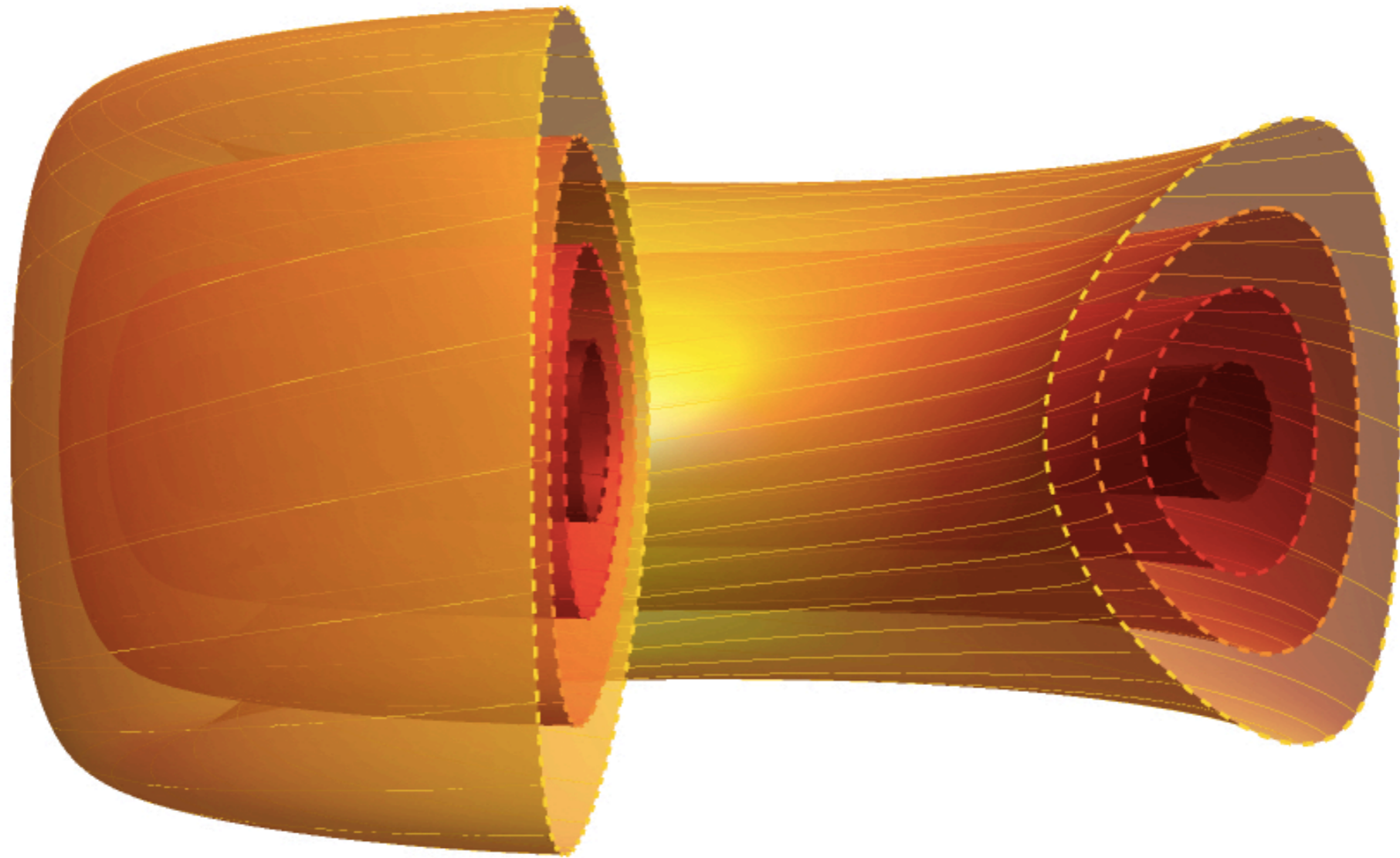# TSVV 2: Negative triangularity August meeting



Justin Ball
31 August 2021

# Agenda

- **General updates**

- Roundtable discussion with team members

- Team meeting scheduling and resources

- Comments, questions?

