

# XP 805 Designed to Isolate the Presence of an $n=2$ Error Field

## Method

- Apply  $n=2$  Error Field of Varying Phases and Magnitude
- Look for Asymmetric Response in (*and increase of*) Pulse Length and Plasma Rotation.
- Mimics procedure that has found the  $n=3$  EF in XP701, XP823

## Status

- Day was plagued by irreproducible startup and early MHD.
- Two phase scans were completed:
  - 150A: No strong effect on performance
  - 300 A: Some indication of a favorable Phase

## Plan

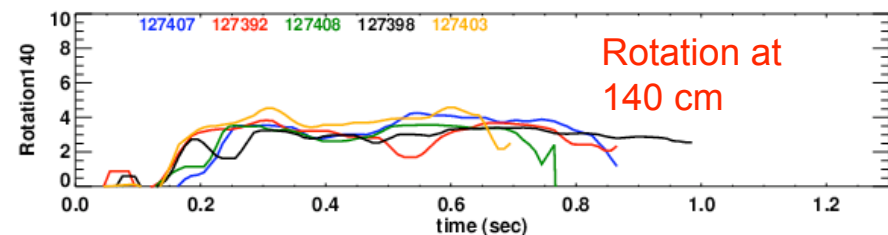
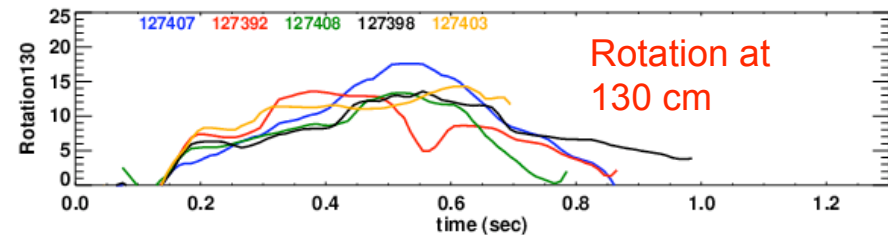
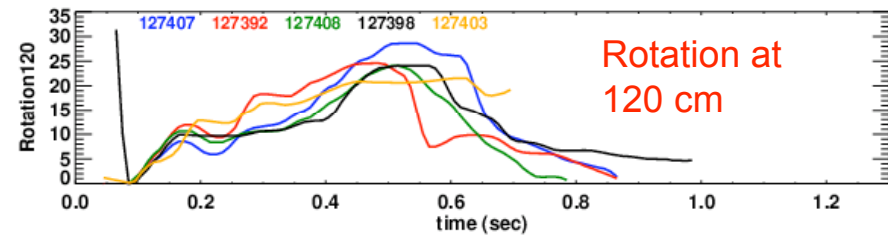
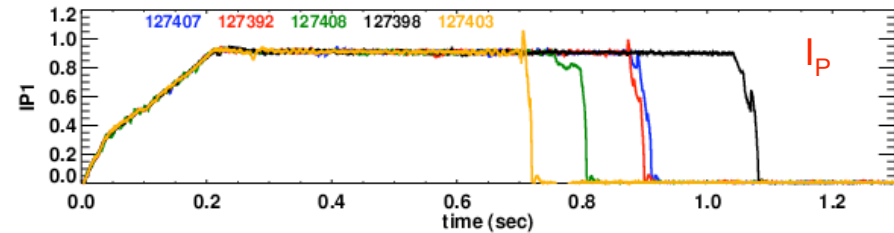
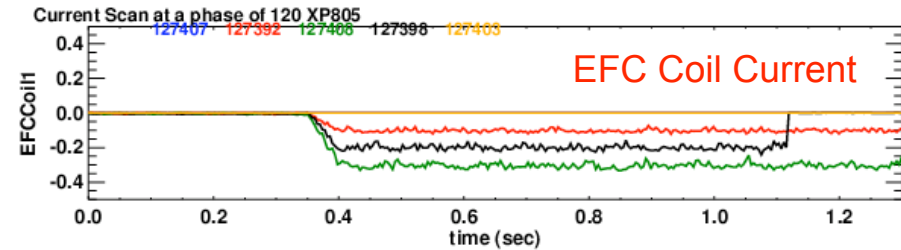
- Run remainder of XP in tandem with the other EF proposal (XP823) to benefit from similar discharges and methods.
- 1/2 day on schedule in last week of April

# Evidence of “Good Phase” found...needs to be confirmed

## Consider Shot 127398

- Longest Fiducial up to that date
- Rotation increases across the profile when field is applied.
- Tolerates the rotating mode for longer.

