Arrangement of measured SOL profiles in NSTX
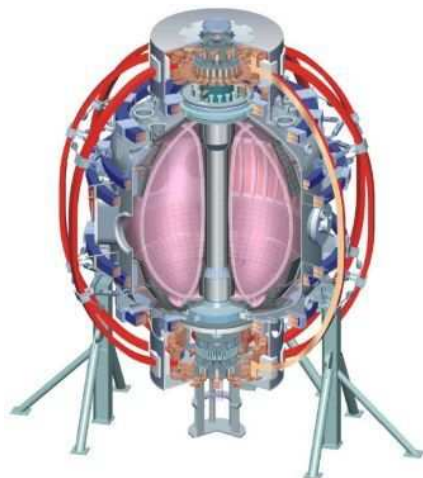
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NSTX Monday Physics Meeting
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Motivation

- Profiles from probe are measured over ~50ms time period, during which the separatrix position does not stay constant all the time

- Same problem for corresponding TS profiles.

- Also, midplane Rsep varies for nominally identical shots

- Use separatrix position as a reference point
    ➔ Plot profiles against distance from the separatrix

- Separatrix position from equilibrium reconstruction can lead to incorrect results ➔ use power balance
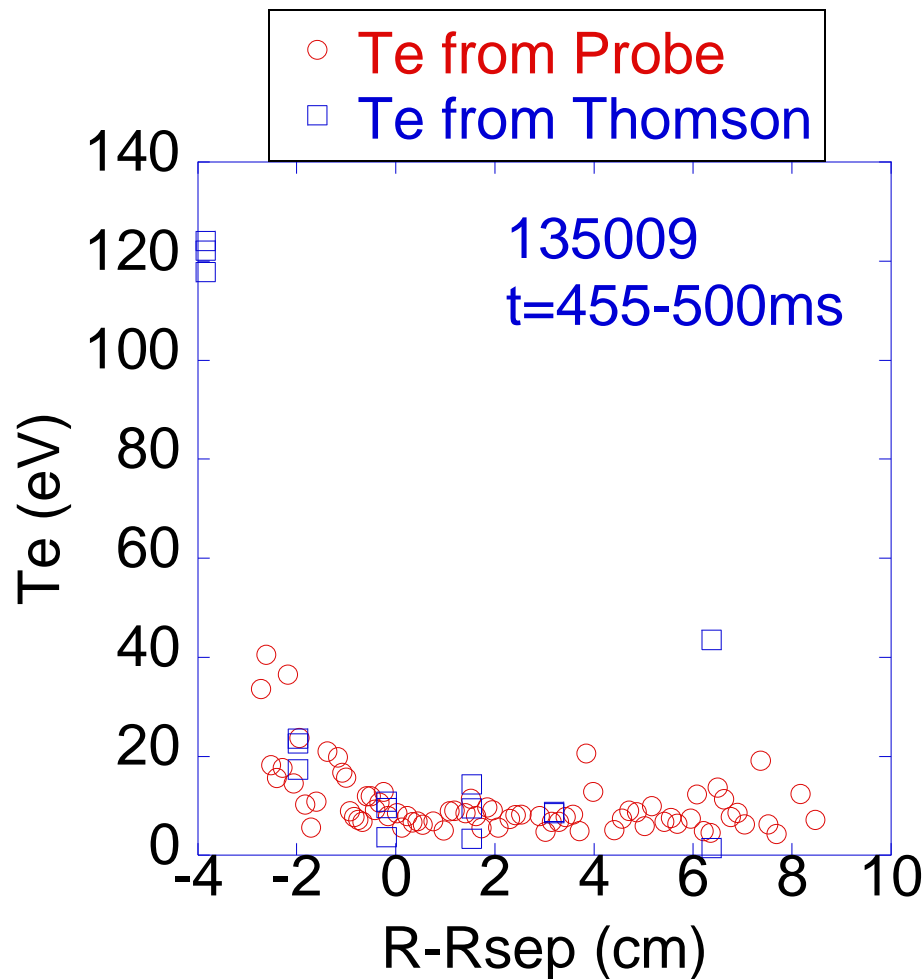
Agreement of Te profiles from Probe and TS
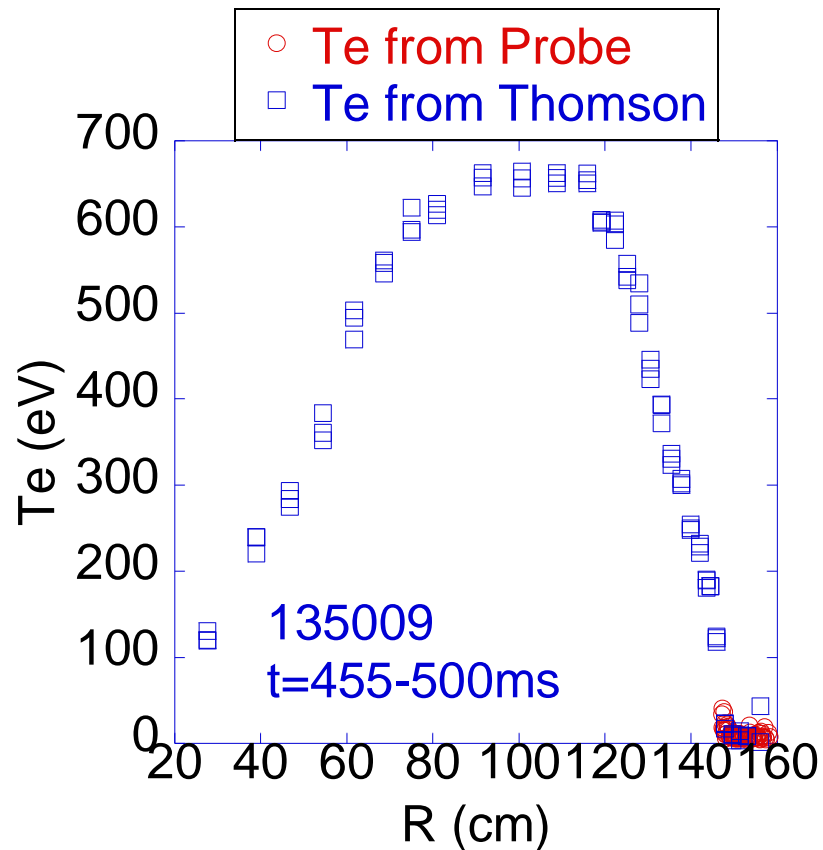
- Probe data taken over ~45ms during plunge
- TS data taken instantaneously for 3 time slices during probe plunge

