

# **Modelling of the TCV pedestal**

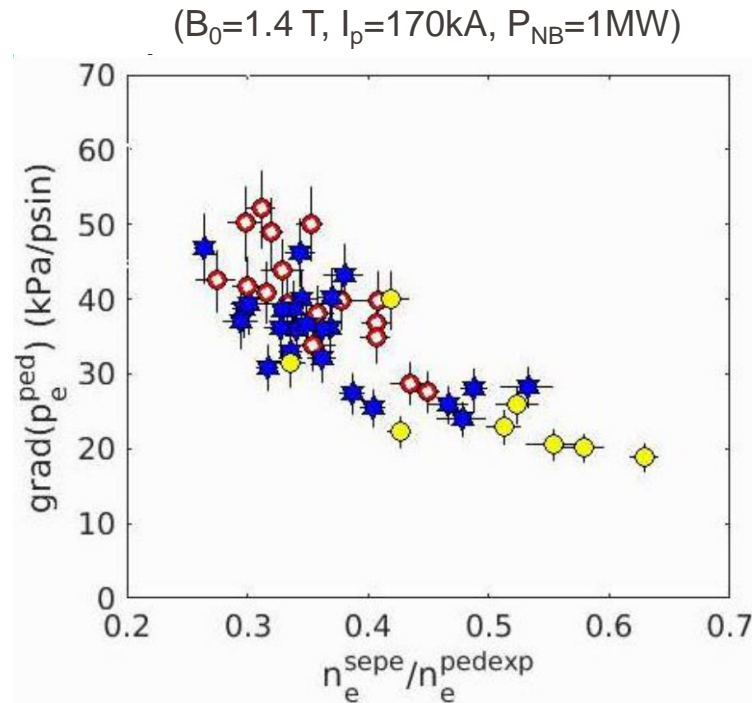
**WPTE RT22-01**

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L. Frassinetti,  
B. Chapman**

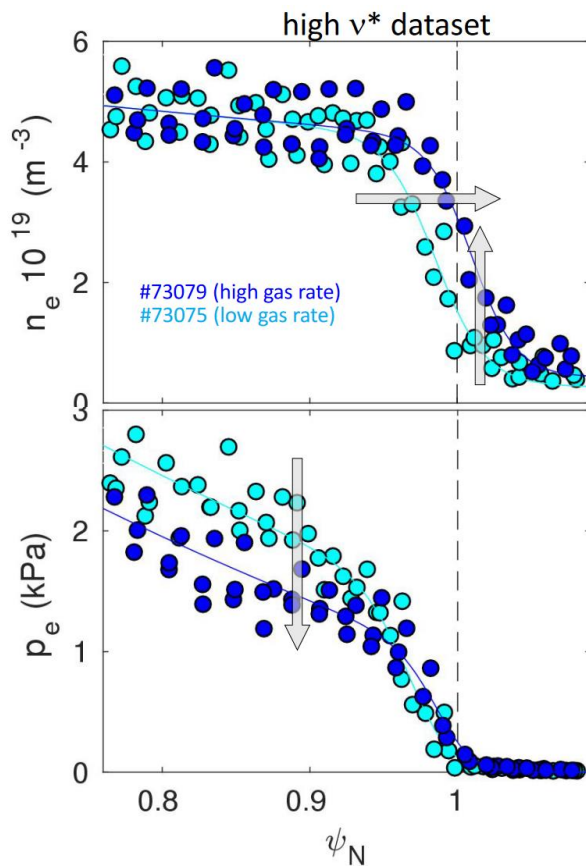
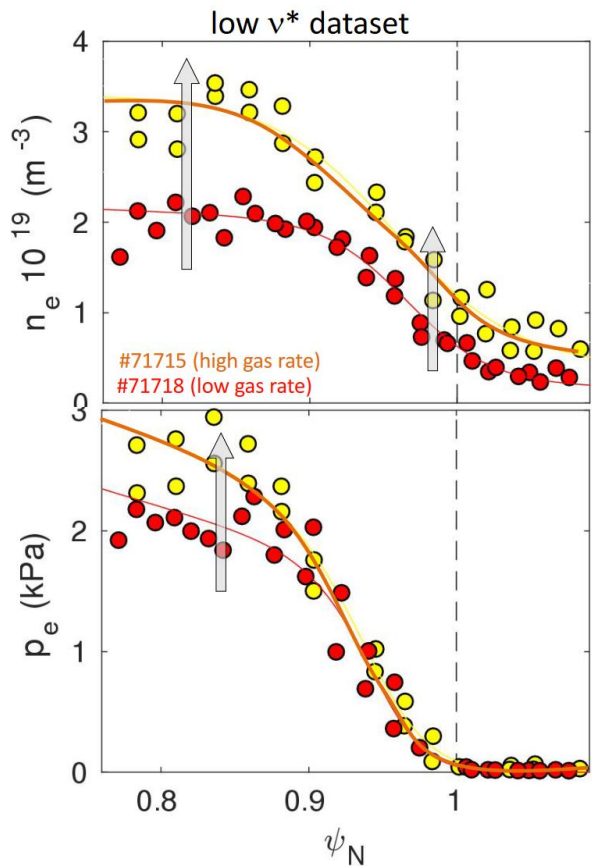
RT22-01 TCV experimental results  
(provided by L. Frassinetti)

