

Current diffusion in AUG

Jorge Ferreira, 8/7/2020, WIMAS-2 weekly meeting

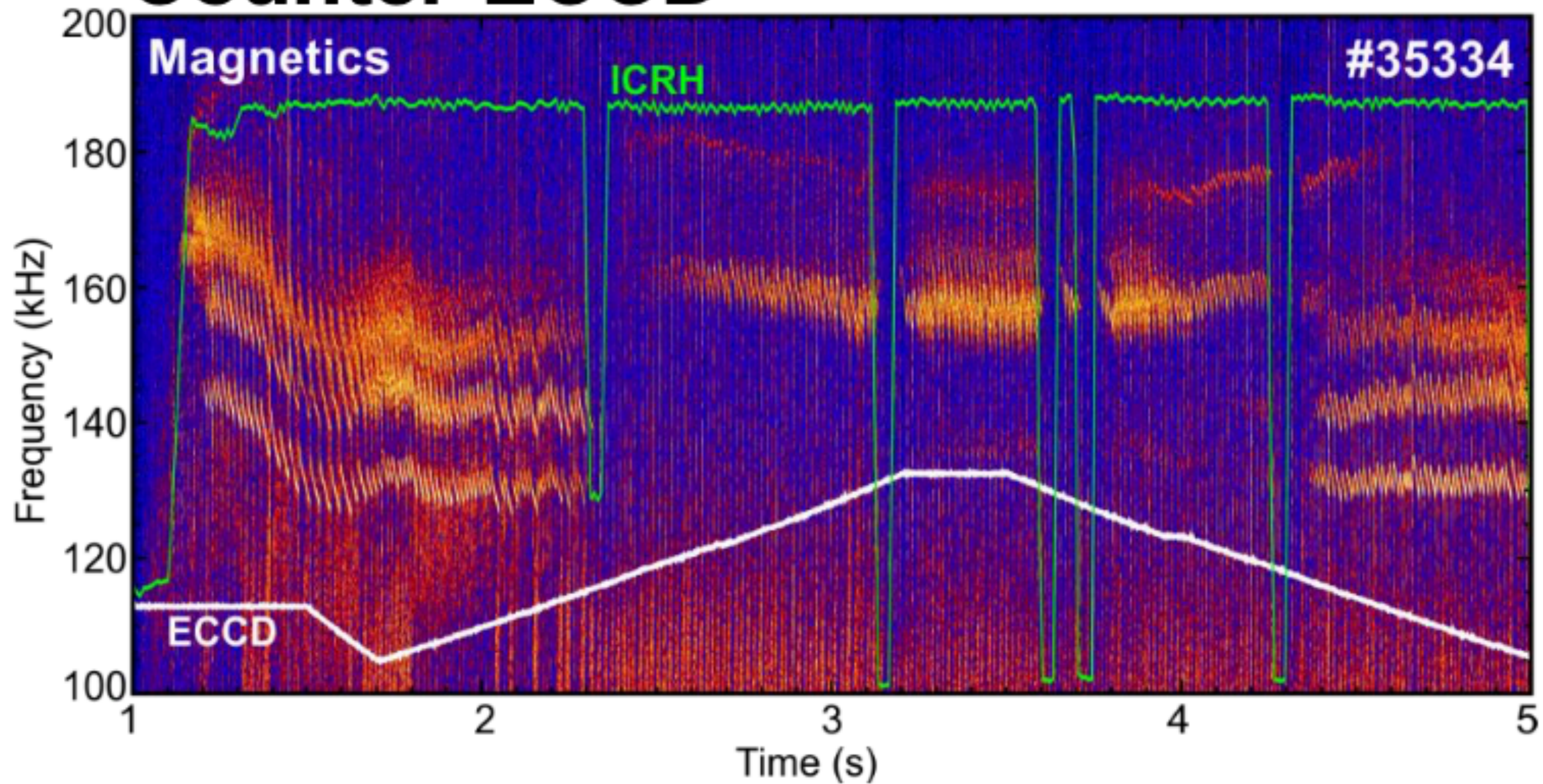
Use case:

experiment to determine the ECCD power threshold required to suppress TAEs in AUG

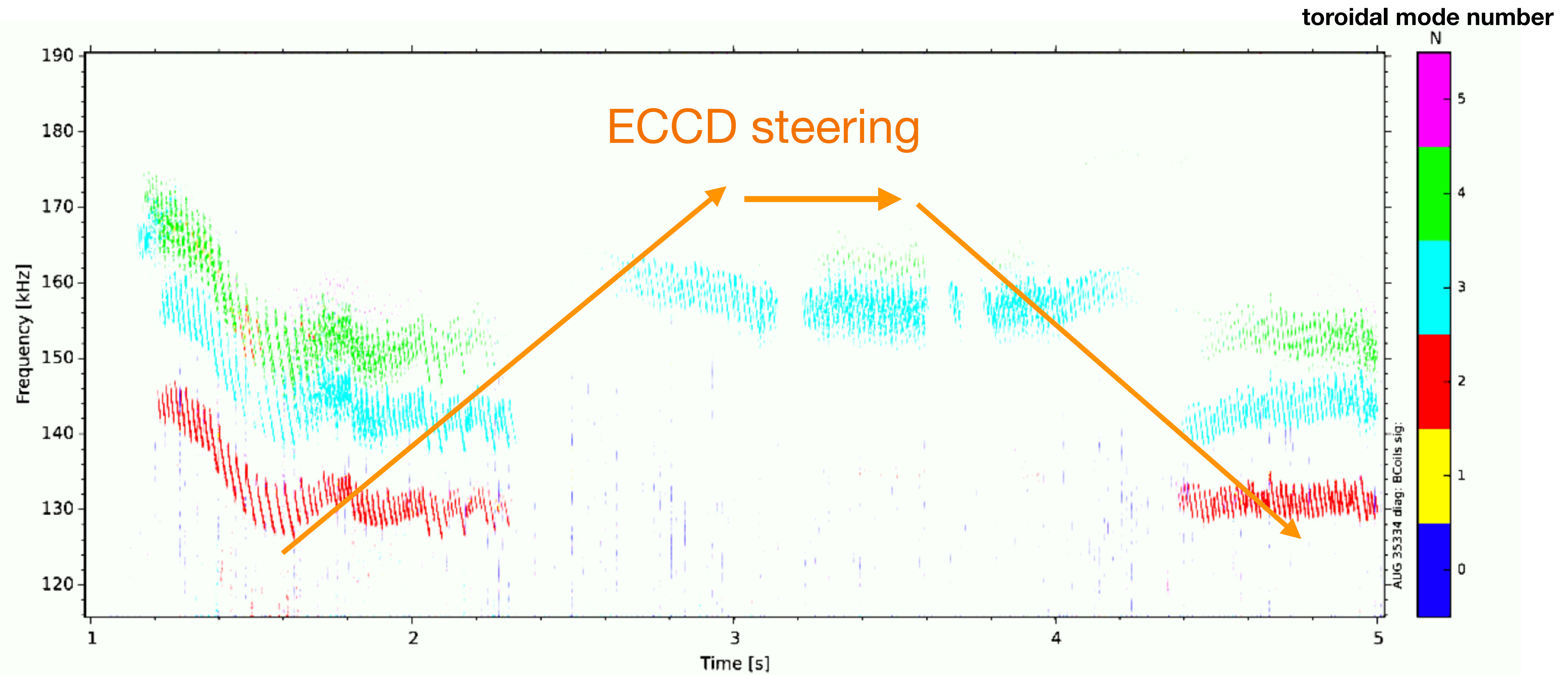
Method:

- TAEs are excited by the hot H-minority heated by ICRH
- counter-current ECCD across the plasma radius to change the local magnetic shear which is believed to suppress TAEs

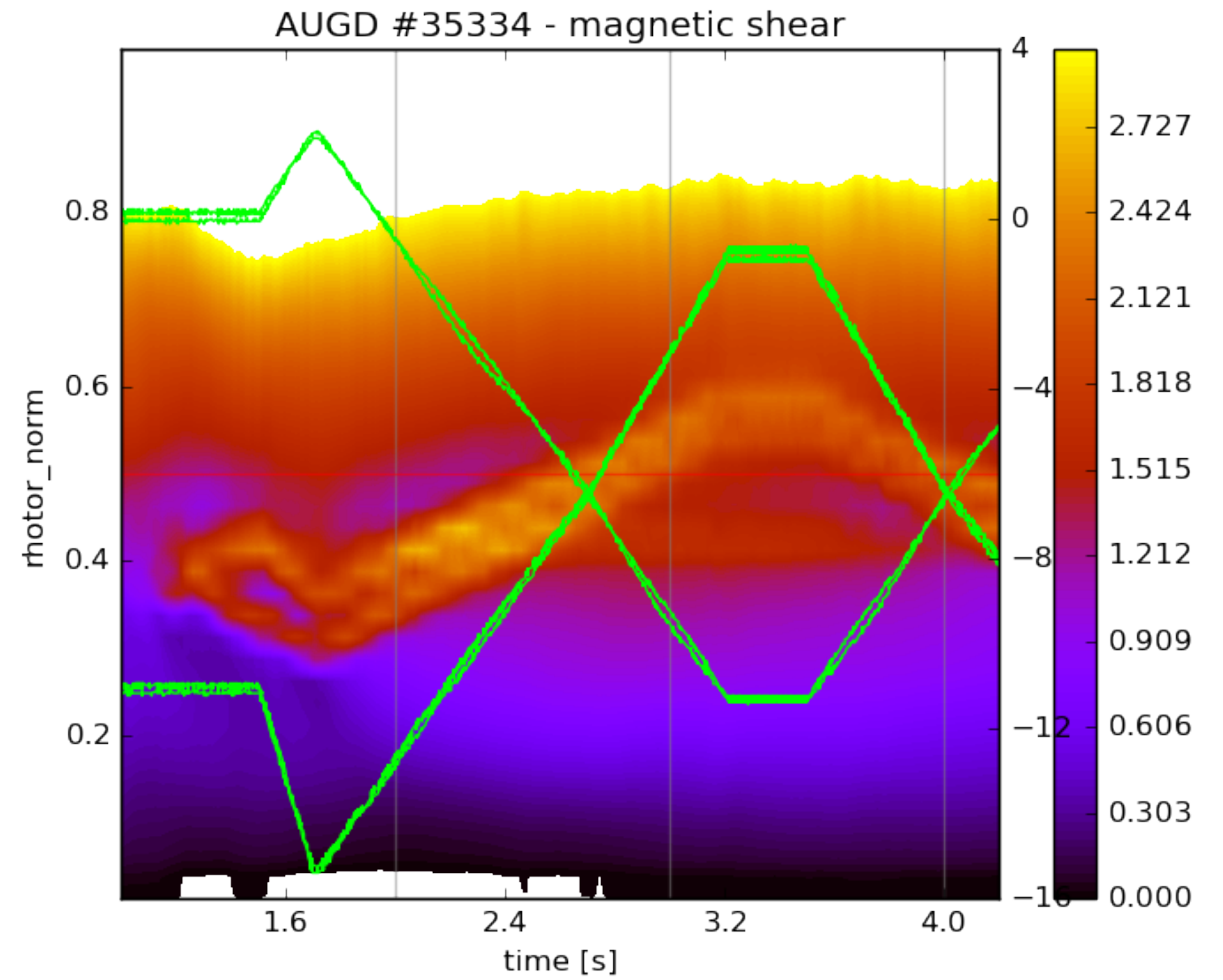
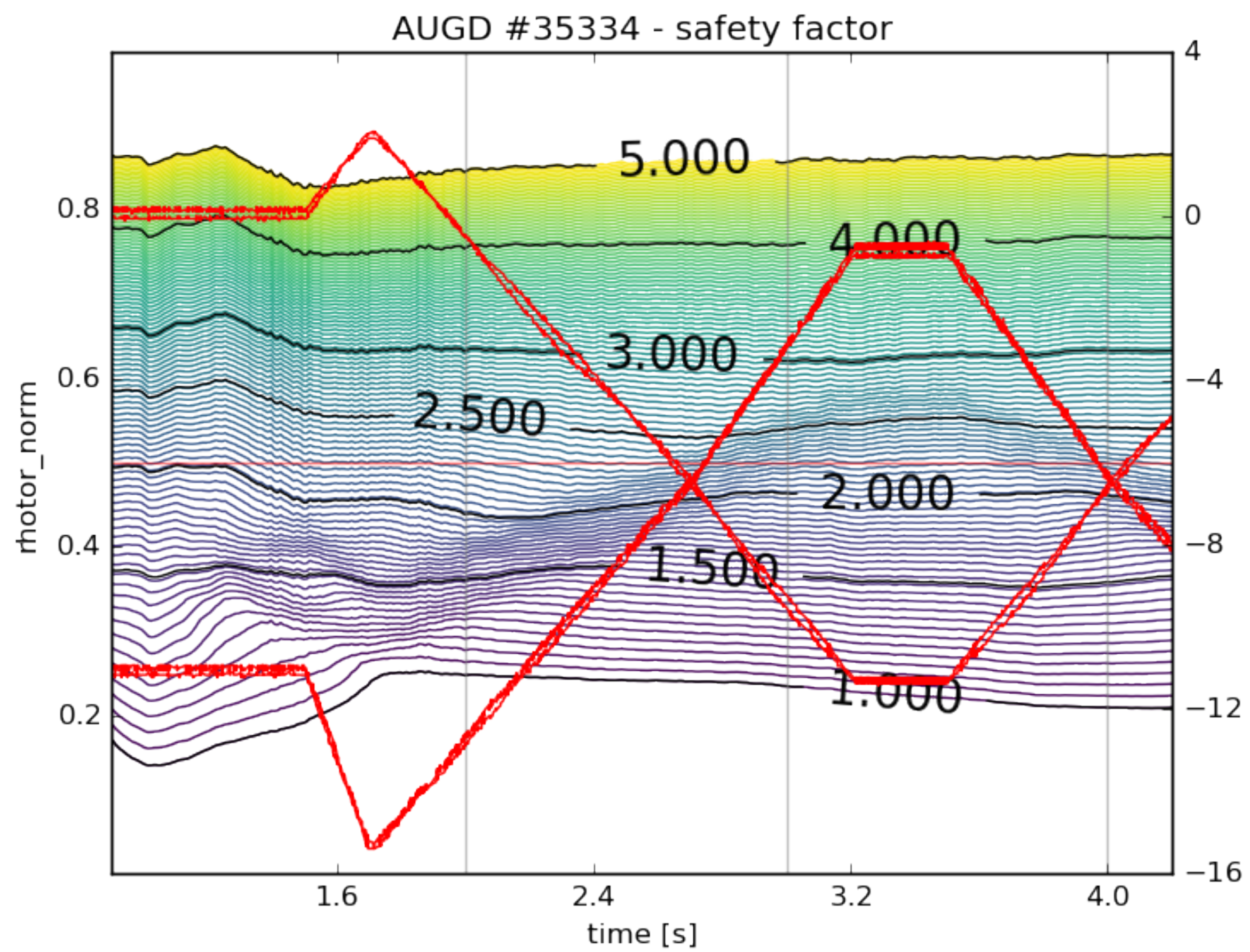
Counter-ECCD