# General updates

1. Two upcoming EUROfusion TSVV meetings late next month (Thrust #5 and 3rd E-TASC Scientific Board), so I will ask for contributions

2. IMAS training for code developers:

The purpose of the training is to explain the IMAS concept, main elements of the framework (Data Model, access layer, etc.) and to demonstrate how to make the code IMAS compatible.

The training will be organised in two sessions, **20 Sept. 2021** and **22 Sept. 2021** (9:00 – 15:00 CEST).

Indicative agenda is available at:
https://indico.euro-fusion.org/event/1246/; and
https://indico.euro-fusion.org/event/1247/

Tutorial materials (as soon as they are prepared) will be available at:
https://docs.psnc.pl/display/WFMS/Tutorial+-+adapting+codes+to+IMAS

# General updates (contd.)

3. TCV equilibria with smoothed kinetic profiles are now available from the wiki (recommended for kinetic analysis)
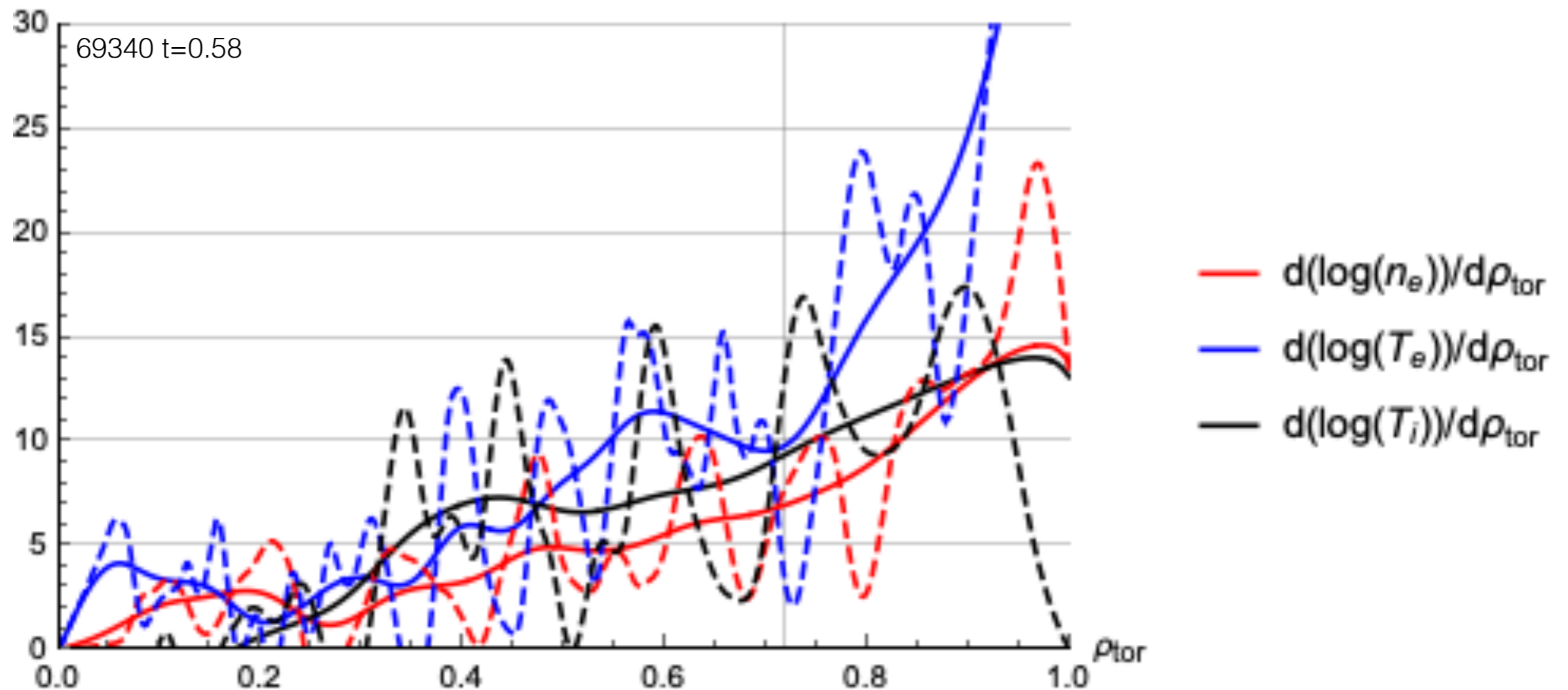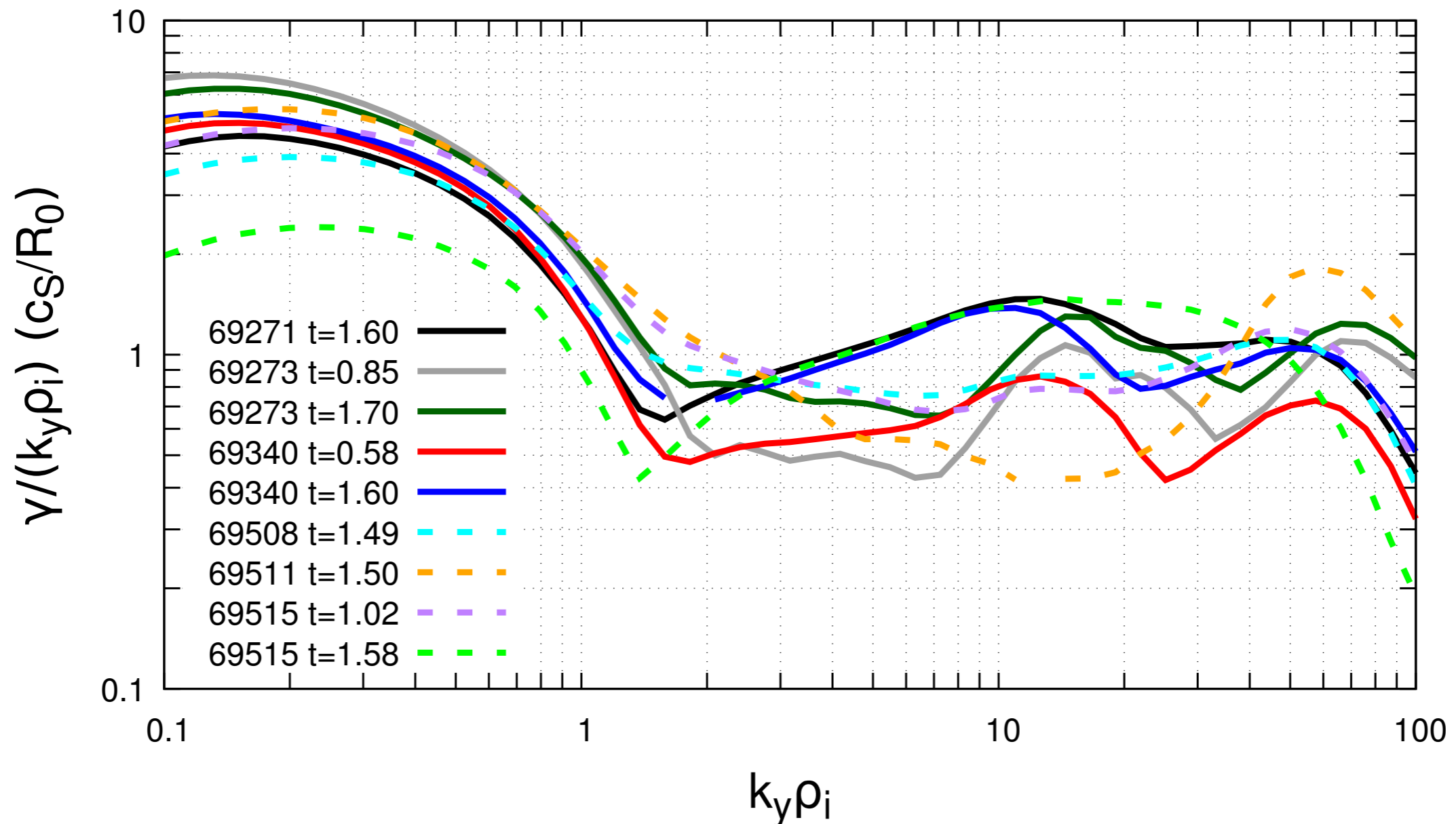
# Agenda

