

WIP 24 Novembre 2014

Debriefing della sessione sperimentale:
M03 (MHD limiting cycles)
di Giovedì 20 Novembre

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ER project di riferimento:

Magnetic reconnection in fusion plasmas

BACKGROUND

Deliverable 1: Experimental study of tearing mode complex behaviour in FTU, determining the role of interaction between islands with different helicities

Exp. done at $q_a < 3$ to exclude (3,1) - (2,1) interaction:

- 38419, 20, 22, 23, 26, 27 at 3.6T/0.7MA.

New experiments:

- Cross $q=3$ in the presence of cycles (I_p ramp)
- Links with ST precursor (soft-x were missing)

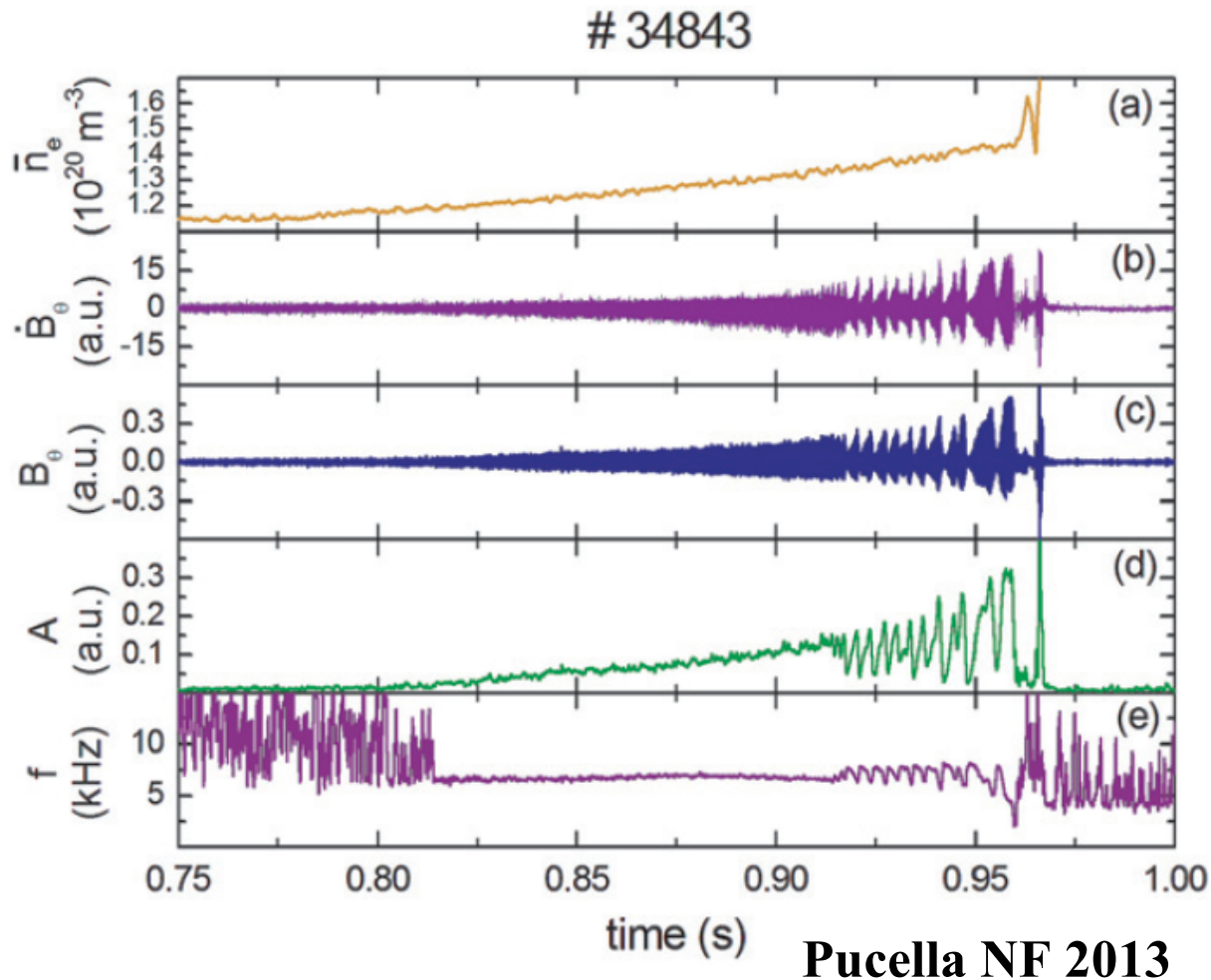


Figure 9. Time traces of some relevant quantities for the MHD activity for a specific discharge with $B_T = 4.0$ T and $I_p = 700$ kA: (a) central line-averaged density, (b) output from the pick-up coil, (c) poloidal magnetic perturbation, (d) mode amplitude, (e) mode frequency.