TAE activity



TRANSP run for #35334



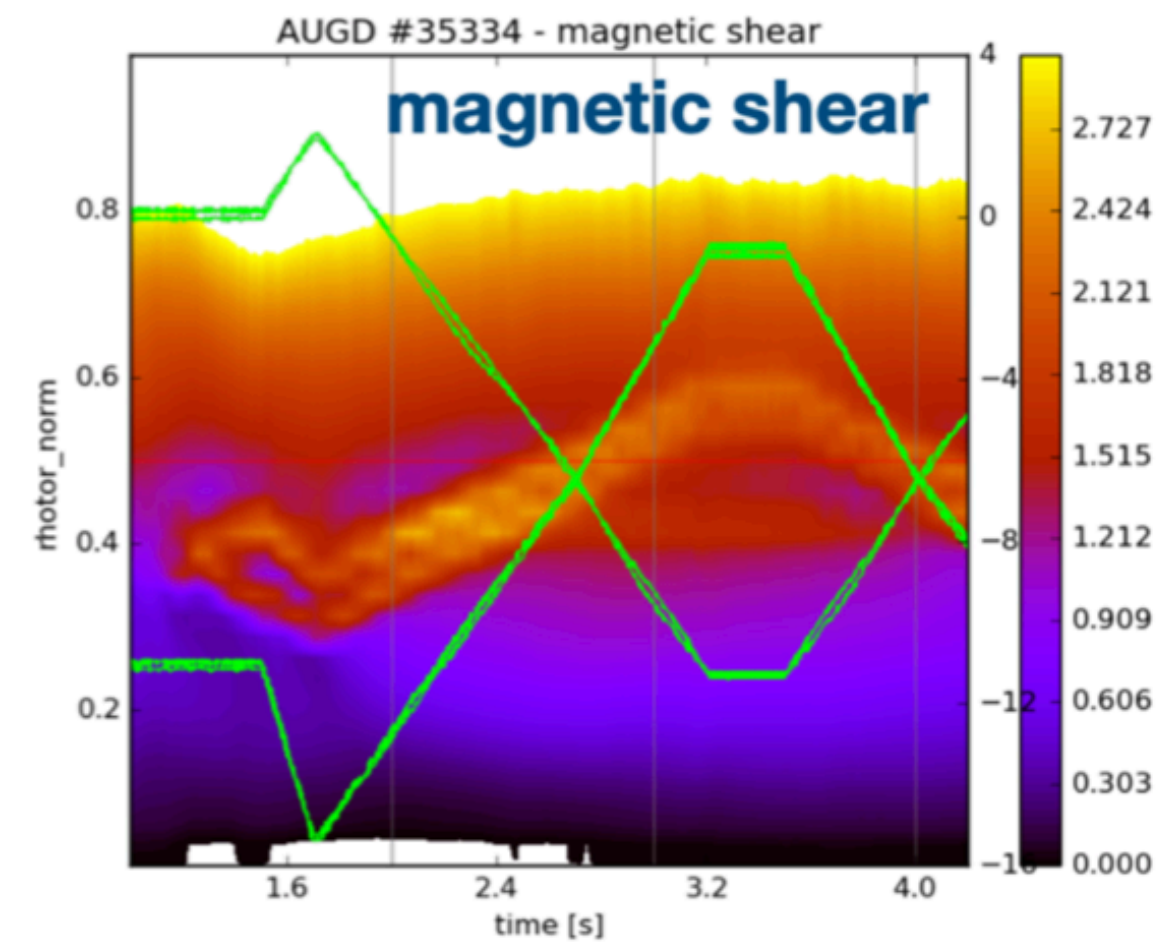
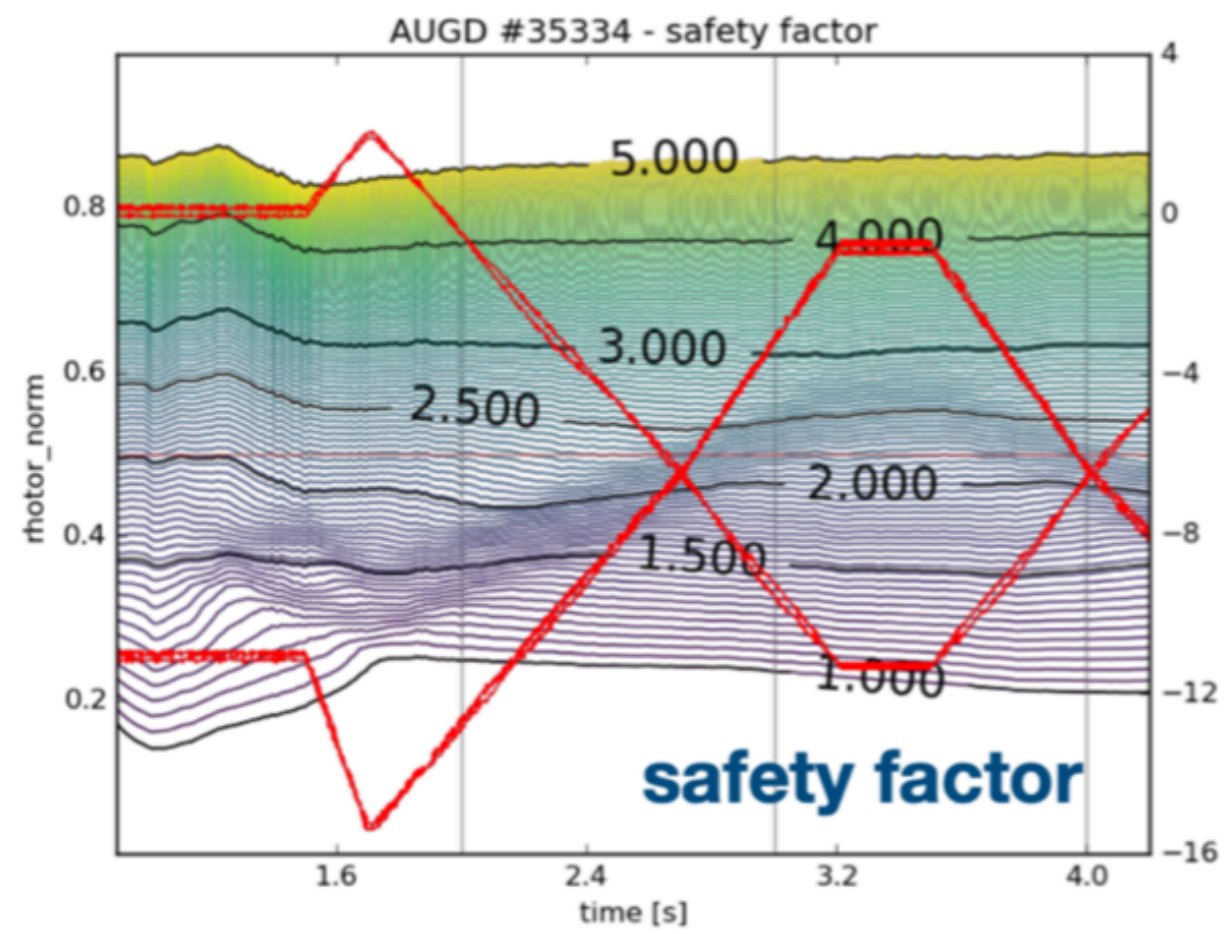
Can we model this with ETS-6?