- General updates

- **Roundtable discussion with team members**

- Team meeting scheduling and resources

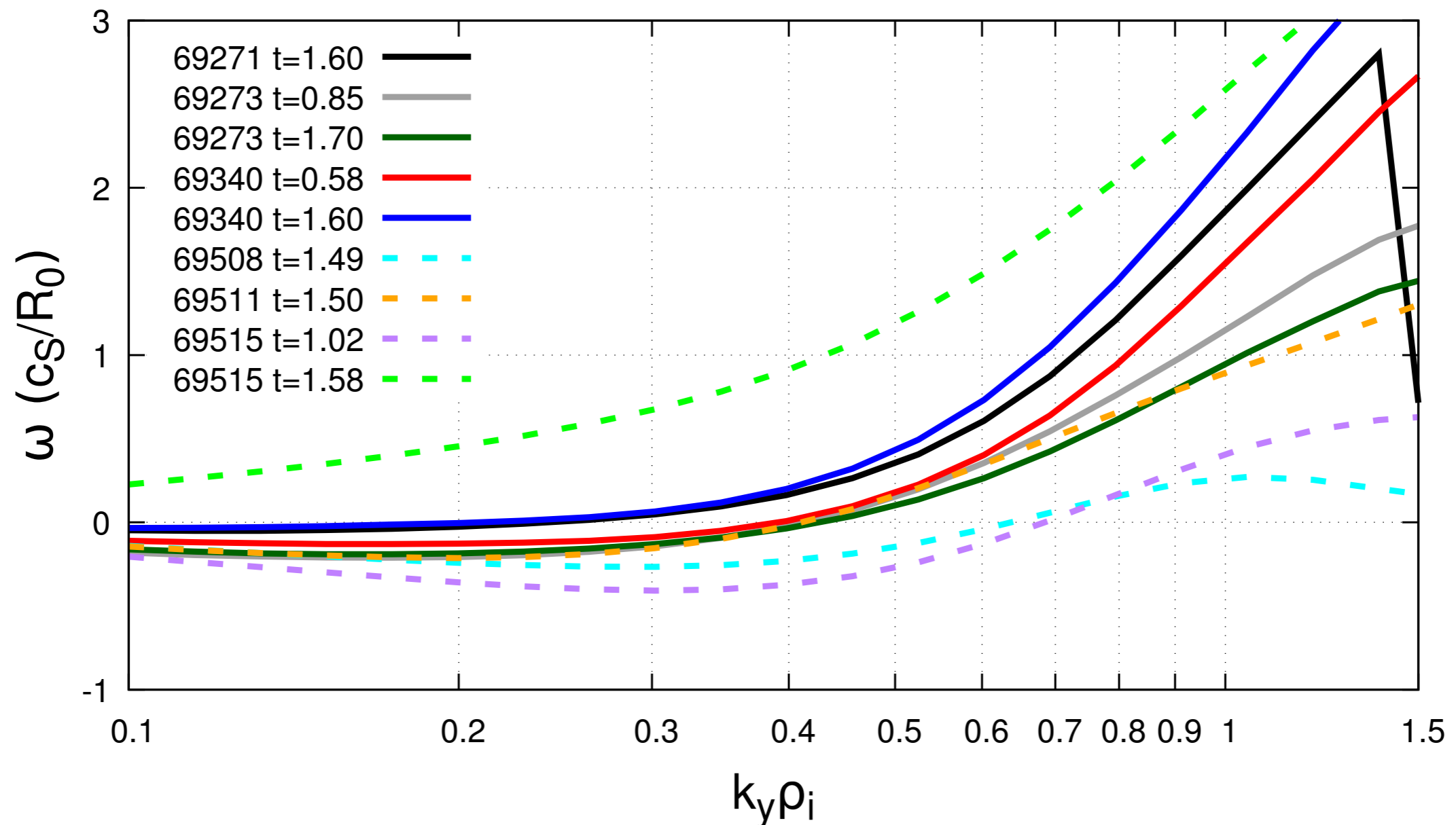- Comments, questions?