*Need to confirm this trend!*



# XP to examine the small island physics of the 2/1 NTM

## Method

- Trigger the 2/1 mode, then step down NB power to restabilize mode.
- This was accomplished in 1 (post-lithium shot in CY2007 run)
- Data to be compared with DIII-D 2/1 rampdown data.
- Key to i) Stay in H-mode and & ii) Avoid mode locking before restabilizing.
- Vary the rotation with  $n=3$  braking, and vary “drive” with an  $I_p$  scan.

## Status

- This was essentially the first XP of the year, and was plagued with technical problems (NBI, ground loops,...).
- A number of ramdown attempts were completed, all of which ended with a mode-lock before island was restabilized.

## Plan

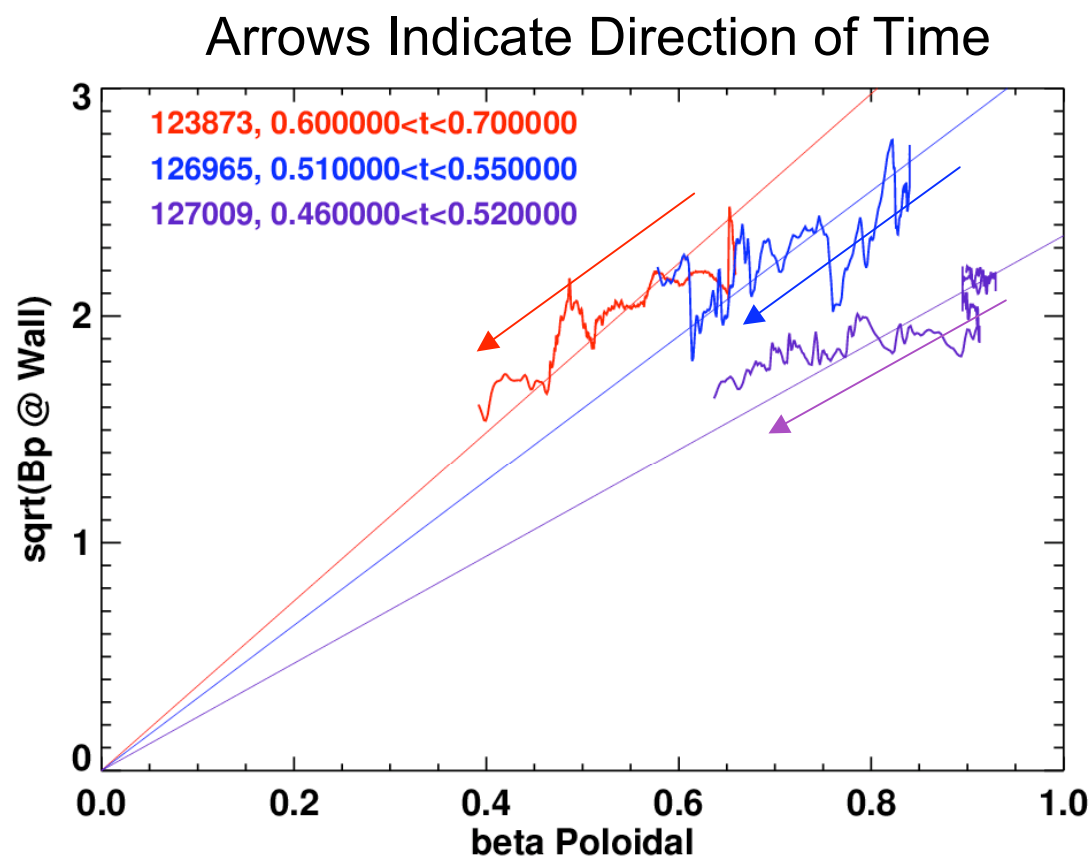
- Need EF correction in order to allow a lower locking threshold. These EF correction techniques are now being optimized in the MHD (XP XXX) and ASC groups (XP 823), with improved feedback control.
- Request a repeat of the run day, once the feedback optimization is complete.

