# Status on QualiKiz and TGLF validation and implementation in CRONOS

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# Post doc: objectives

1) understanding the key aspects and numerically reproduce tokamak **advanced scenarios** for different machines.

2) extrapolating the obtained results for the prediction of advanced scenarios for **ITER**.
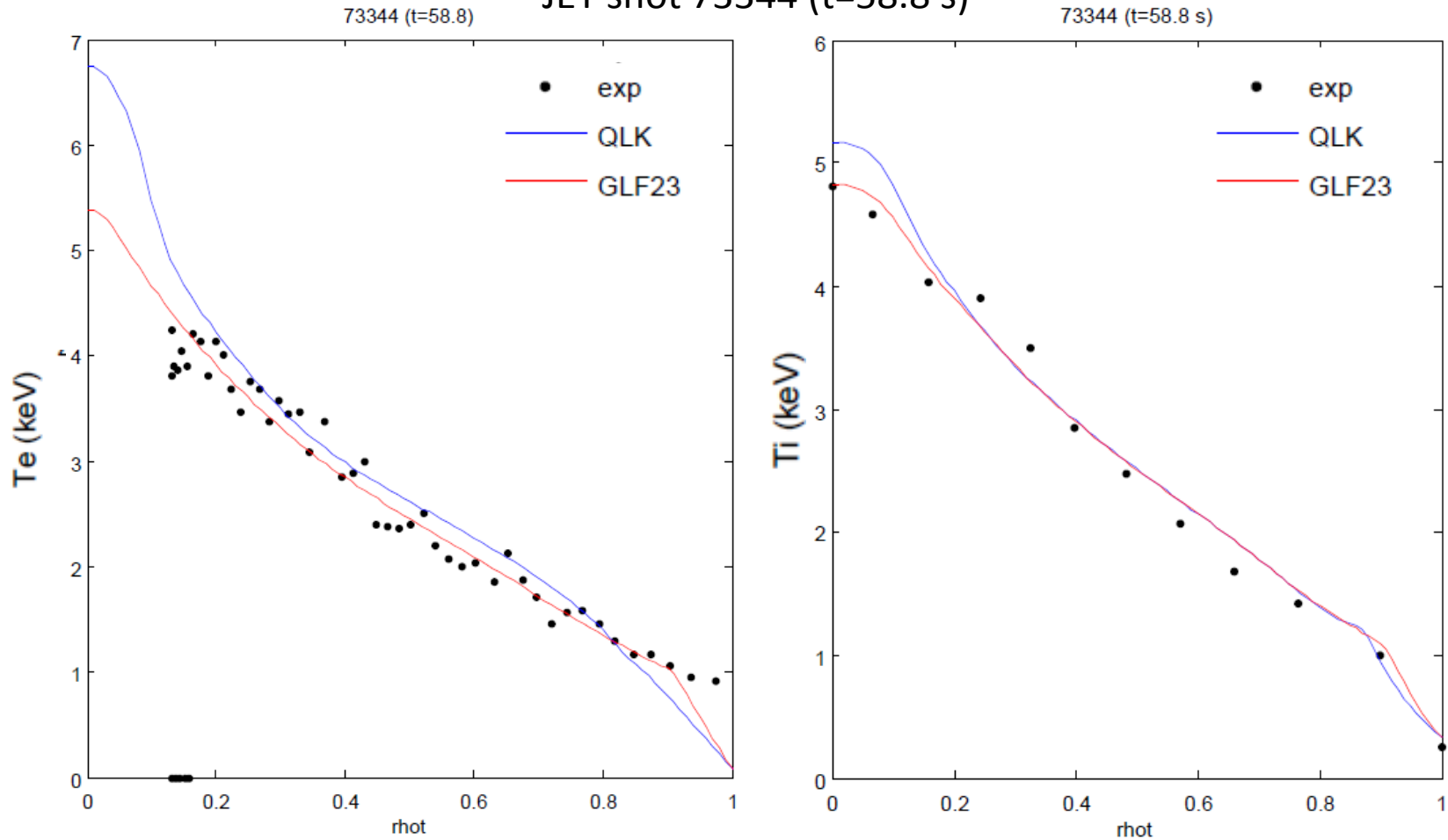
**QuaLiKiz** and **TGLF** are planned to be used, both in their stand alone version and coupled with CRONOS.