In principle yes

- we have a tool to import data from AUG - TRVIEW
- current diffusion is working - eg. full JET Ohmic scenario
- GRAY for ECCD is ready for tests
- CYRANO & STIXREDIST were finalised a week ago and they are ready to be tested
- TRANSP runs available for verification / benchmark

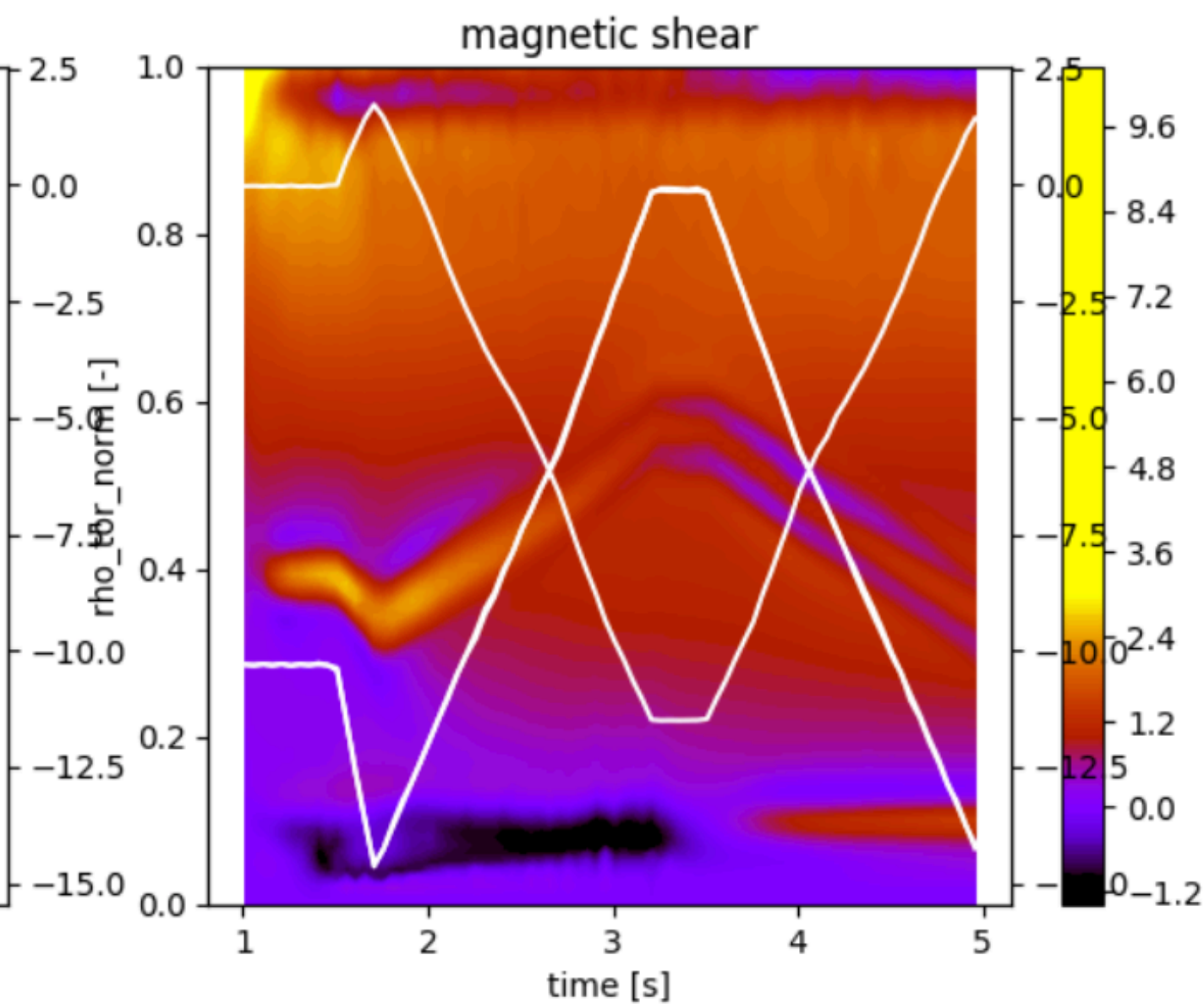
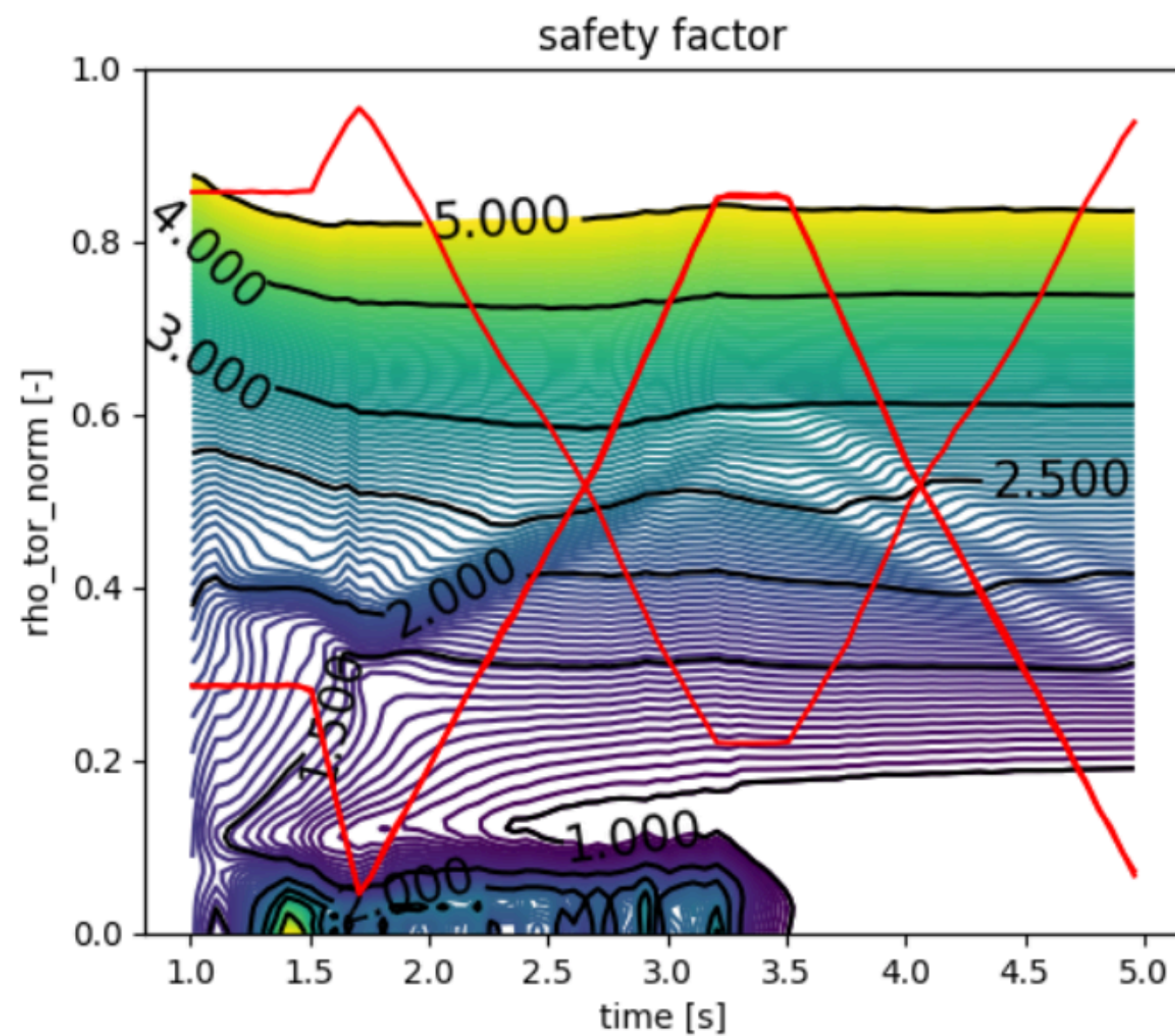
TRANSP 35334F11

- #35334 - ECCD effect on q and shear

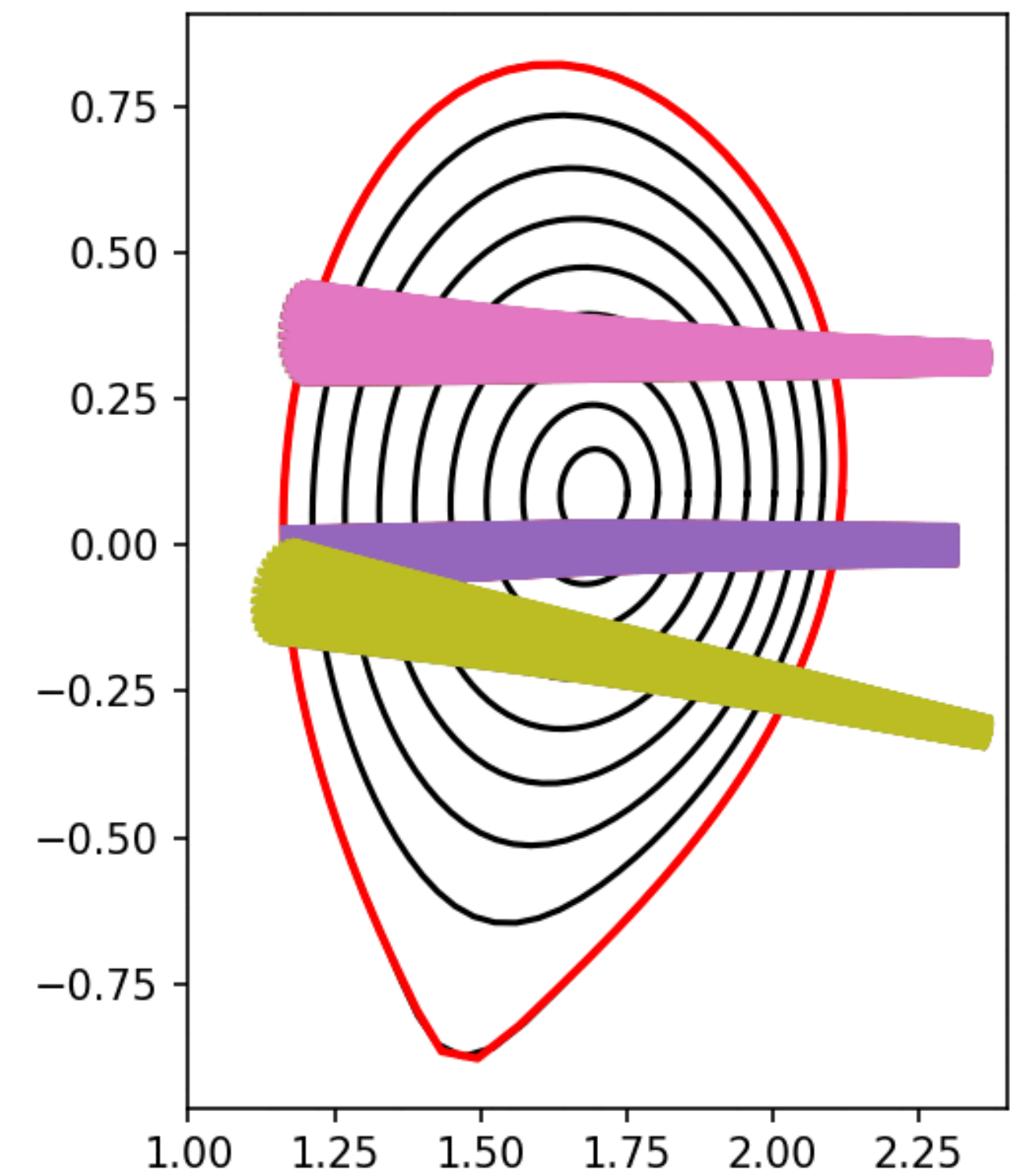


**preliminary assessment
@ Summer Code Camp**

ETS-6 [g2jofe/35334/1010](#)