- Experimental link between  $n_e^{sep}/n_e^{ped}$
- With and w/o buffels
- High collisionality
- Consistent with JET?

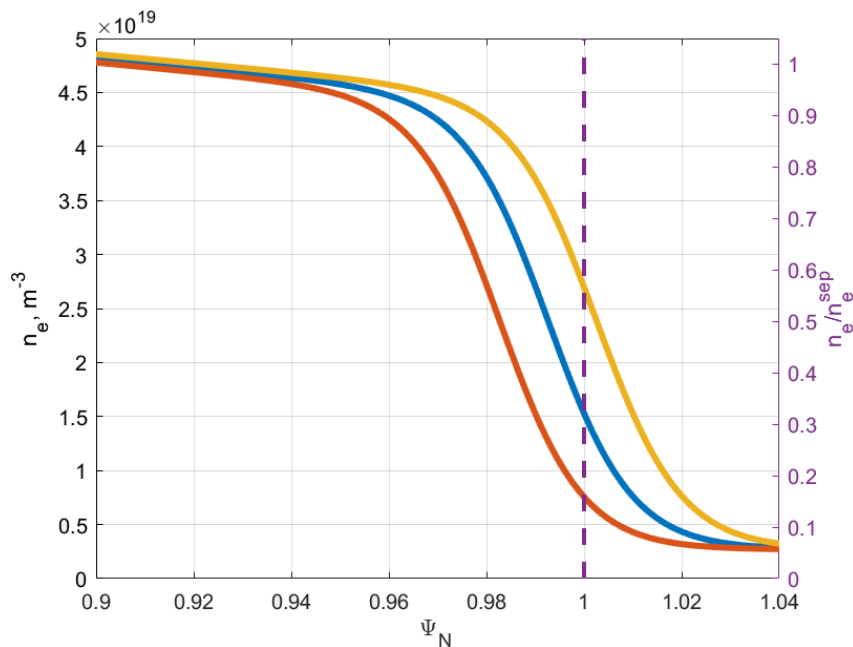
(L. Frassinetti *et al* 2021 *Nucl. Fusion* **61**  
126054)



# Experimental profiles



# Modelling setup



Electron scale local GENE modelling

Experimental density and temperature profiles (inter-ELM),  $T_e = T_i$ .

TCV shot 73075,  $n_e^{sep}/n_e^{ped} \approx 0.32$

Modified  $n_e^{sep}/n_e^{ped} \approx 0.16$

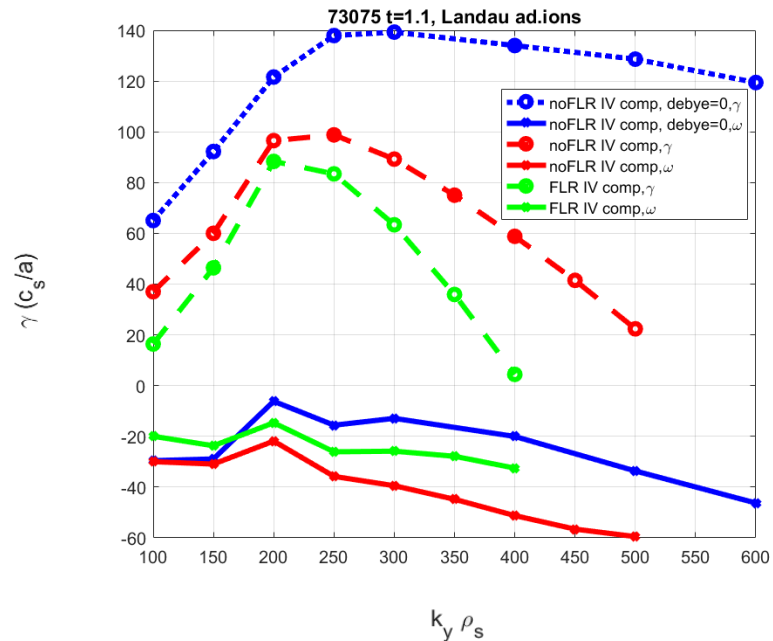
Modified  $n_e^{sep}/n_e^{ped} \approx 0.56$