# Linear scoping study

- A common rule rule of thumb, comparing $\gamma/k_y$, suggests that electron-scale turbulence is weak (except 69515 $t = 1.58$, which is in H-mode without CXRS)

# Linear scoping study

- Simulations indicate a mixed ITG-TEM regime, with NT discharges a bit more ITG dominated

# Nonlinear study of comparison 3

- Simulations are well resolved

- Ion heat flux is slightly larger than electron heat flux, consistent with a mixed ITG-TEM regime

- By swapping the driving gradients, we see that NT is stabilizing
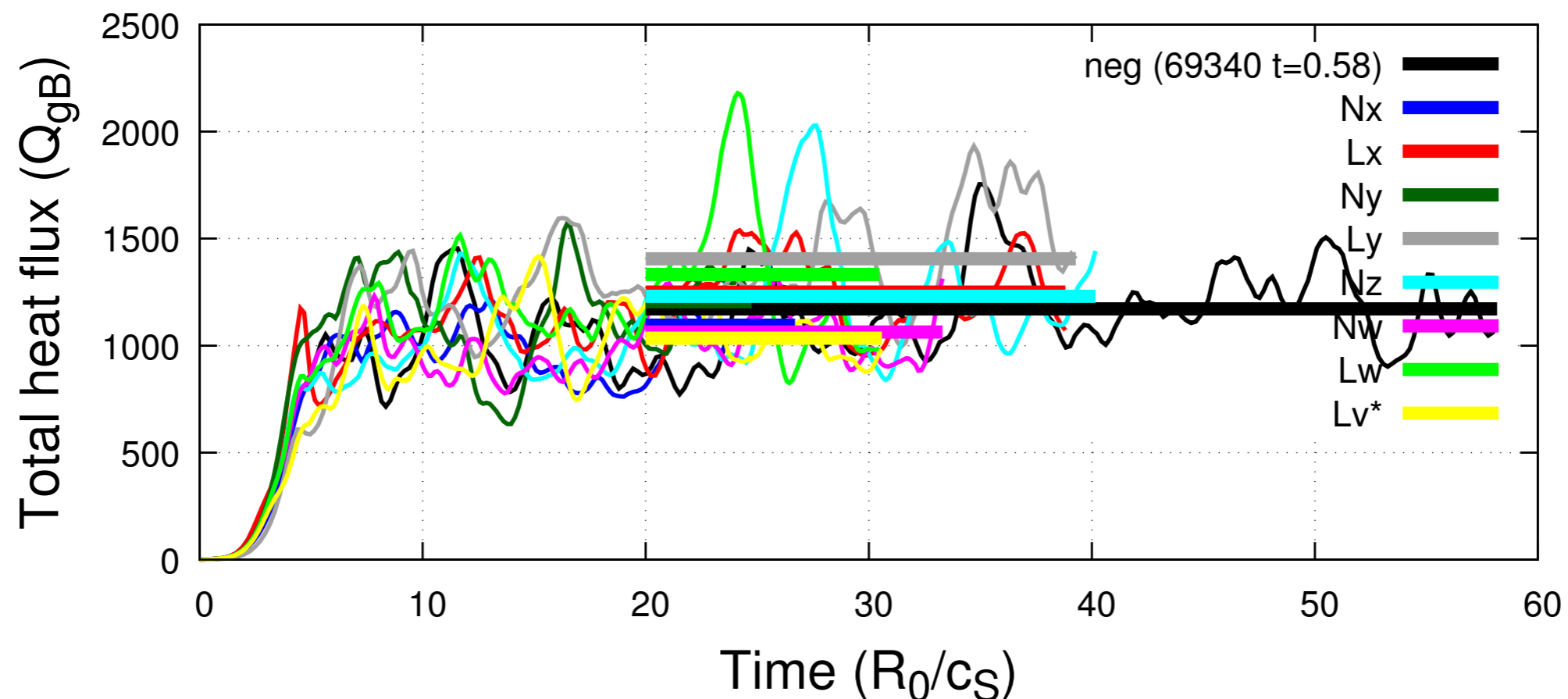
# Nonlinear study of comparison 3