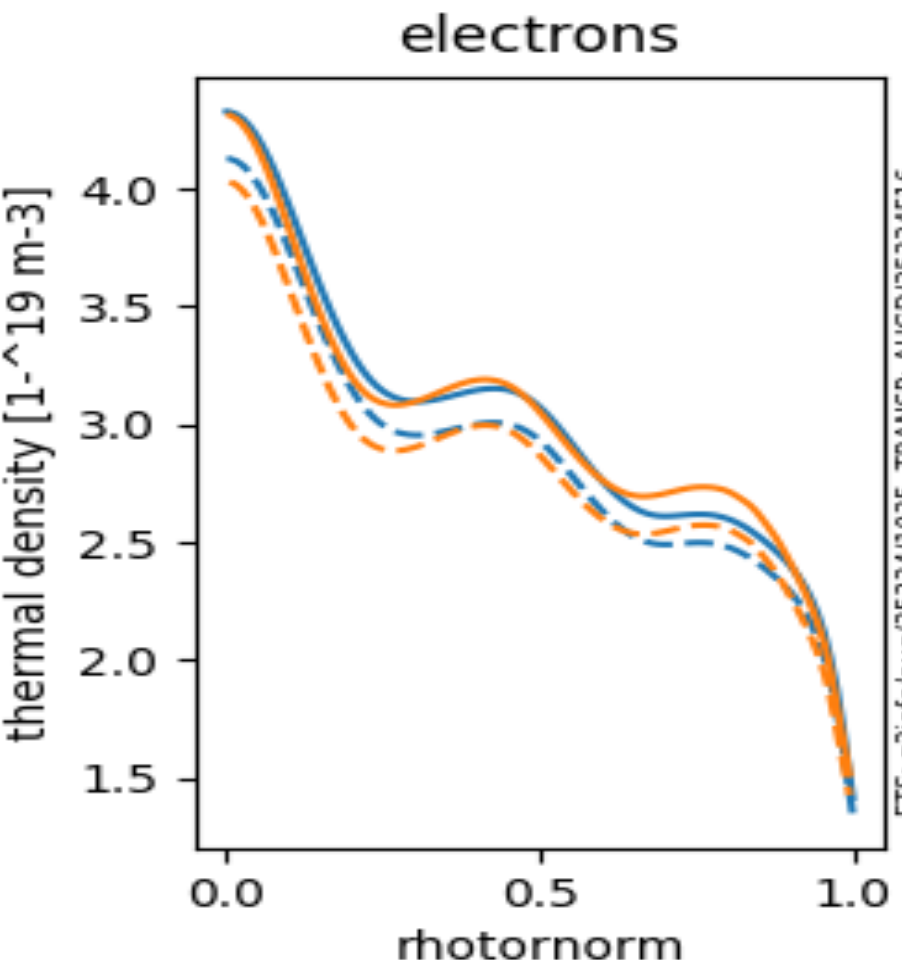
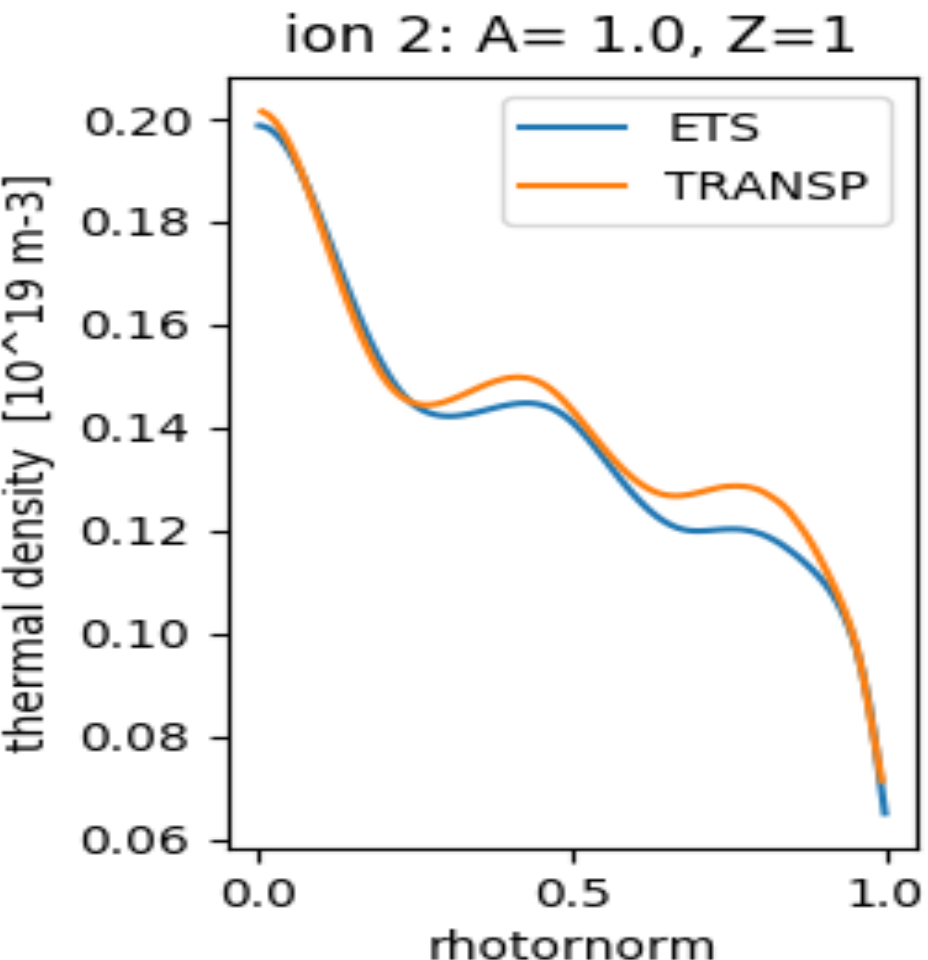
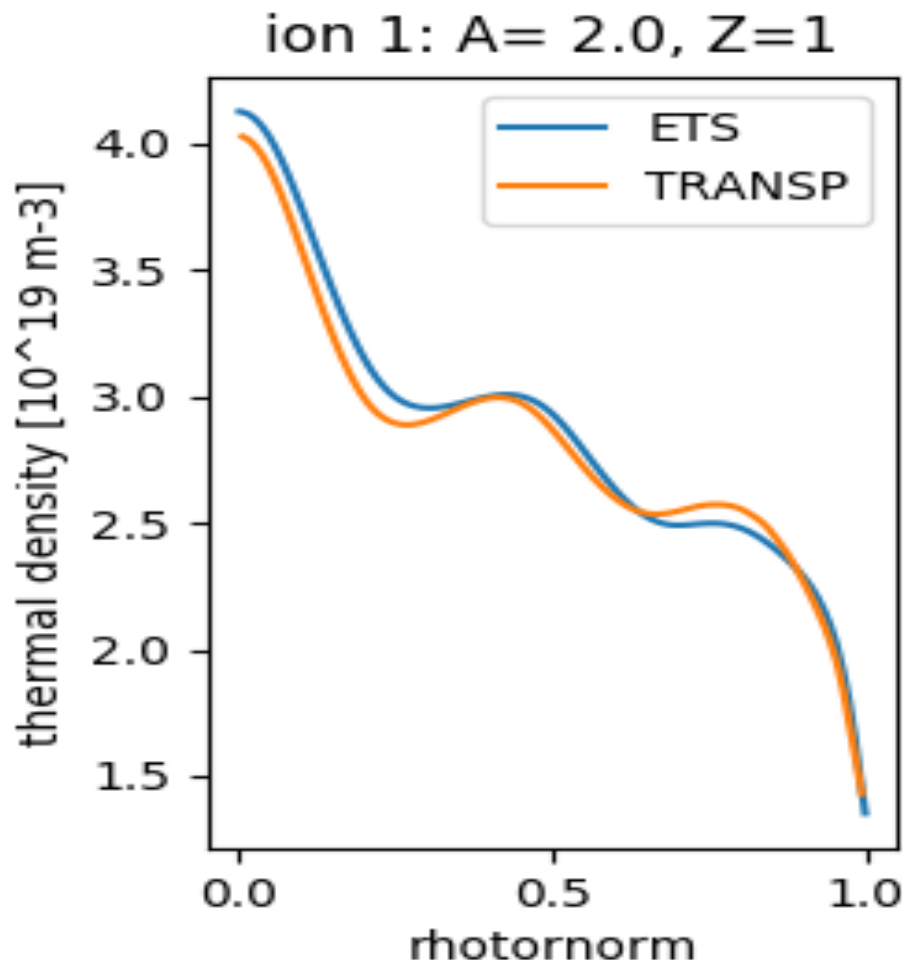
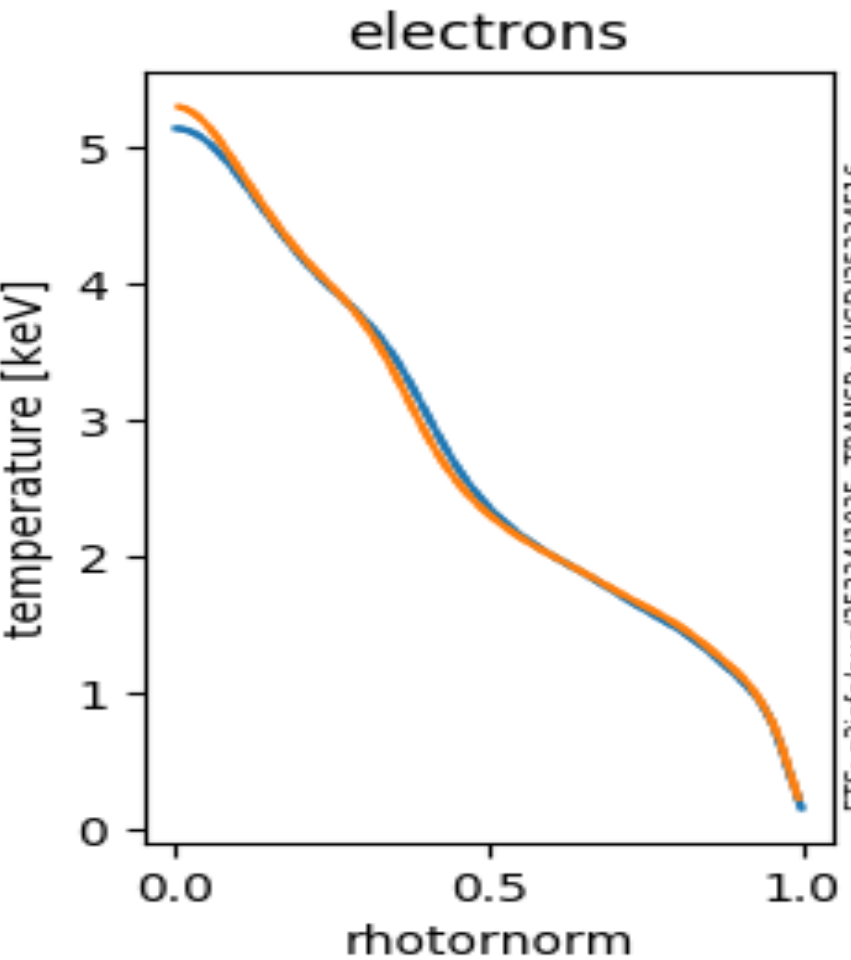
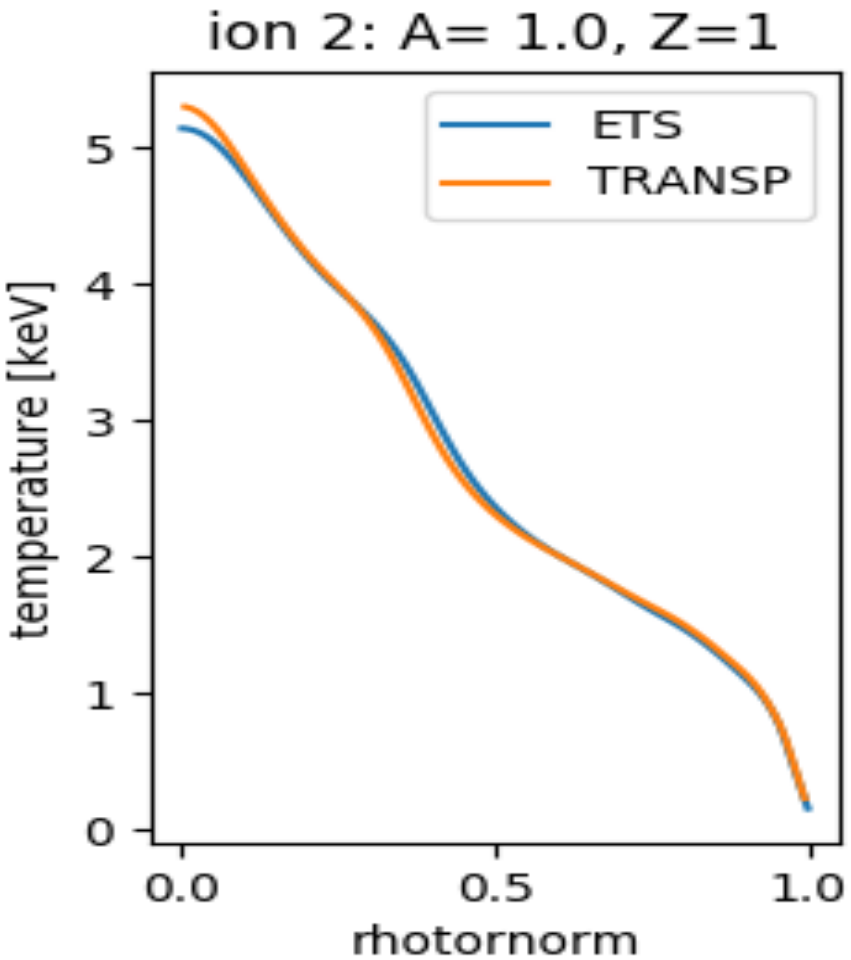
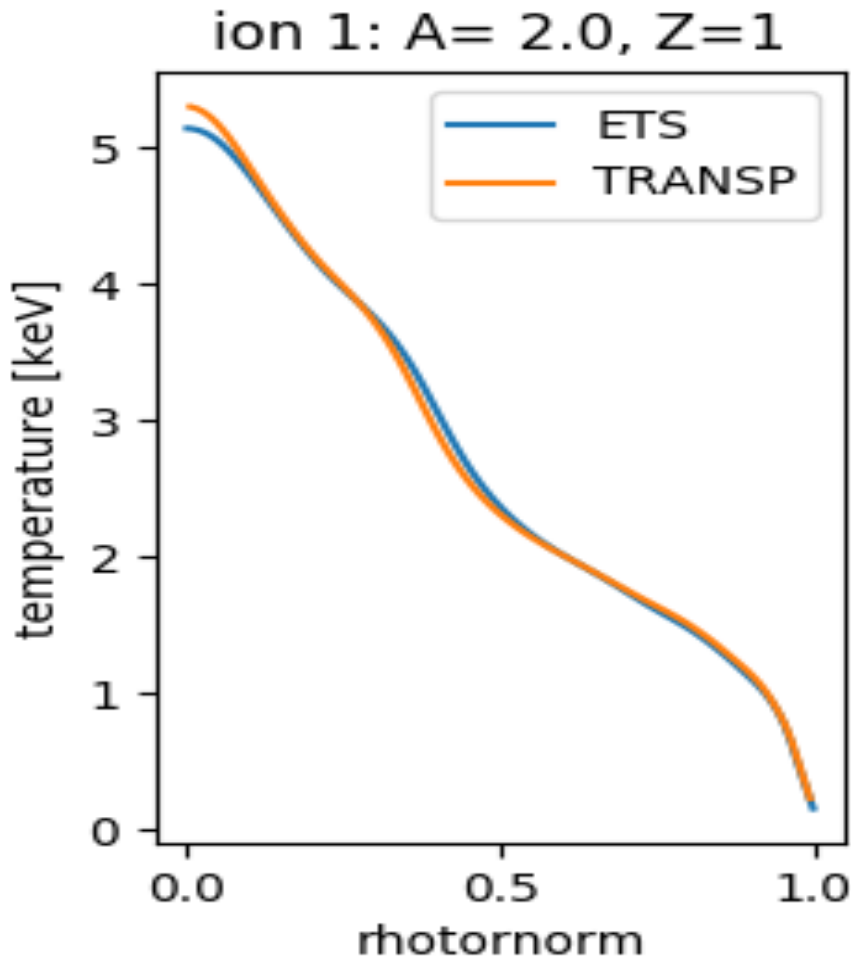