# Post doc: workplan

1. Studying the transport models in their **stand-alone version**

2. Coupling transport models **to CRONOS** and validation

3. Studying **advanced scenarios of existent fusion machines**

4. Extrapolating to advanced scenarios of **ITER**

# On going work

- **Comparison of TGLF and QuaLiKiz (stand alone version)**: study of sensibility and dependence on geometrical and physical parameters:
  - -> reproduction of a standard case present in literature
  - -> scan on JET hybrid discharges

  Problem:  different versions and  benchmark
  several input parameters in TGLF  in progress

- **Validation of coupling of QuaLiKiz to CRONOS:**
  - -> simulated JET H-mode discharges (73344):  Ti, Te
  - -> simulated JET hybrid discharges (77922): Ti, Te

- **Coupling of TGLF to CRONOS and validation:** work in progress
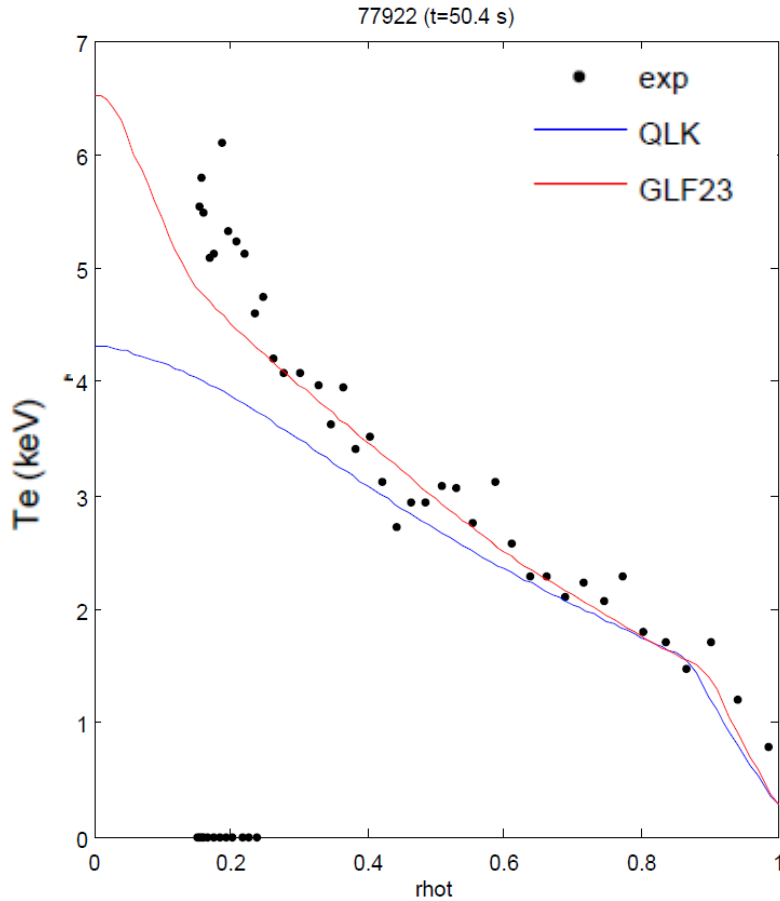
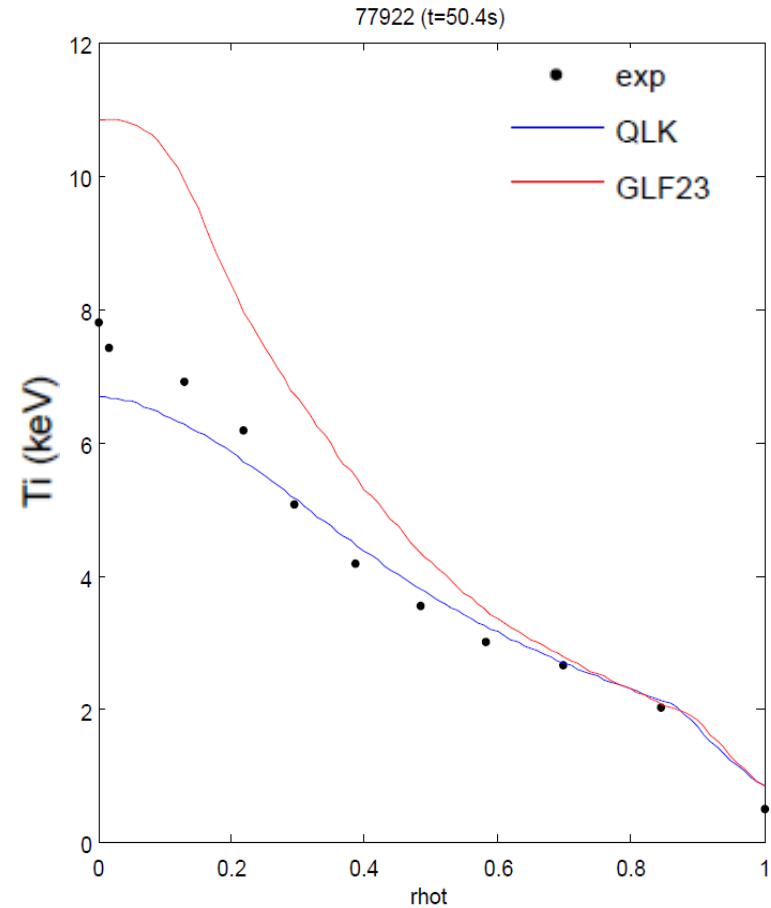# QuaLiKiz in CRONOS: H-mode