Agreement of Te profiles from Probe and TS
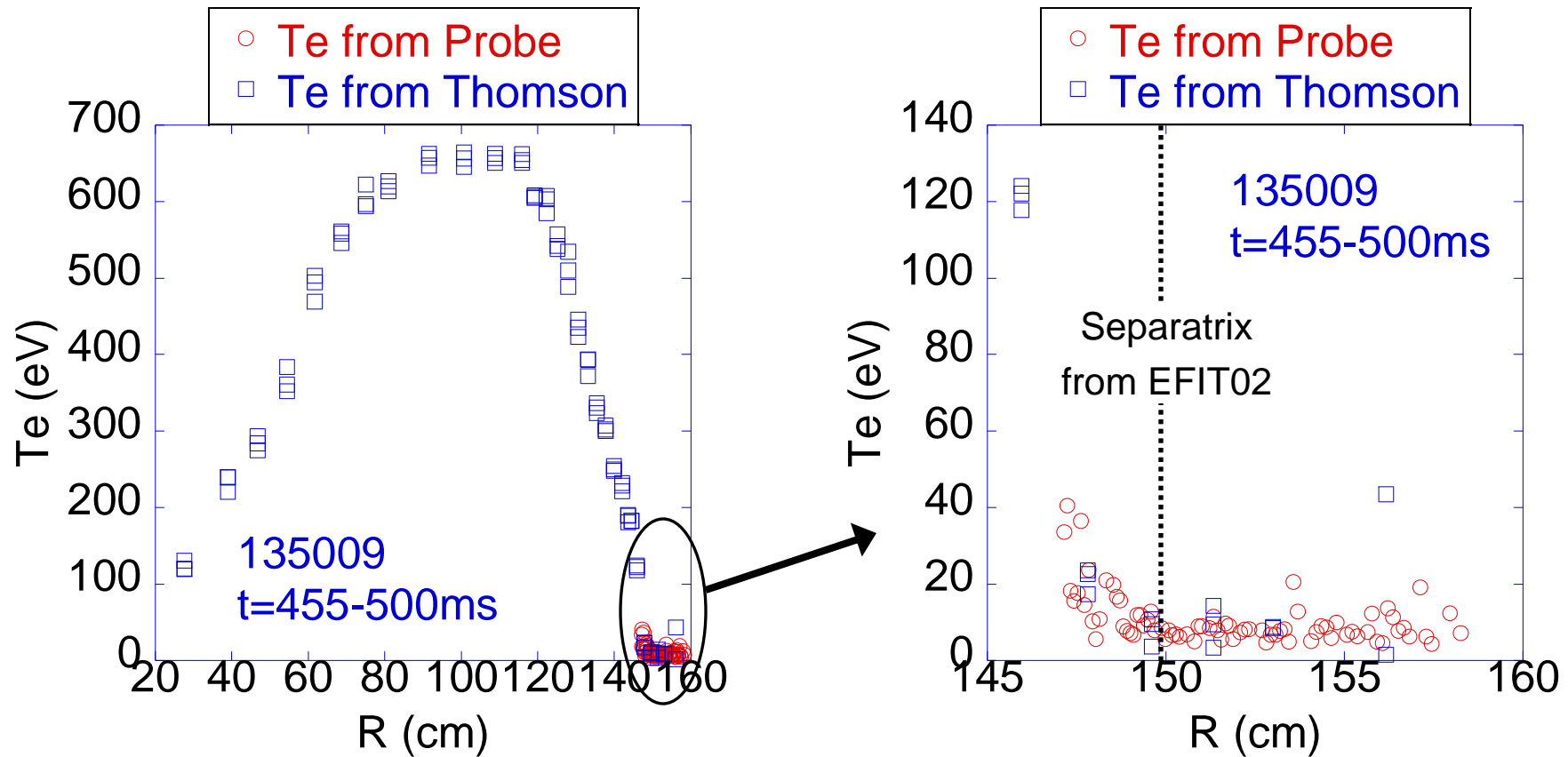
- Probe data taken over ~45ms during plunge
- TS data taken instantaneously for 3 time slices during probe plunge