time: 2.01 [s]



Thermal profiles - ETS/TRANSP benchmark

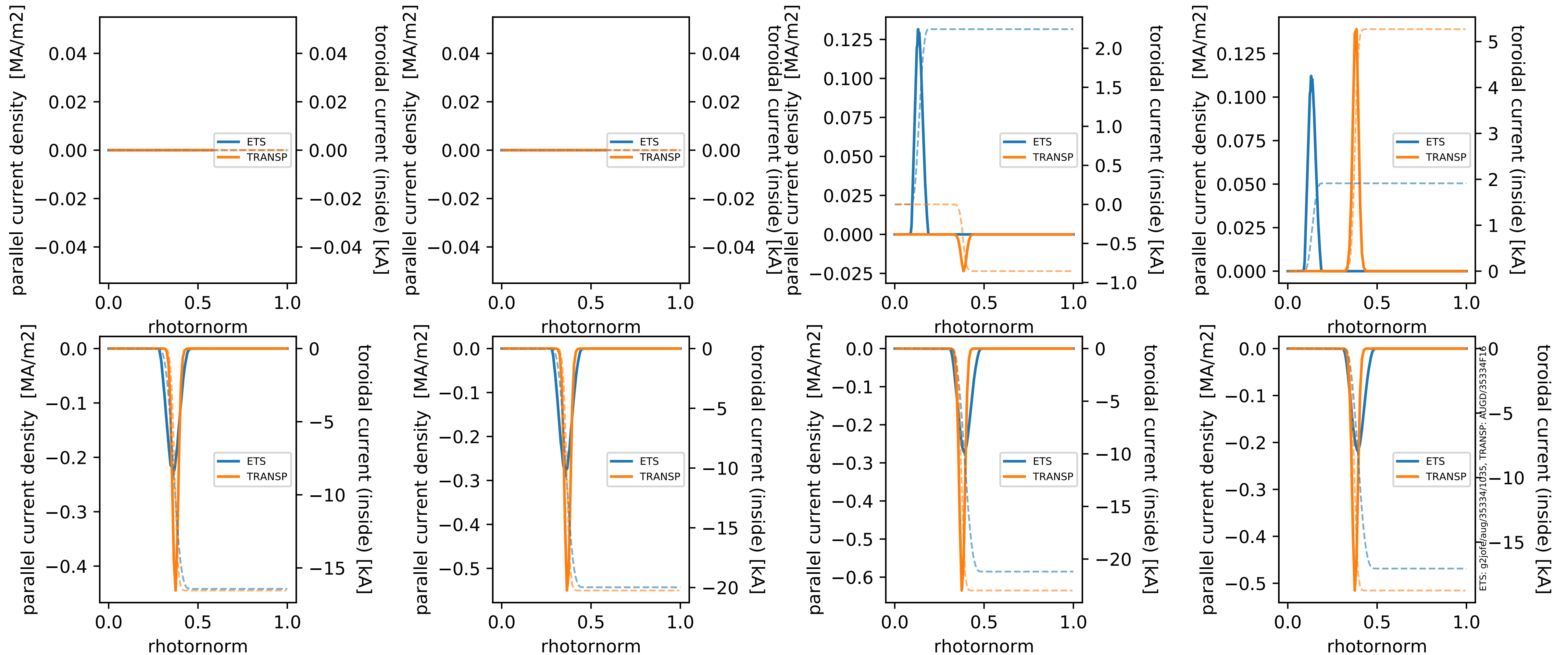
thermal profiles, time: 1.21 [s] (TR: 1.21 [s])