# Data collected was useful for demonstrating the neoclassical nature of the mode

- NTM should have island width proportional to  $\beta_P$

$$w \propto \sqrt{\tilde{B}_P}$$

$$w \propto \beta_P$$



123873: Survived into rampdown phase in CY2007

126965, 127009: Locked in CY2008

# XP Designed to study the role of n=1 error fields at high and low rotation

## Method

- Trigger the 2/1 mode at high and low rotation, with and without n=1 error field
- Maintain H-mode and avoid mode-locking.
- Determine if the threshold in  $\beta_N$  changes...important for assessing role of EF in plasmas without momentum input (read: ITER)

## Status

- This was essentially the second run day of the year, and was plagued with technical problems (NBI, ground loops,...).
- However, limited data was collected.
- Lack of error field correction made interpretation difficult

## Plan

Beta-N limit changed with EF... or did it.

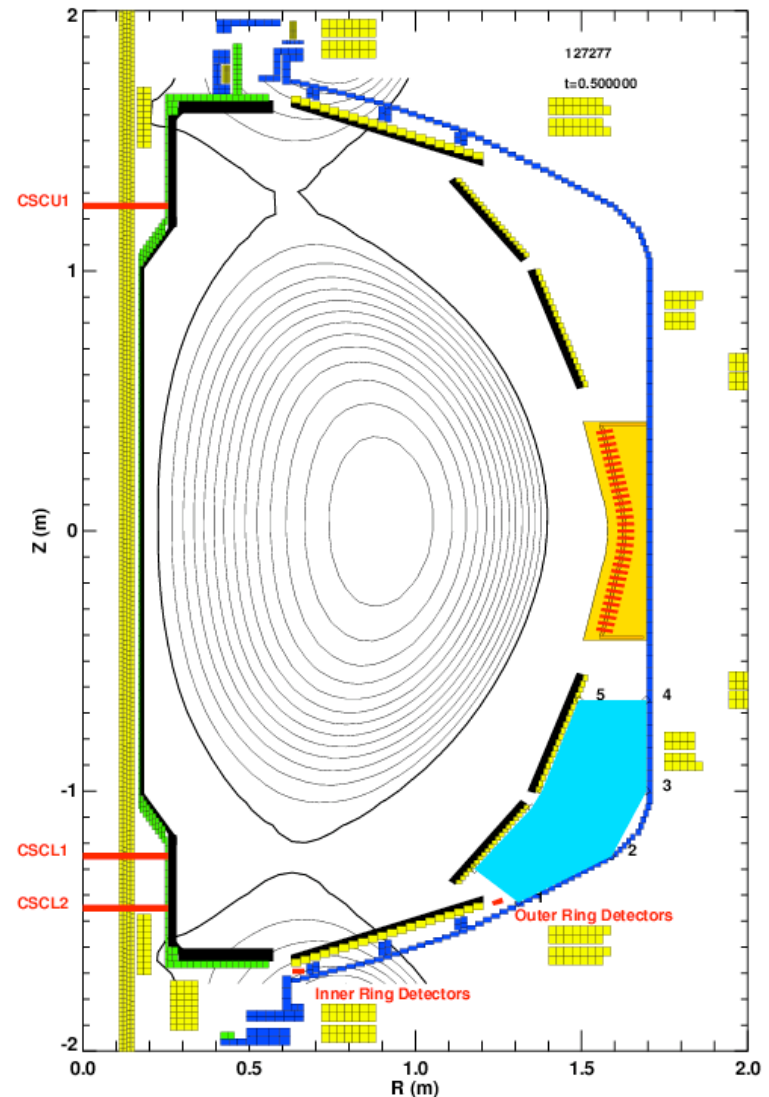
# Upgraded Halo Current Diagnostics Significantly Improve Measurements