Te profiles against R-Rsep from EFIT

- Both probe and TS profiles indicate Te,sep < 10eV from EFIT
- Need to have a good estimate for the separatrix position

Te profiles against R-Rsep from power balance

Te from Probe, λ_{Te}=0.77cm

□ Te from Thomson

135009
t=455-500ms

Te (eV) vs R-Rsep (cm)
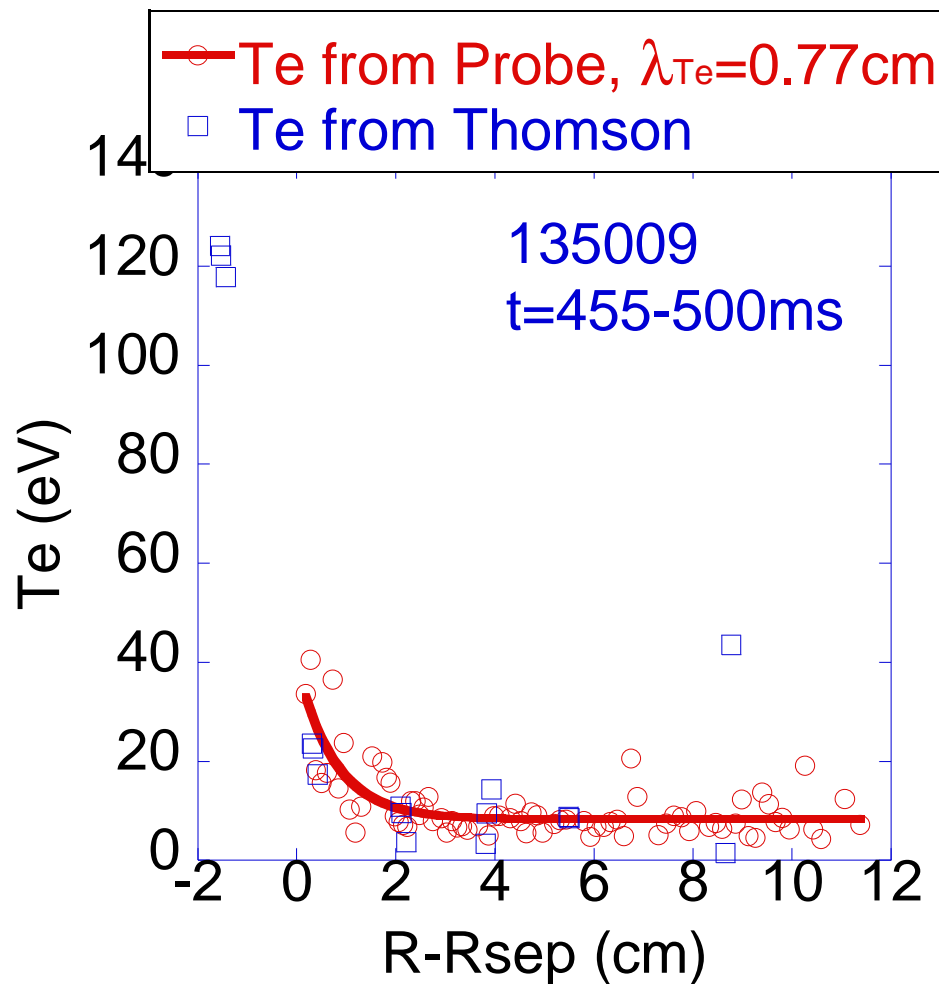
- From simple power balance consideration, Te,sep~40eV
- Set radius value for Te=40eV to Rsep
- Re-arrange Te profile as a function of R-Rsep