EC verification - ETS/TRANSP benchmark

ETS: GRAY
TRANSP: TORBEAM

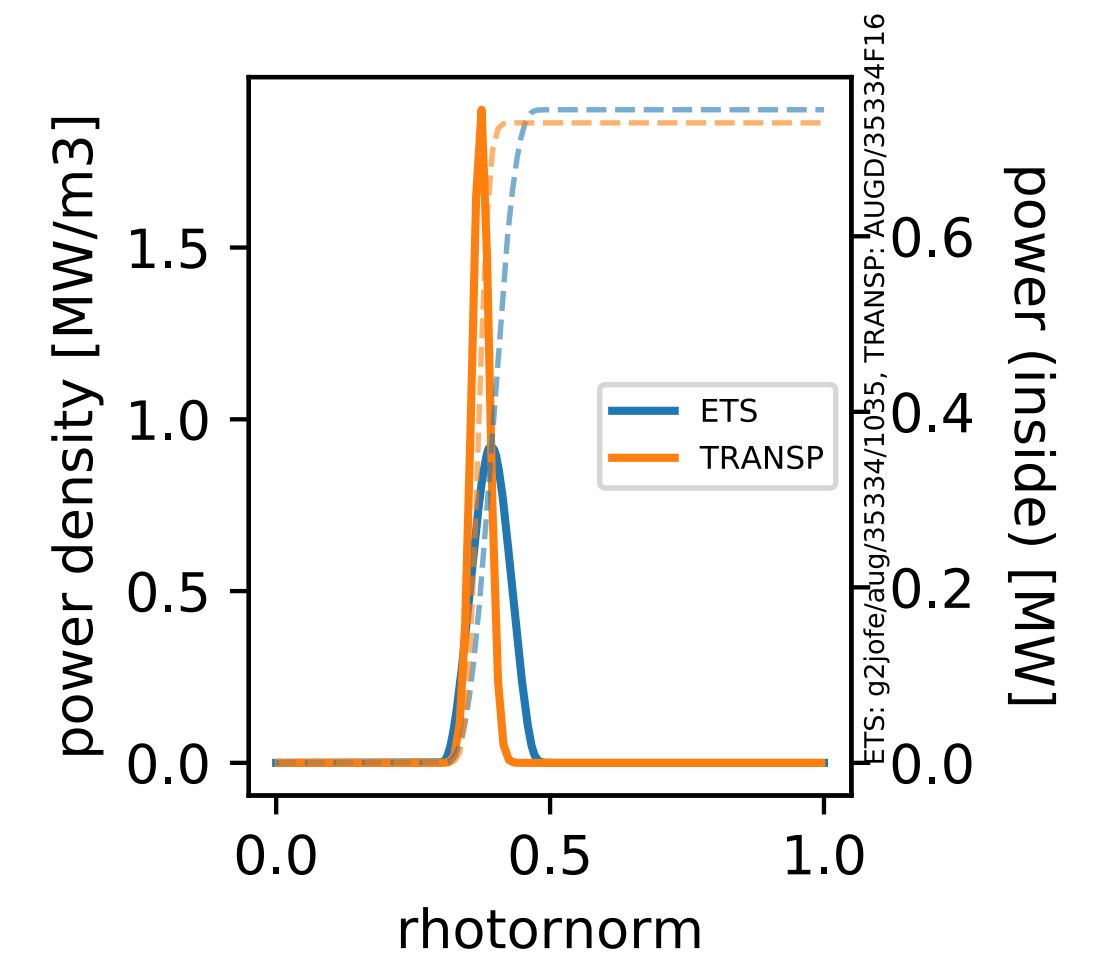
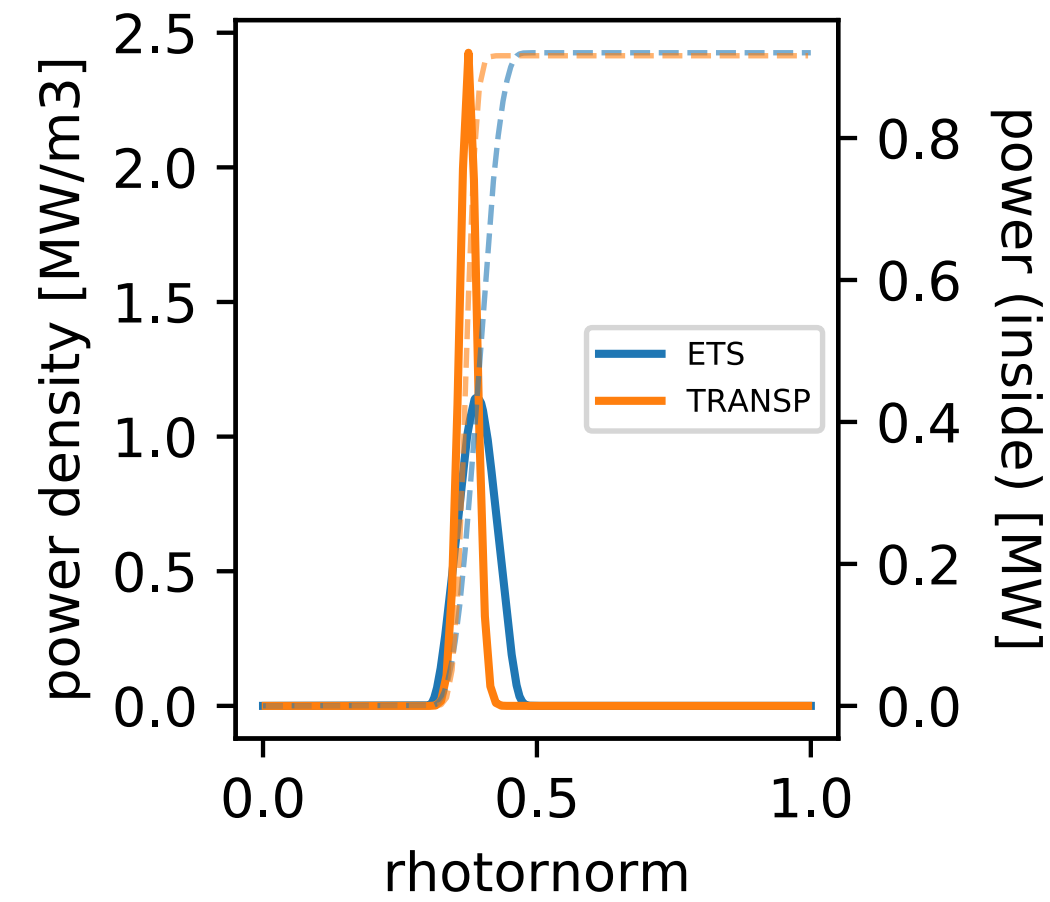
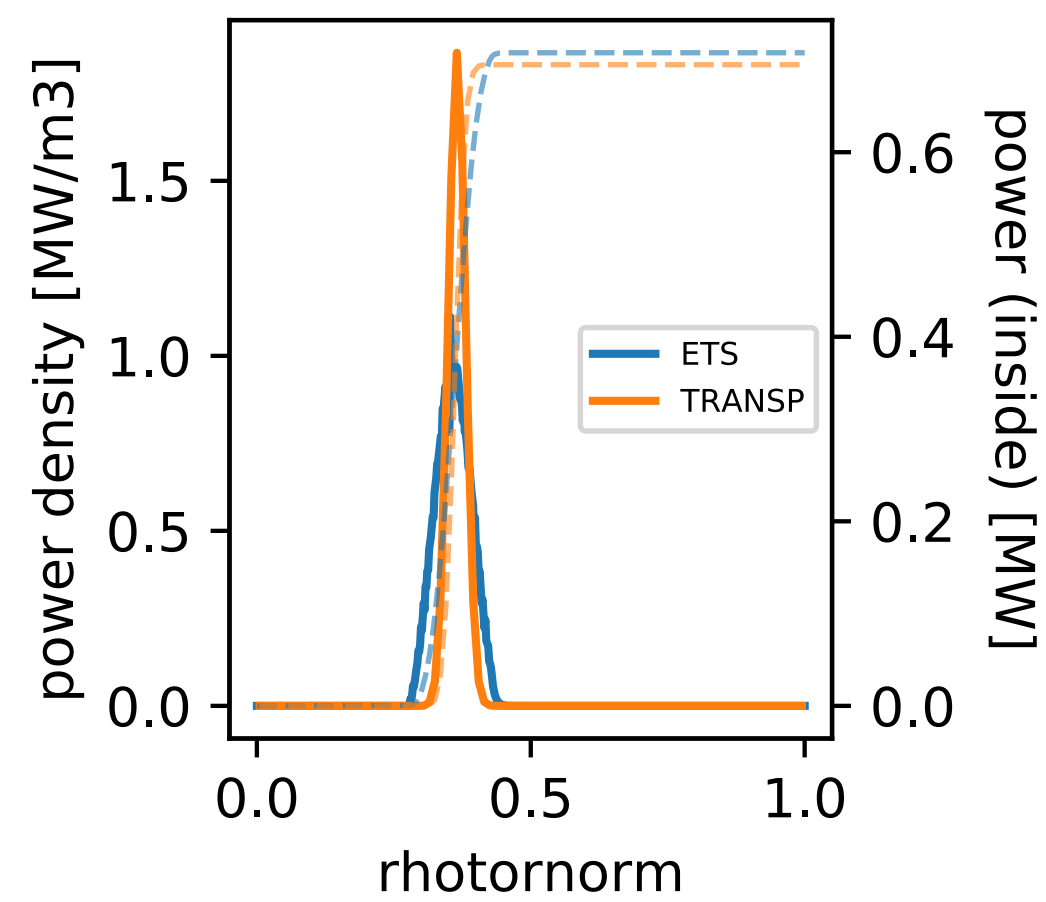
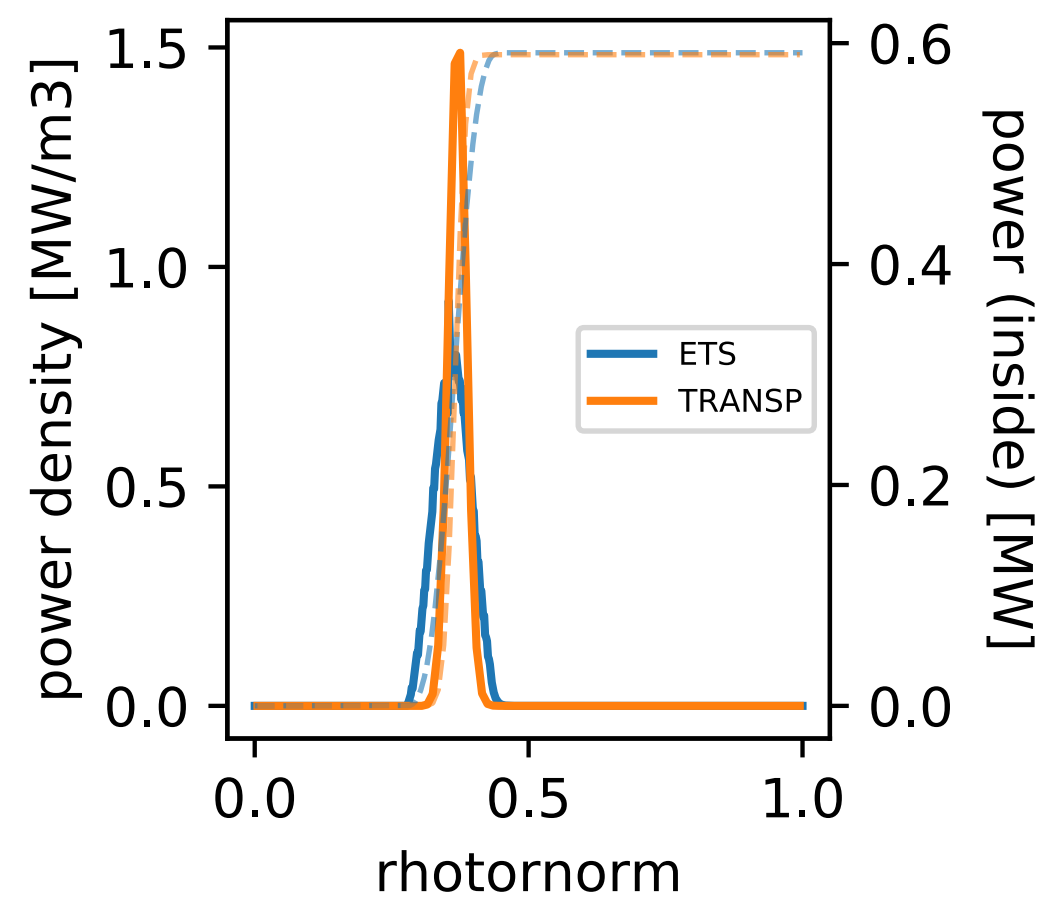
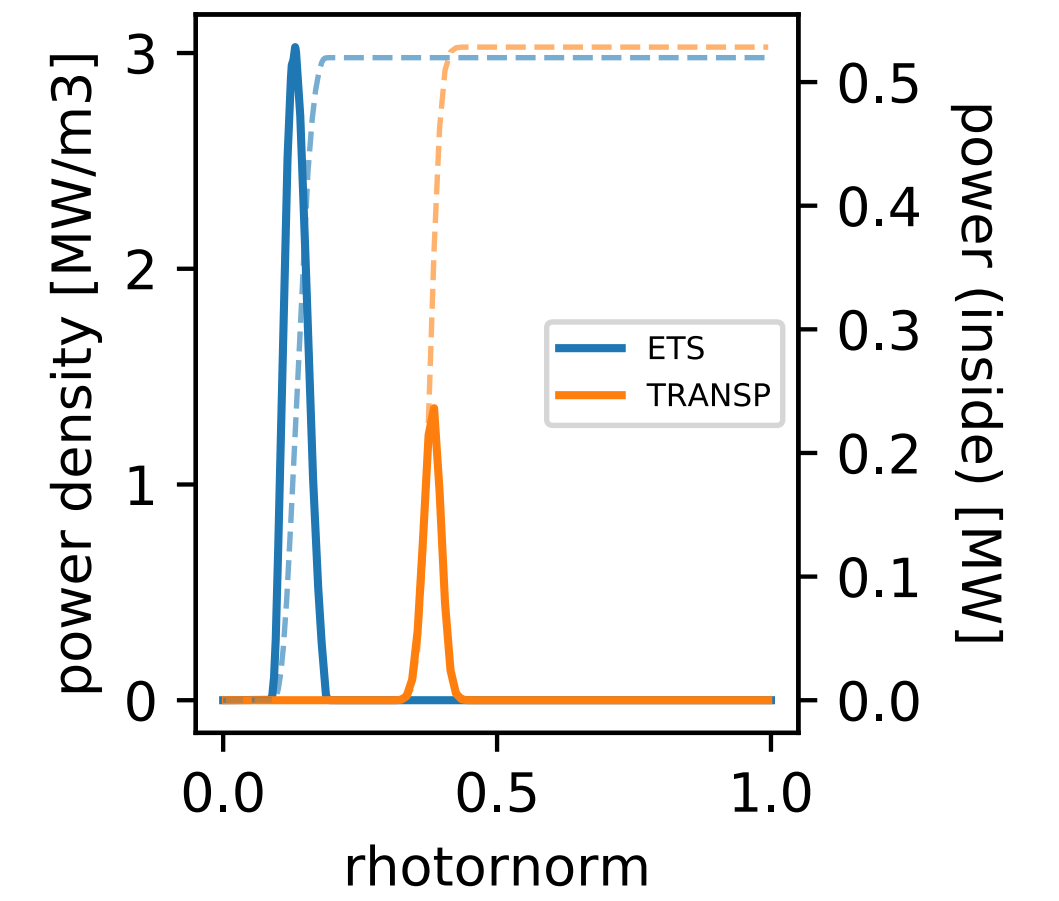
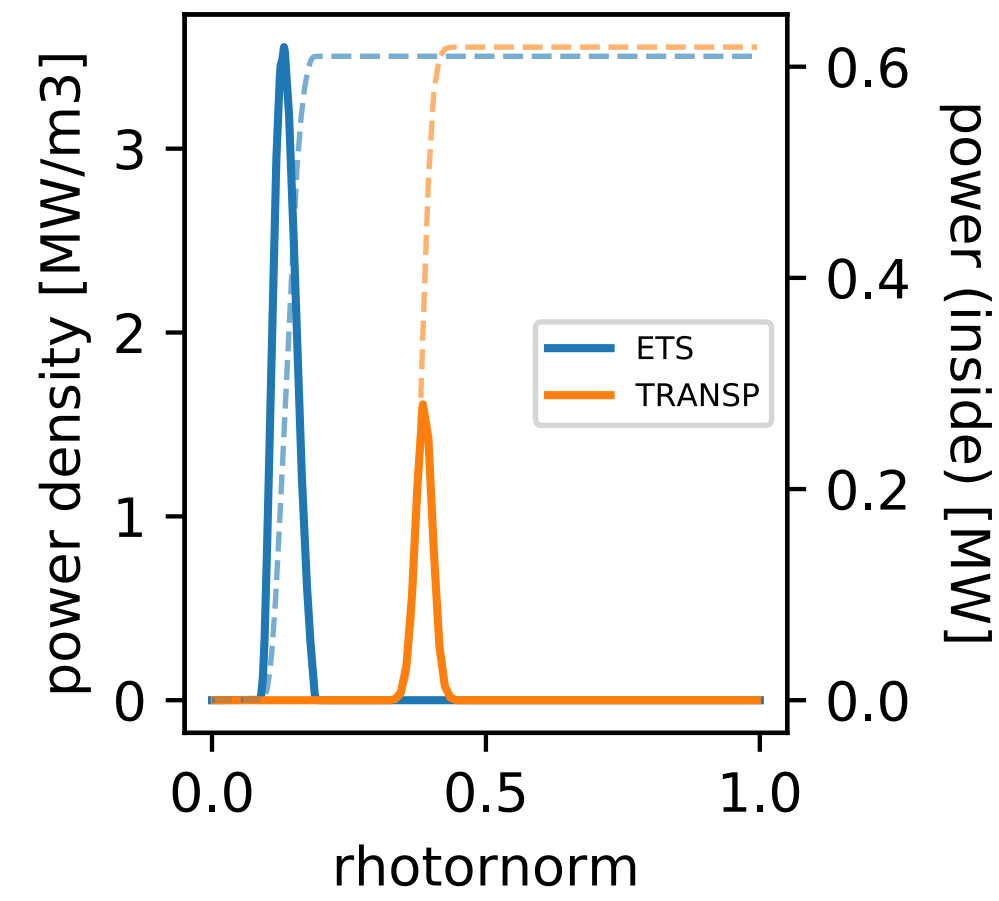
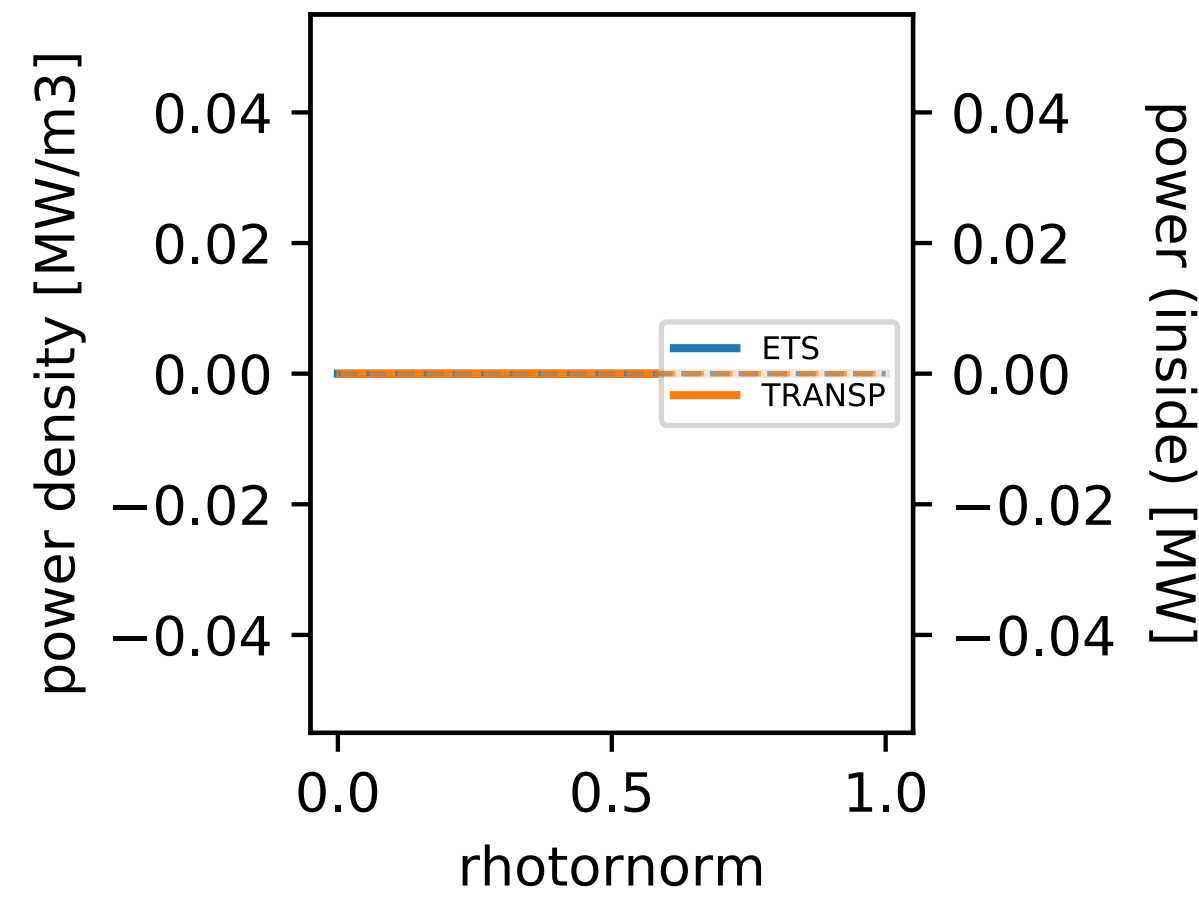
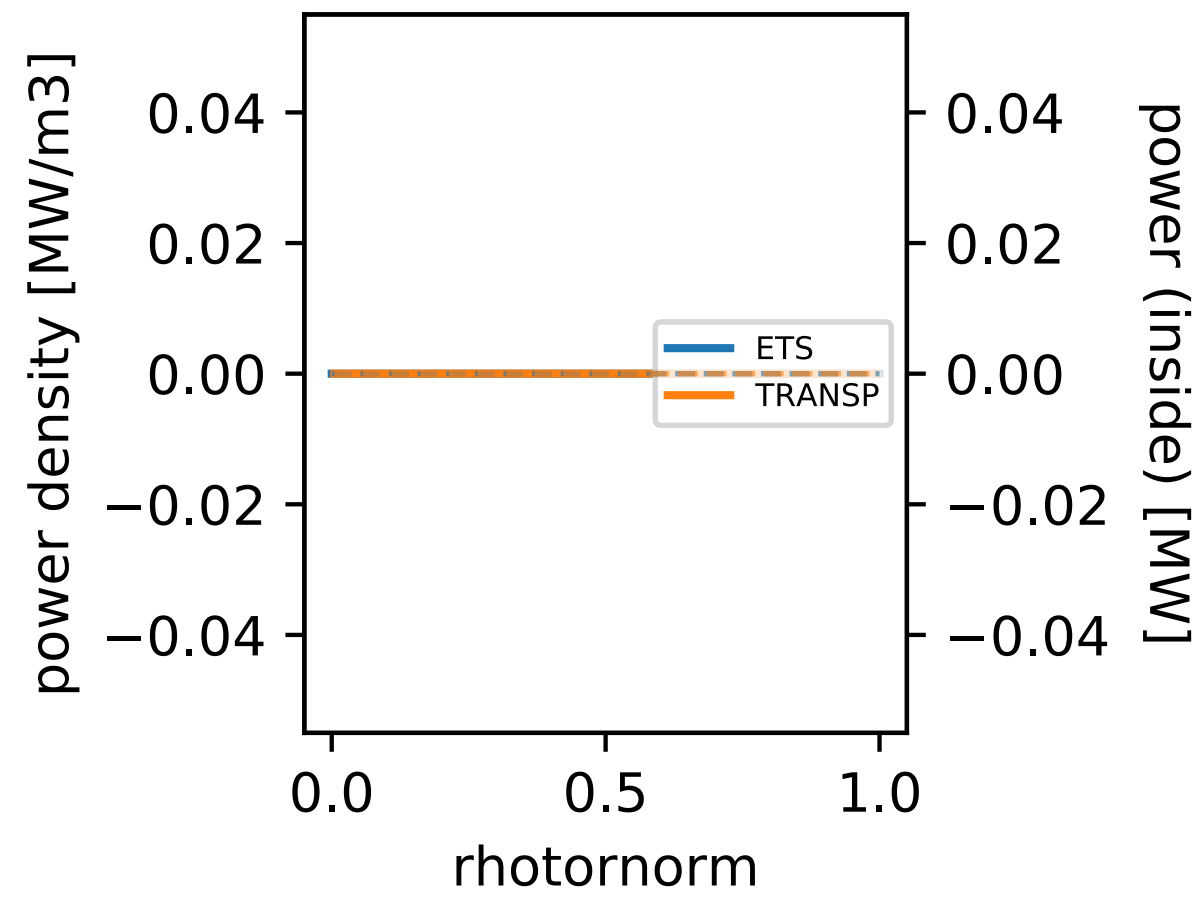
EC parallel current density, time: 1.21 [s] (TR: 1.21 [s])