Saturation and limit cycles

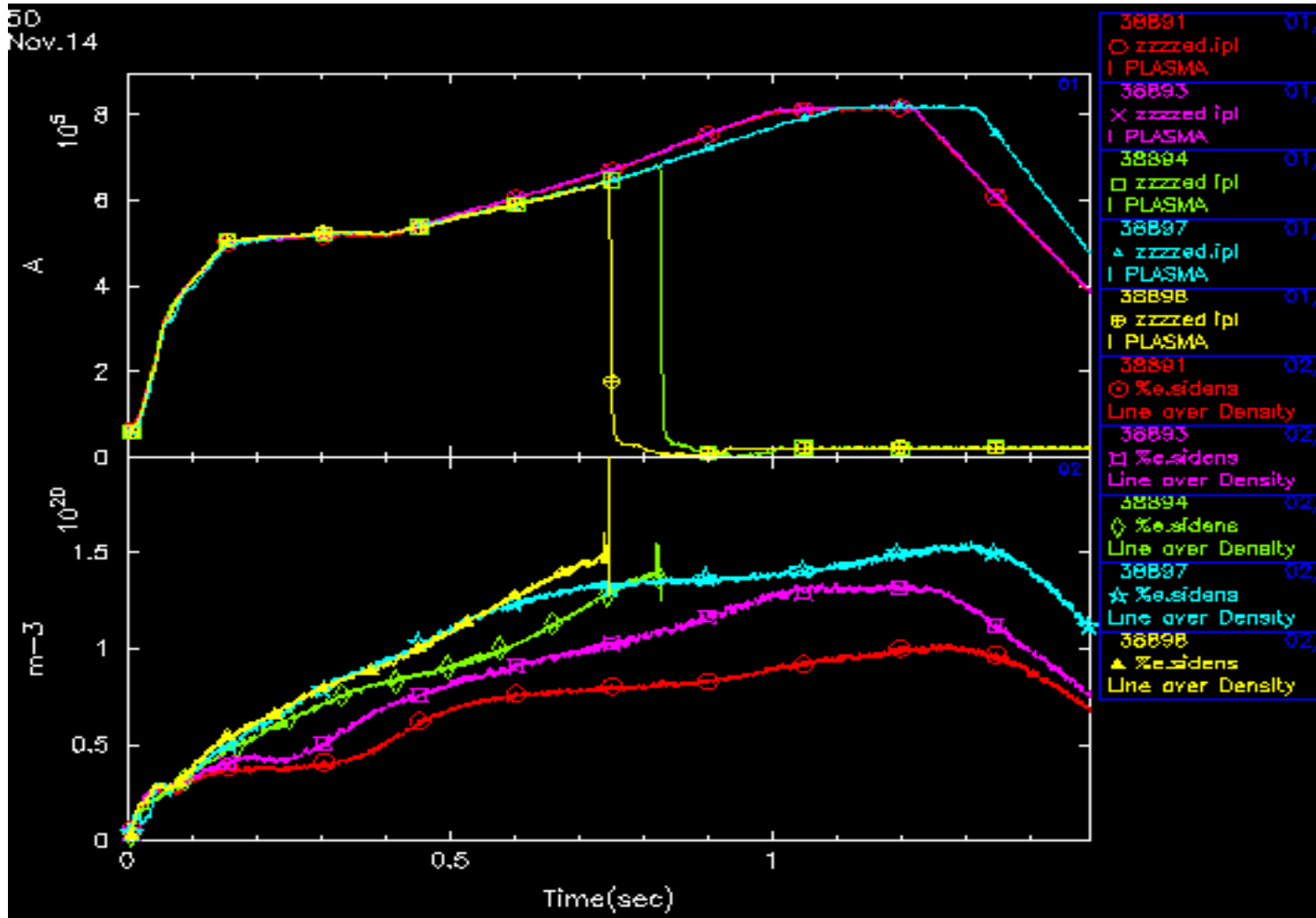
- What is the role of 2/1 – 3/1 mode coupling?
- What is the role of error field?
- What is the scaling of critical amplitude?
- How does the mode structure change during cycles?