- Spatial resolution of TS profile is not good enough for fitting
  ➔ need to ensemble-average TS profiles over multiple identical shots

# Re-arranged profiles for multiple identical shots
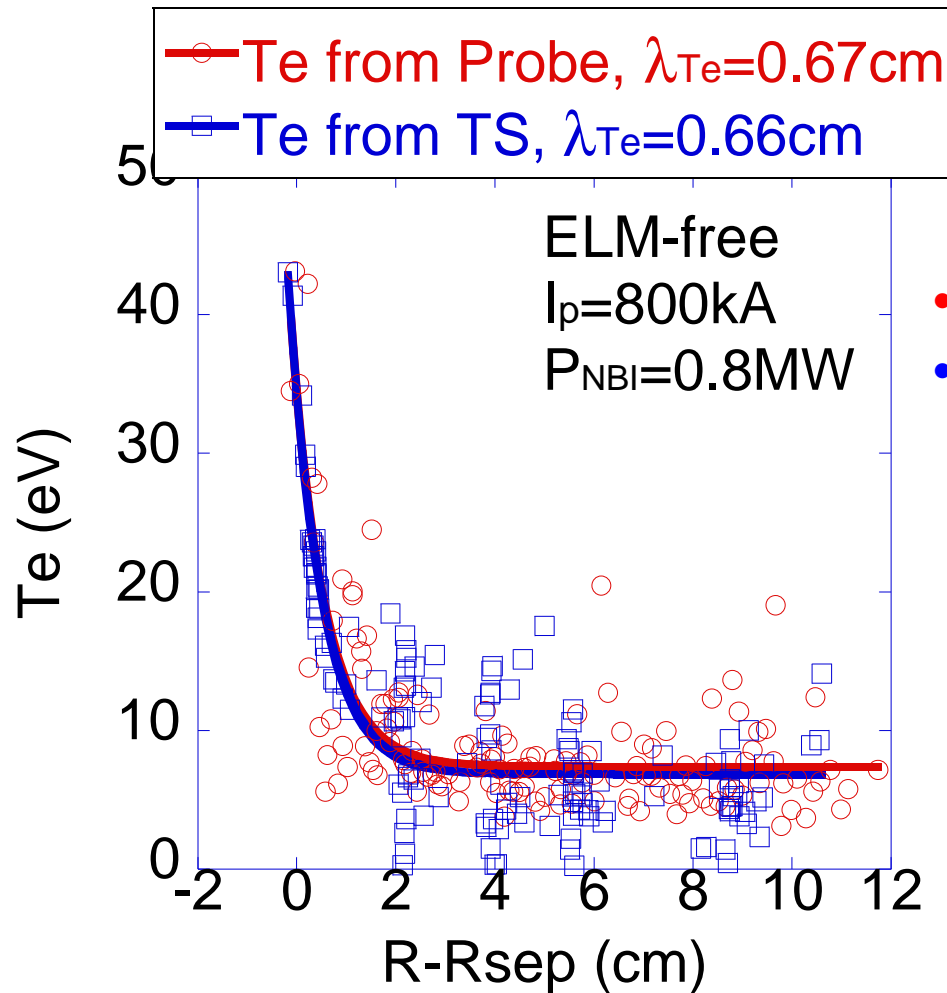
- Probe data for 2 deepest plunge shots
- Ensembled TS data for 10 shots
  → enough spatial resolution for fitting