- Heat flux is 10x too high and the profiles aren't particularly stiff

- Could be finite system size effects or an issue with the gyroBohm normalization
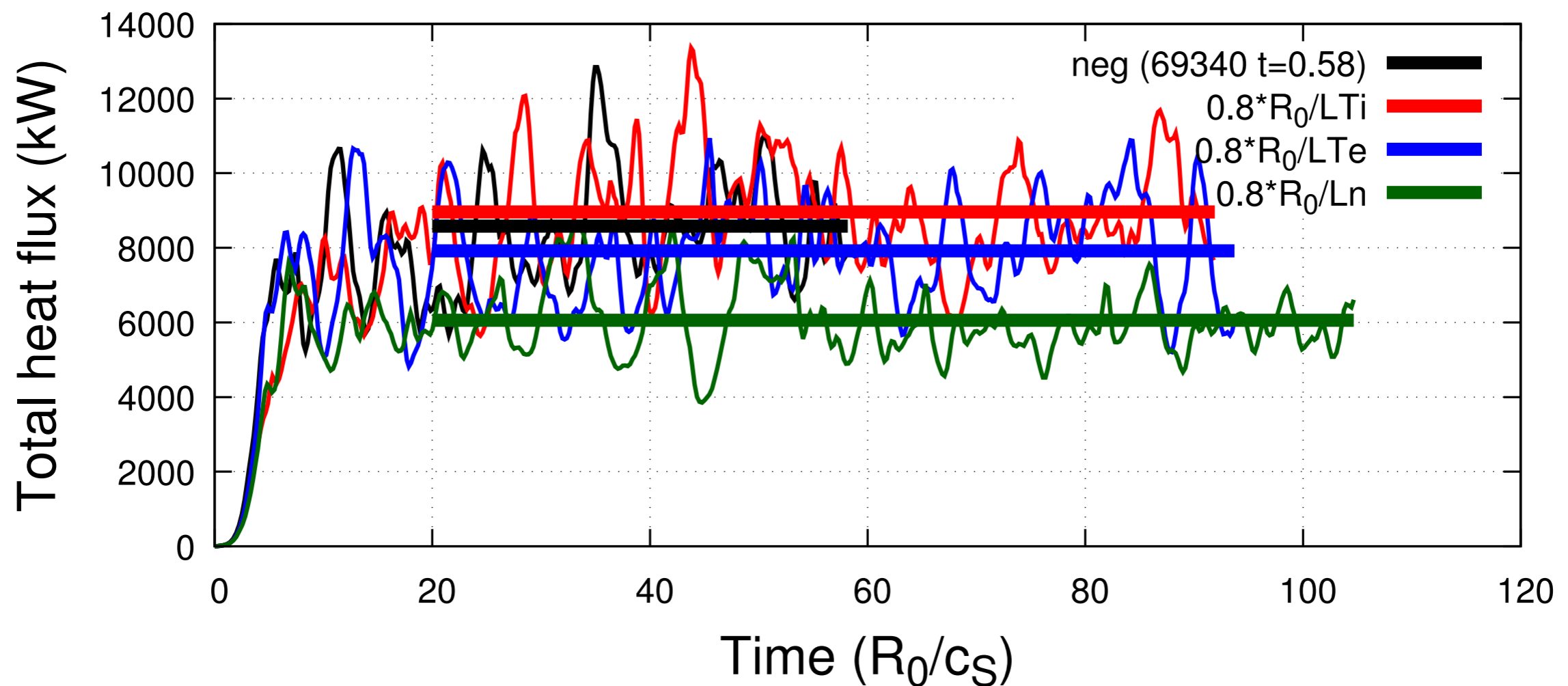
# Agenda