PULSE PLAN

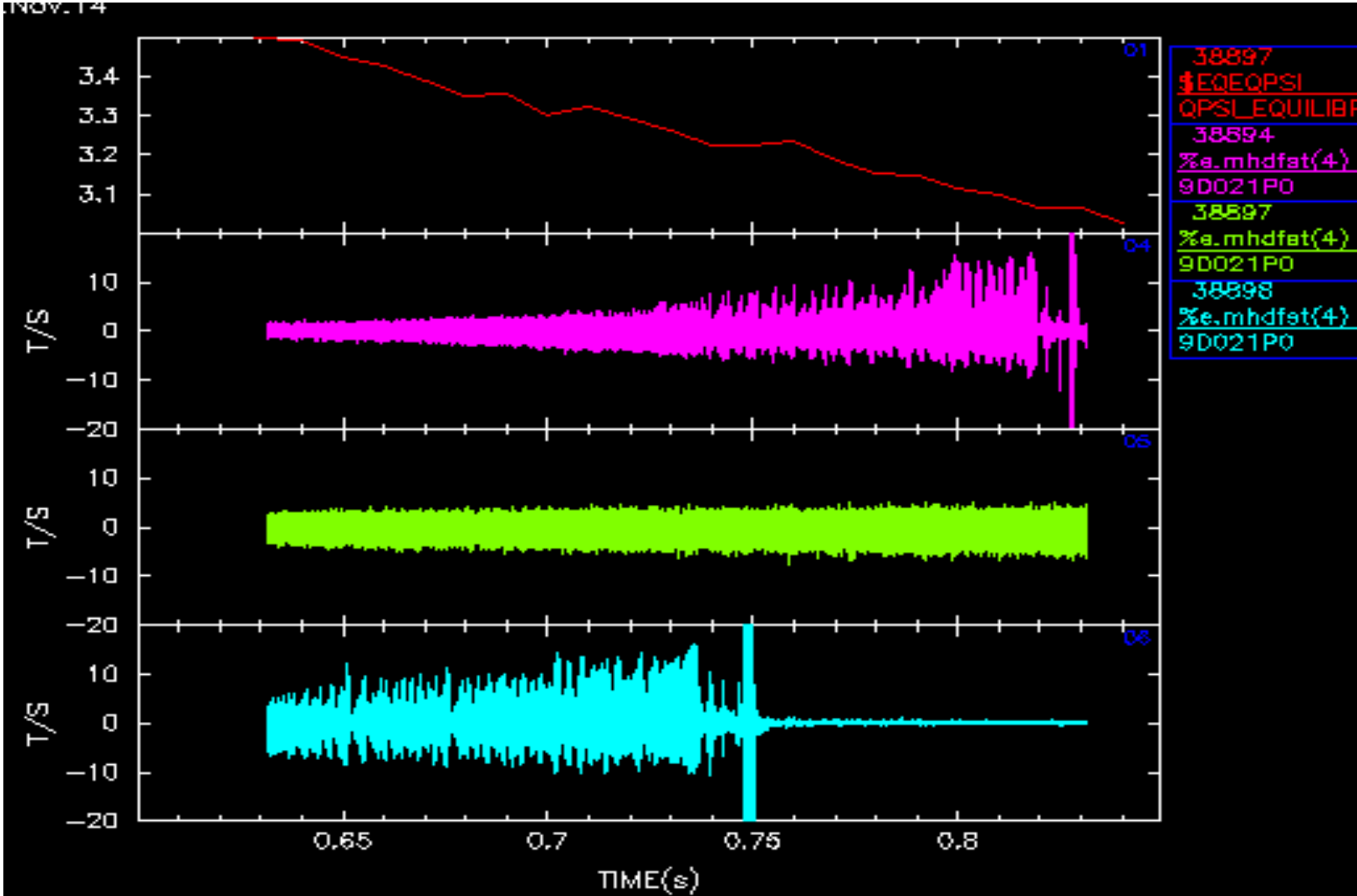
I_p ramps to 0.8 MA at 4T or to 0.7 MA at 3.6T (decide with RdO)

- B=0 pulse (1)
- Adjust I_p ramp (3)
- Increase density to generate MHD cycles during the ramp (6)
- Recovery pulses in case of disruptions (3)
- Low density, low I_p pulses for mode locking without cycles (6)

Results



Results



PULSE LIST (B=4T, 0.5-0.8 MA I_p ramps)

- 38884 Zero
- 38891 cross $q=3$ at low density
- 38893 cross $q=3$ at $n=1.2E20$ (no MHD cycles)
previous: $q=3$ crossing at 0.8s
next: $q=3$ cross at 0.9 s
- 38894 cycles and disruption just before $q=3$
- 38897 cross $q=3$ at $n=1.5E20$ (no MHD cycles)
- 38898 cycles and disruption just before $q=3$

- Next request: repeat 38897 with more gas