Linear modelling:

Small timestep, long computation times

Crucial factors:

- Resolving parallel direction ( $n_z = 480$ )
- Correctly including collisions (FLR effects)
- Finite Debye length effects

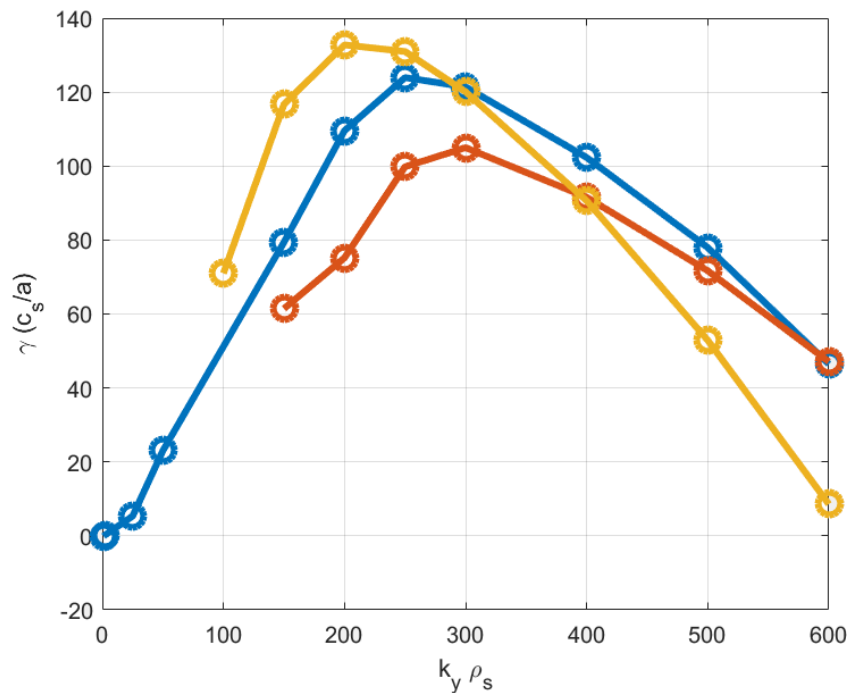


## Final linear computation:

- $T_e = T_i$
- Local ( $\rho_{\text{tor}} = 0.97$ )
- Adiabatic ions
- Collisions (with FLR)
- Both EV and IV

## Model limits:

- ~~Grid resolution~~ ✓
- ~~Kinetic ions~~ ✓
- ~~Collision operator~~ ✓
- ~~Ballooning angles~~ ✓
- ~~Different  $\rho_{\text{tor}}$~~  ✓
- ~~$Z_{\text{eff}}$  in collisions~~ ✓



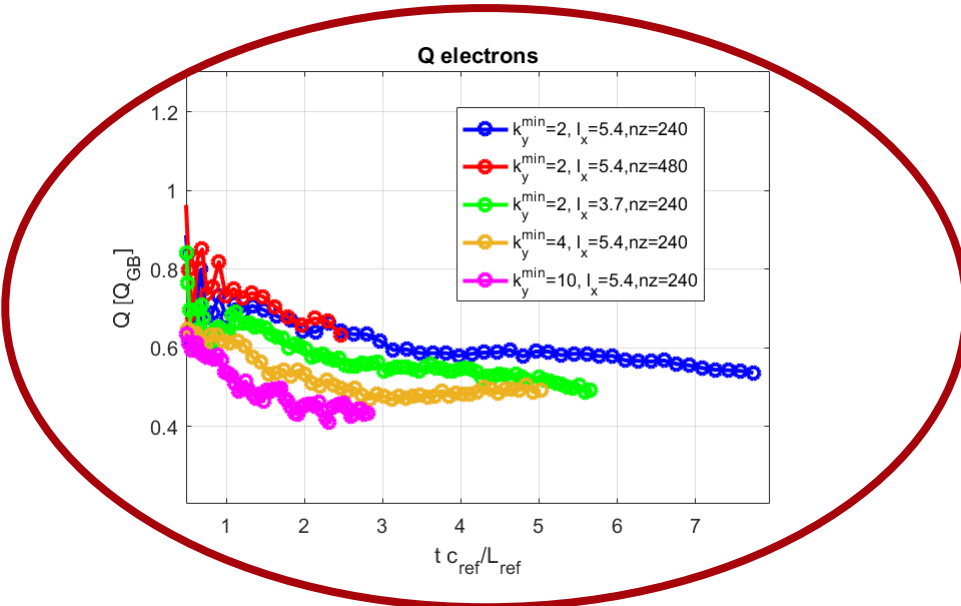
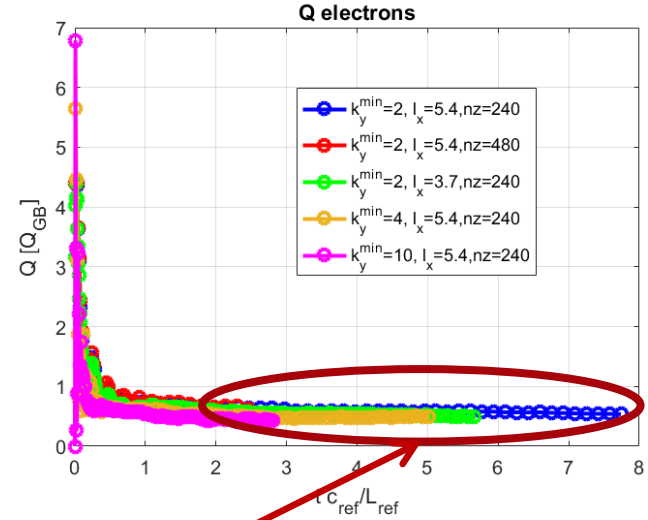
$$n_e^{sep}/n_e^{ped} \approx 0.32$$