GRAY: relativist w/asym exp., gaussian beams, radial/angular #rays 16/32, order larmor exp. 5

EC verification - ETS/TRANSP benchmark

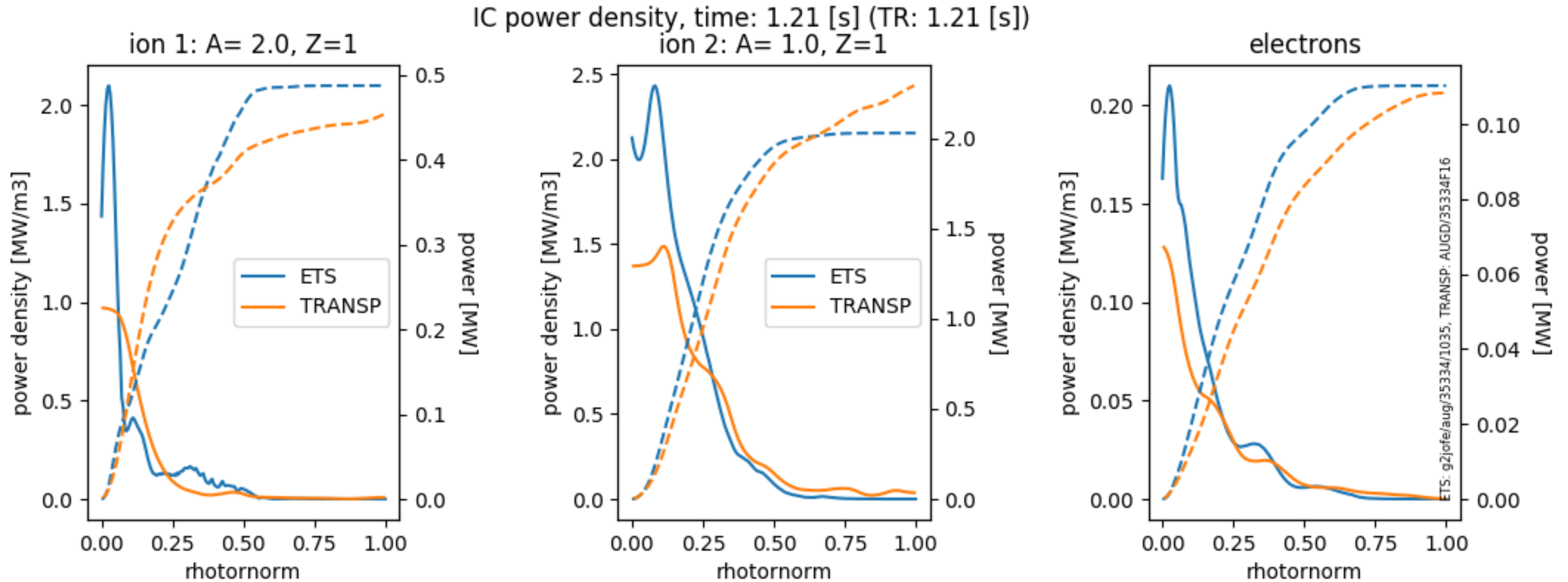
EC power density, time: 1.21 [s] (TR: 1.21 [s])



ETS: g2jofe/aug/35334/1035, TRANSP: AUGD/35334F16

IC verification - ETS/TRANSP benchmark

Power = 2.8MW
(in antenna I)