## Method

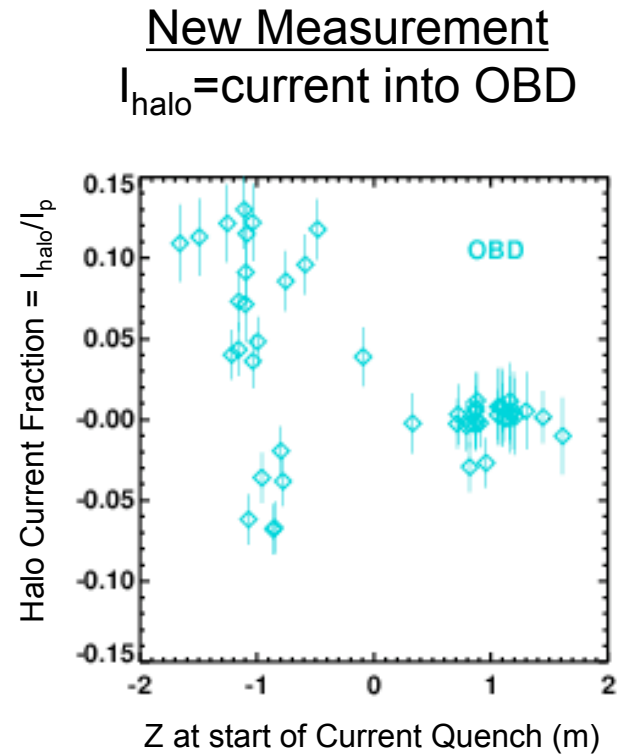
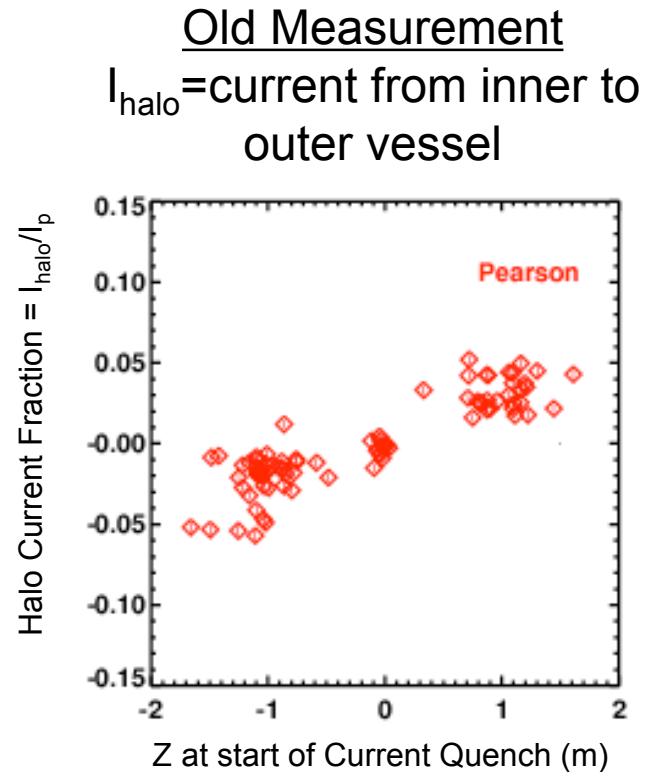
- Array of 12  $B_T$  sensors
  - “Inner Ring” Inside of OBD
  - “Outer Ring” Outside of OBD
- Treat as sections of a partial rogowski coil.
- Use in combination with existing measurements.

## Status

- Collecting data on every shot.
- Please make lots of disruptions!



# New Sensors Increase the HCD Estimate By a Factor Of Two



Interpretation: HCF much larger when current path doesn't include the CHI buswork