Summary and conclusions

- Very good agreement between probe and TS measurements for ELM-free H-mode plasmas

- Separatrix position from EFIT can lead to too low Te,sep
  - ➡ Power balance can be used to correct it

- Probe provides a high spatial resolution profile measurement, good enough for scale length fitting

- TS measurement doesn't have enough spatial resolution for fitting, needs to be ensemble averaged for identical shots.

Agreement of ne profiles from Probe and TS

- ne from Probe
- ne from Thomson

135009
t=455-500ms

ne (1e19m-3)

R (cm)
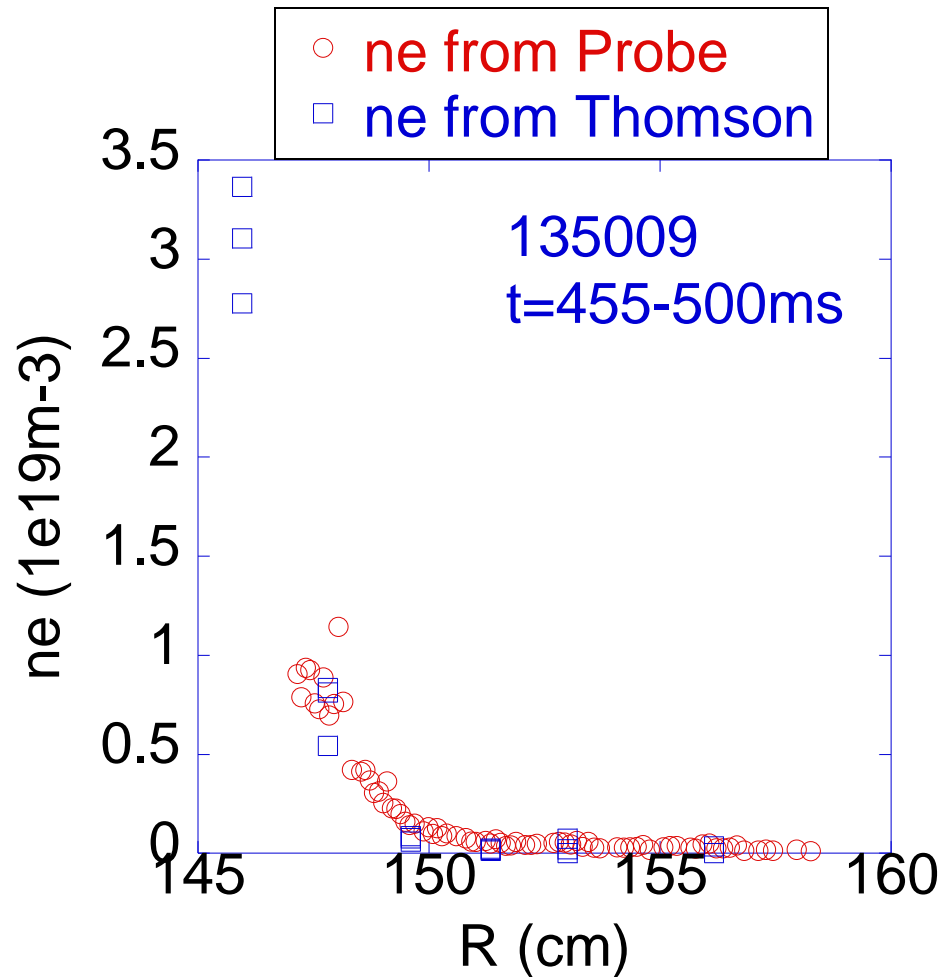
• ne profiles from probe and TS well agree with each other, too