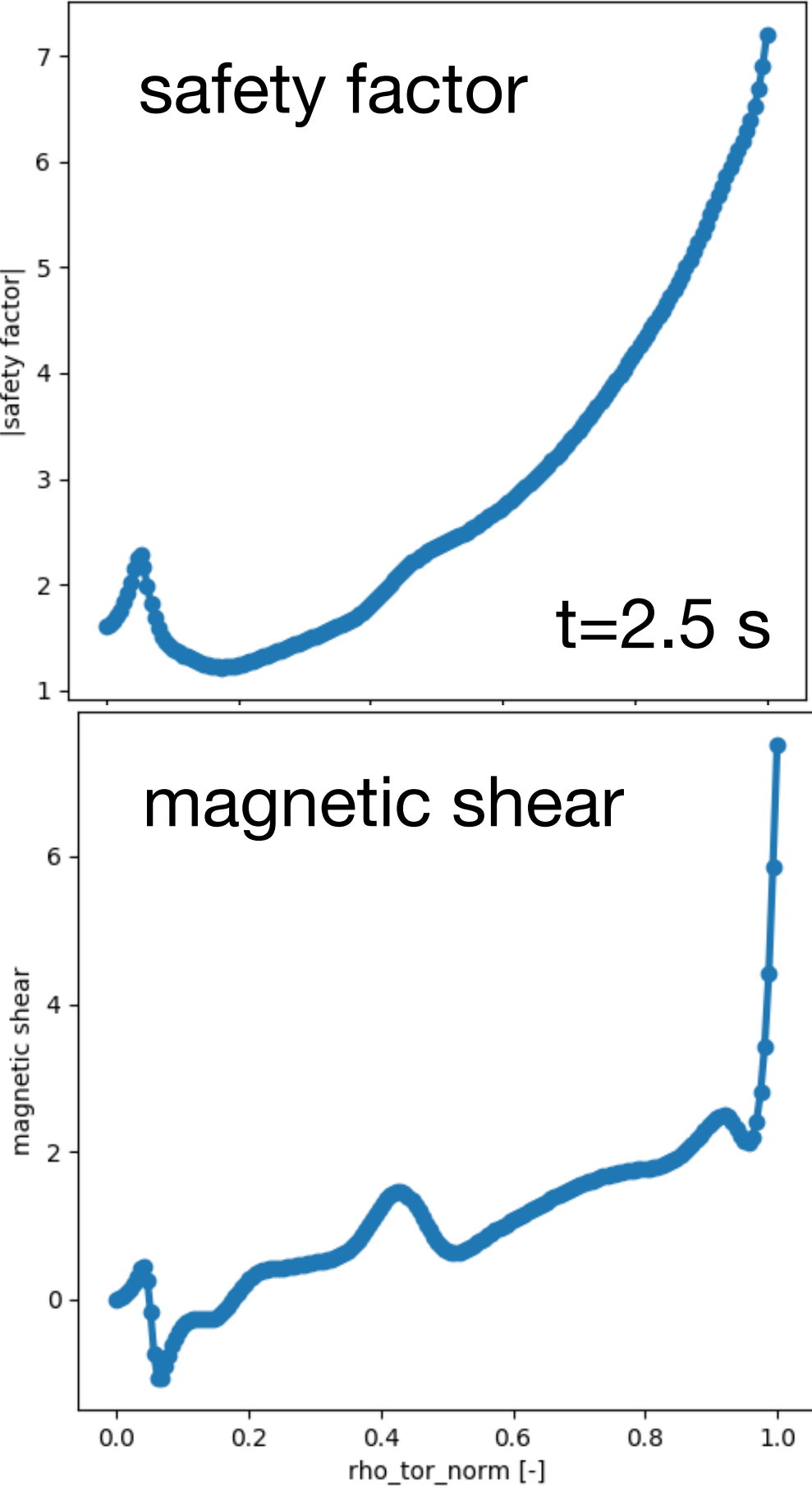
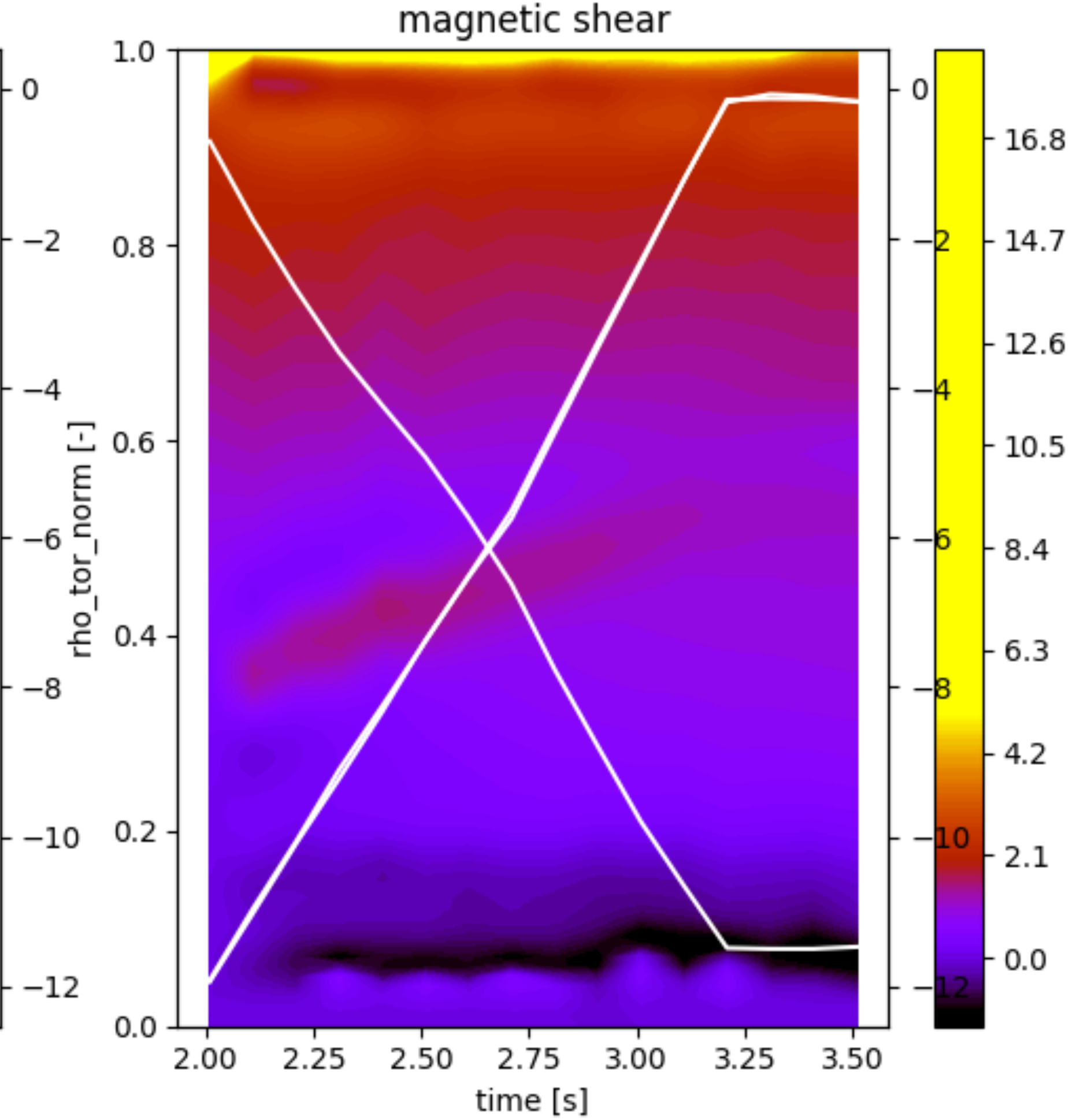
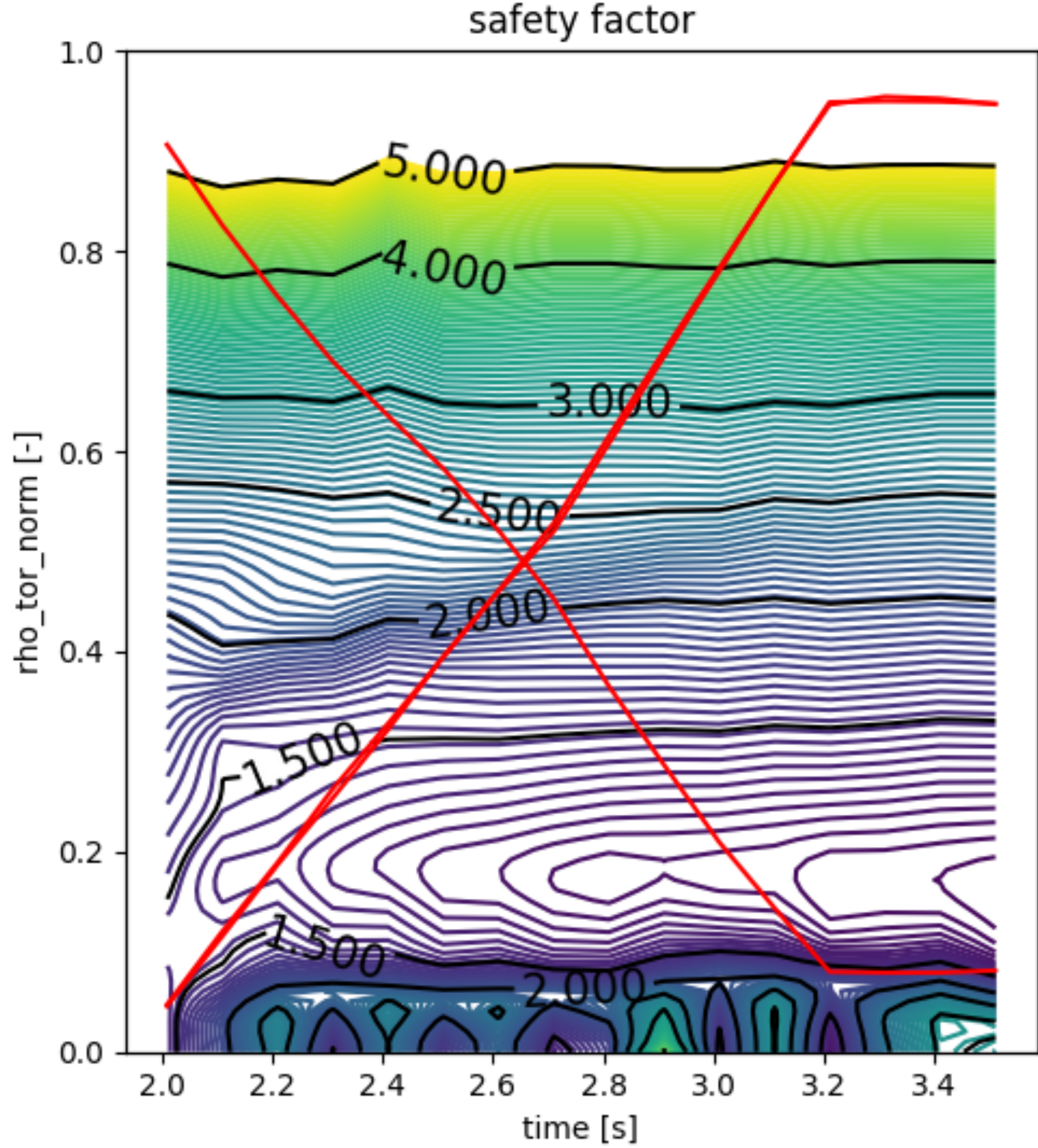


ETS: CYRANO/STIXREDIST, TRANSP: TORIC

Cyrano: Ntor=12, Npol=64, iterate_teff=false, target_ion=Hmin, no fast particles

Current evolution under the action of ECCD

old run,
new one still running...



Next actions

Short-term

- repeat the simulations with the last version of ETS (probably I will wait for Dimitriy)
- review the ICRH settings and spend more time on the IC verification/benchmark
- use ETS output for linear stability assessment of the TAE (WPMST1)

Medium/long-term

- push for the parallelization of GRAY and CYRANO/STIXREDIST (or FOPLA) to speed up the simulation (eg. in TRANSP 16 cores were used for TORIC)