- General updates

- Roundtable discussion with team members

- **Team meeting scheduling and resources**

- Comments, questions?

# Marconi reminder

- 50% through the allocation period (March 2021-Feb 2022)

- 10% of the following conventional A3 allocation has been used:

  - GENE: 375k node-hours = 100k (Alberto) + 125k (Justin) + 150k (MJ)

  - GBS: 175k node-hours

  - HYMAGYC: 100k node-hours

- 9% of the following GPU C1 allocation has been used:

  - ORB5: 80k node-hours

# Team meetings

- Topical group meetings the week of September 13-17

- Next whole team meeting on Tuesday September 28th at 15h

# Agenda

- EUROfusion updates

- TCV experimental equilibria

- Roundtable discussion with team members

- Team meetings, schedule, and resources

- **Comments, questions?**

All done.

# TCV experimental equilibria

- Run some preliminary nonlinear simulations using comparison 3

| Comp. Num. | Description | Constants of comparison | Discharge | Time (sec) | elong | delta | betaN | P_nbi (kW) | q95 | Ip (kA) | <ne> (x10^19 m^-3) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Diverted, PT | q95, betaN | 69515 | 1.02 | 1.43 | +0.29 | 0.97 | 636 | 3.17 | 242 | 4.0 | not great q95 match |
| 1 | Diverted, NT | q95, betaN | 69340 | 0.58 | 1.42 | -0.28 | 0.97 | 362 | 2.94 | 218 | 3.3 | with Langmuir probes |
| 2 | Diverted, PT | q95, ne, Pheat | 69515 | 1.02 | 1.43 | +0.29 | 0.97 | 636 | 3.17 | 242 | 4.0 | not great q95 match |
| 2 | Diverted, NT | q95, ne, Pheat | 69271 | 1.60 | 1.42 | -0.27 | 1.59 | 612 | 2.90 | 217 | 4.4 | - |
| 3 | Diverted, PT | Ip, betaN, ne | 69508 | 1.49 | 1.43 | +0.28 | 1.12 | 735 | 3.31 | 217 | 4.0 | - |
| 3 | Diverted, NT | Ip, betaN, ne | 69340 | 0.58 | 1.42 | -0.28 | 0.97 | 362 | 2.94 | 218 | 3.3 | with Langmuir probes |
| 4 | Limited, PT | Ip, betaN, ne | 69511 | 1.50 | 1.34 | +0.35 | 1.25 | 1030 | 3.38 | 228 | 3.4 | - |
| 4 | Limited, NT | Ip, betaN, ne | 69273 | 0.85 | 1.29 | -0.29 | 1.30 | 475 | 2.85 | 228 | 3.4 | - |
| 5 | Limited, PT | Ip, Pheat | 69511 | 1.50 | 1.34 | +0.35 | 1.25 | 1030 | 3.38 | 228 | 3.4 | - |
| 5 | Limited, NT | Ip, Pheat | 69273 | 1.70 | 1.26 | -0.26 | 2.02 | 1020 | 2.79 | 226 | 4.6 | - |
| - | Diverted, PT | - | 69515 | 1.58 | 1.43 | +0.34 | 1.84 | 1020 | 3.29 | 239 | 7.1 | in H-mode; no CXRS so Ti=Te |
| - | Diverted, NT | - | 69340 | 1.60 | 1.40 | -0.27 | | | 2.92 | 217 | 5.4 | with Langmuir probes |