$$n_e^{sep}/n_e^{ped} \approx 0.16$$

$$n_e^{sep}/n_e^{ped} \approx 0.56$$

### Nonlinear modelling:

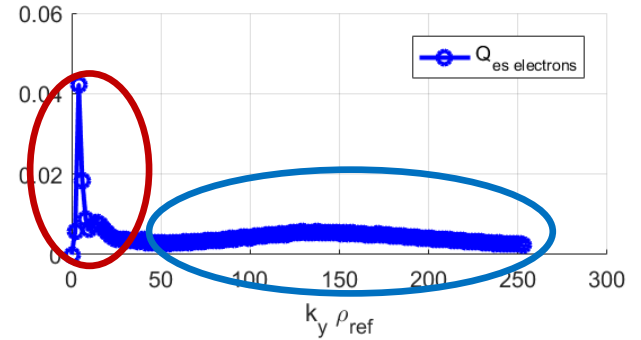
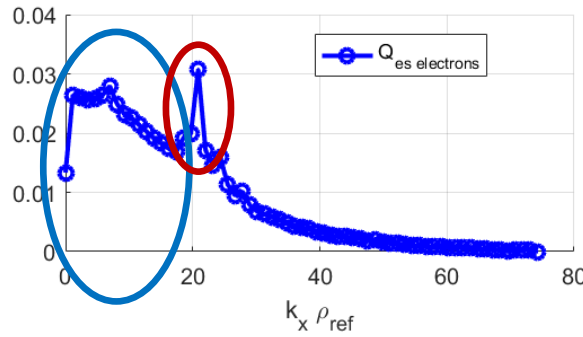
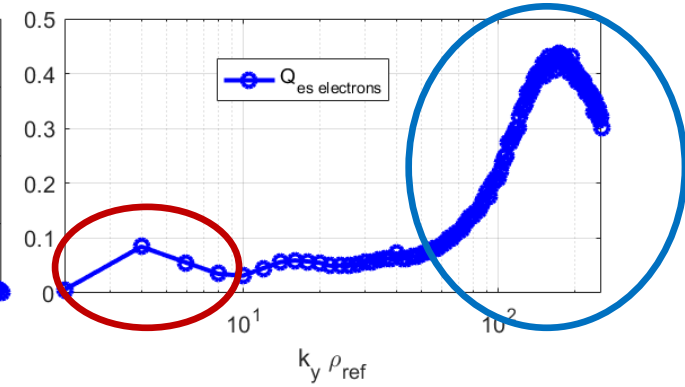
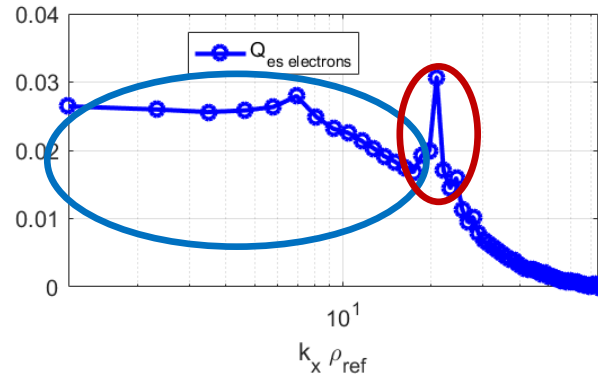
- Even longer computation times
- Sensitivity to resolution
- Multiple scales in the simulation



Additional ETG mode at lower  $k_y$

Not included in the model:

- Kinetic ions
- Flow shear





Thank you for your attention!