_e (keV), P_{NB} (MW/10) q_{95}/10
TIME (sec)

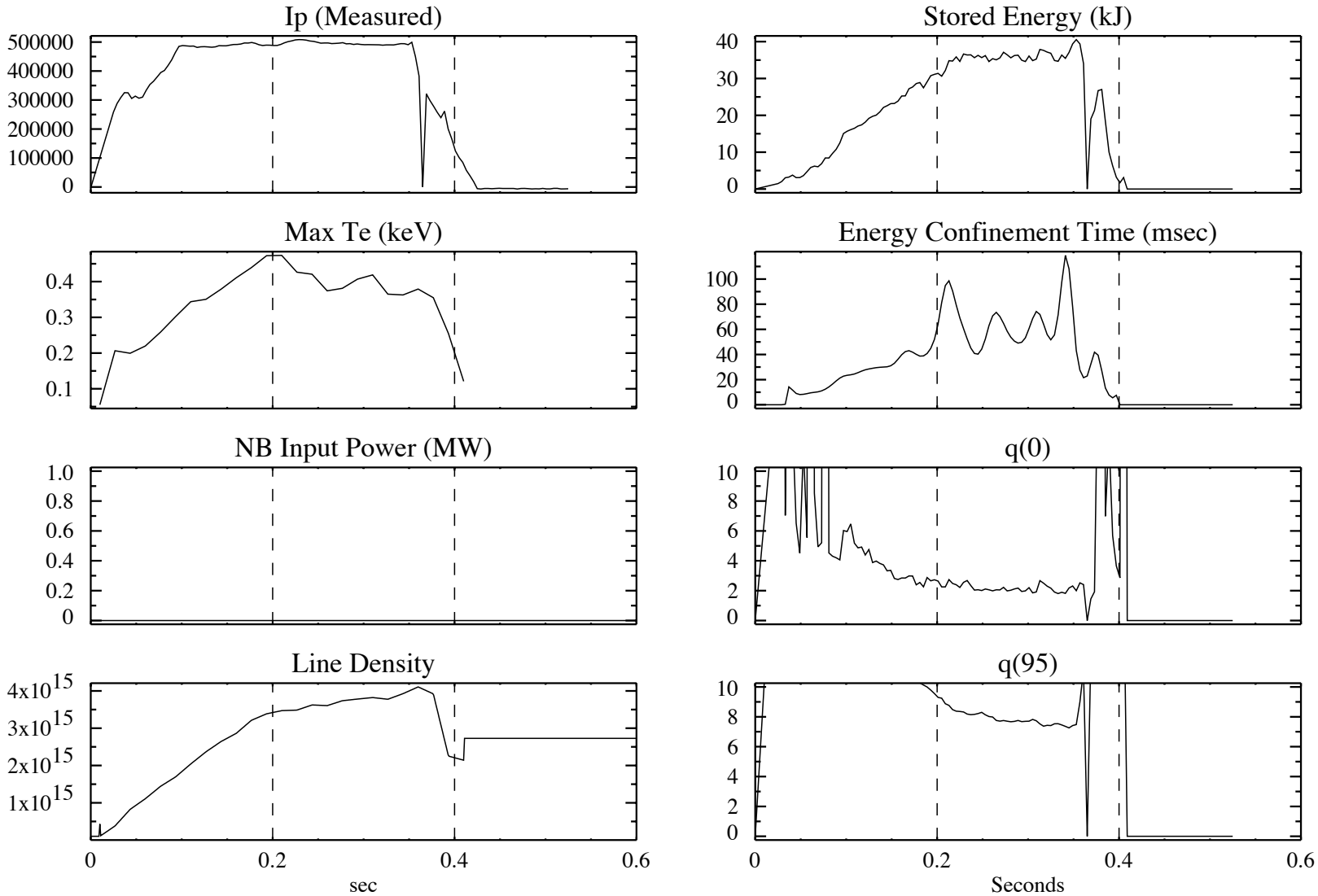
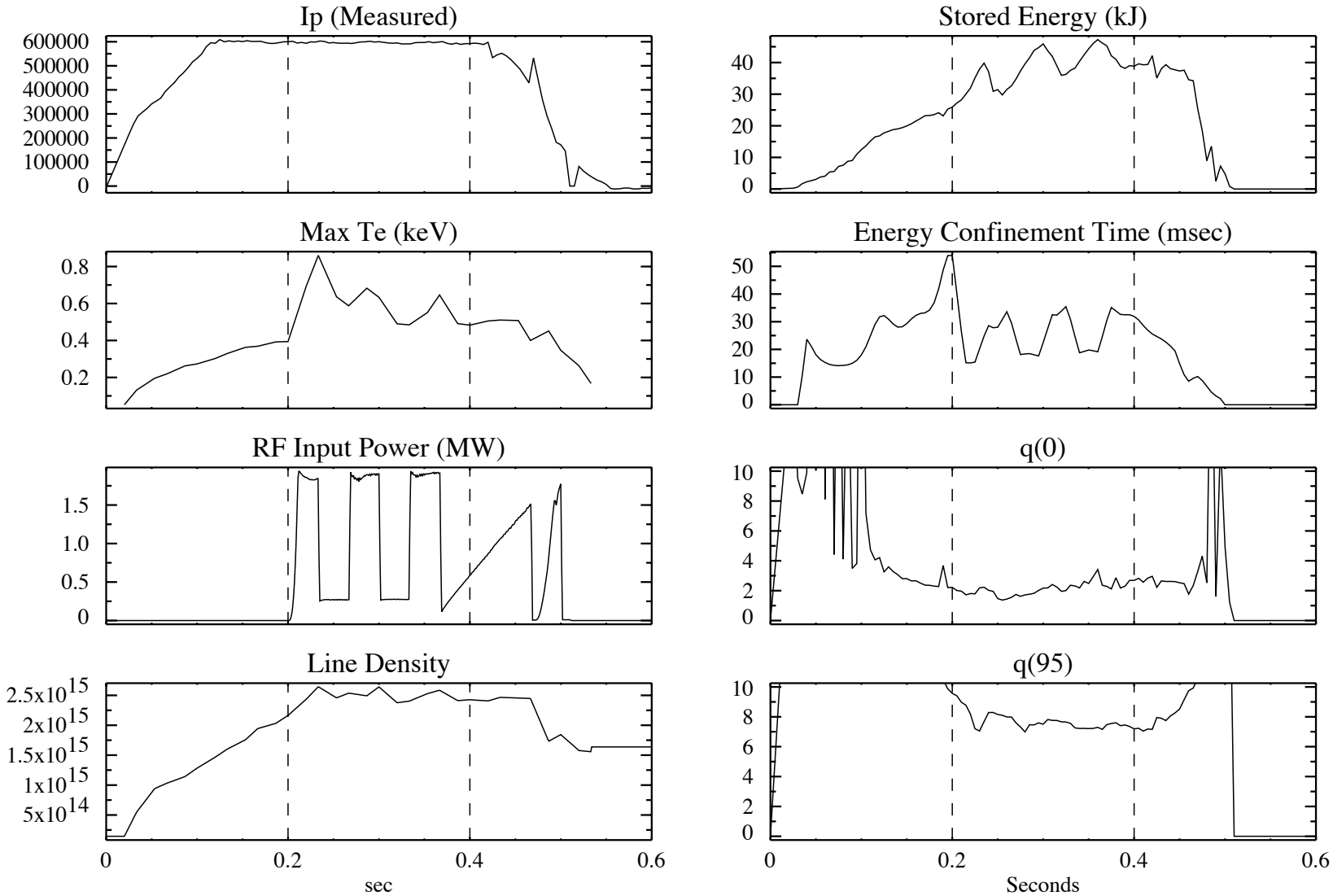
Summary

- Sets of Ohmic (He), RF, and NB L-mode plasmas analyzed.
  - Long correlation lengths of ~15-20 cm are seen in each case, irrespective of the heating method. AEs are absent in ohmic and RF cases, so this seems to rule out turbulence due to sea of fast particle driven instabilities.
  - Correlation length values (~1-20 cm) are similar for all three discharge types and always increase towards the core. This may be intrinsic to L-mode behavior in the ST.
  - L_{cr} seems to scale better with $\rho_{s\theta}$ vs radius than with ρ_s. B_p dependence could not be verified using I_p scan from XP-439. This dependence should be investigated in the future.
  - Normalized correlation length is lower for RF discharges near the core. Unfortunately no T_i or TRANSP available for these shots.
- Connection to GYRO and TRANSP results?.

Shots:
113114



Shots:
113153



Shots:
113501