# Initial turbulence results for comparison 3

- Found that logarithm profiles have significant scatter



69508 t=1.49

Legend:
- d(log($n_e$))/d$\rho_{tor}$
- d(log($T_e$))/d$\rho_{tor}$
- d(log($T_i$))/d$\rho_{tor}$
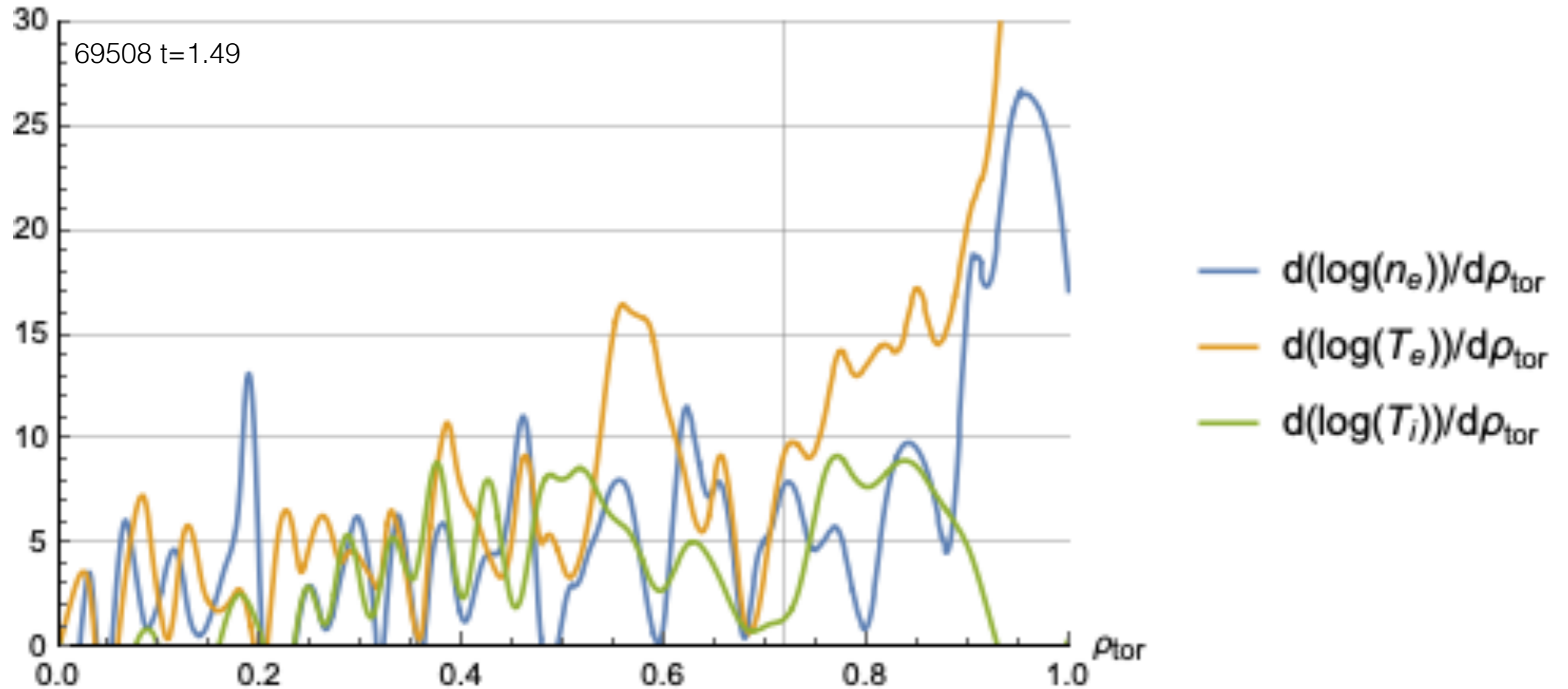
# Initial turbulence results for comparison 3

- Visible in profiles themselves



69508 t=1.49

Legend:
- $n_e$ $(10^{20}\ m^{-3})$
- $T_e$ (keV)
- $T_i$ (keV)