JET shot 73344 (t=58.8 s)



good agreement with experimental data and glf23 simulations

# QuaLiKiz in CRONOS: hybrid
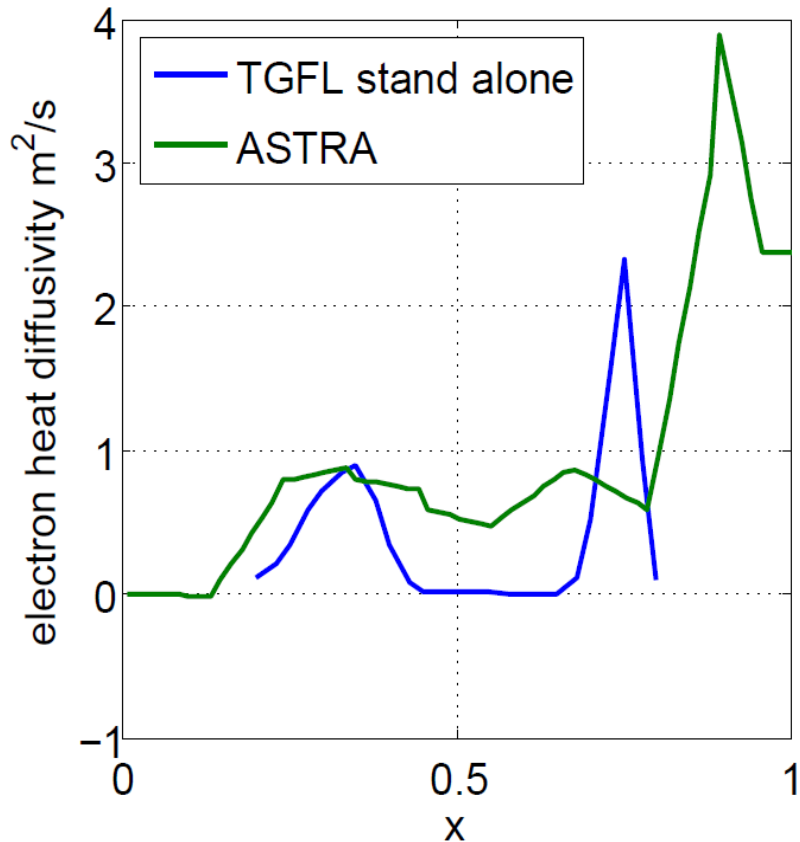
JET shot 77922 (t=50.4 s)
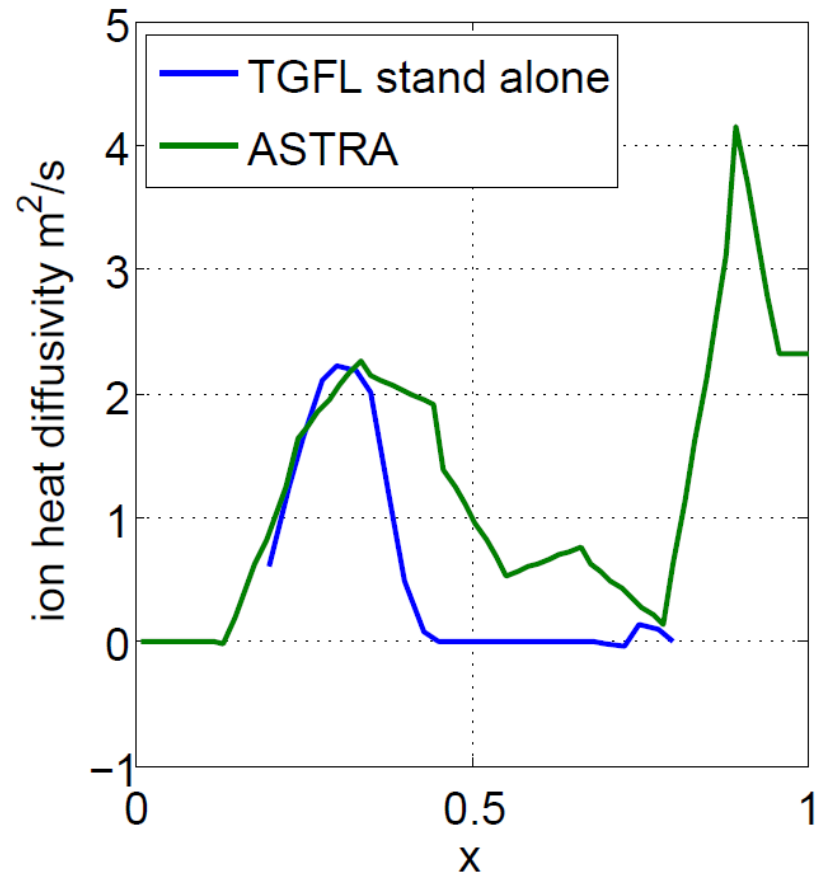


Electrons underestimated

glf23 with ExB shear stabilization, qlk without

# TGLF: stand alone benchmark

TGLF stand alone and ASTRA TGLF with same input data for 77922:



Different versions, different parameters

Even comparison of growth rates with
GYRO linear simulations not good

# Considerations and outlook

- **Qualikiz in cronos:**

  heat:      *H-mode*: good agreement with experimental data and glf23
                   simulation
              *hybrid*: agreement with experimental data and glf23 simulation
                  -> planned to simulate other hybrid discharges (75225 is running)
  particles: -> needed benchmark for density evolution

  **Problem**: much time demanding


- **TGLF benchmark:**

  **Problem**: - a lot of versions (the last one in October) without documentation
             - differences between results of stand alone and self consistently TGLF

  -> in parallel: planned stand alone TGLF comparison for other shots
             TGLF coupled to CRONOS but check needed (first simulations are running)