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Active Control of Rotation Damping in RWM Plasmas

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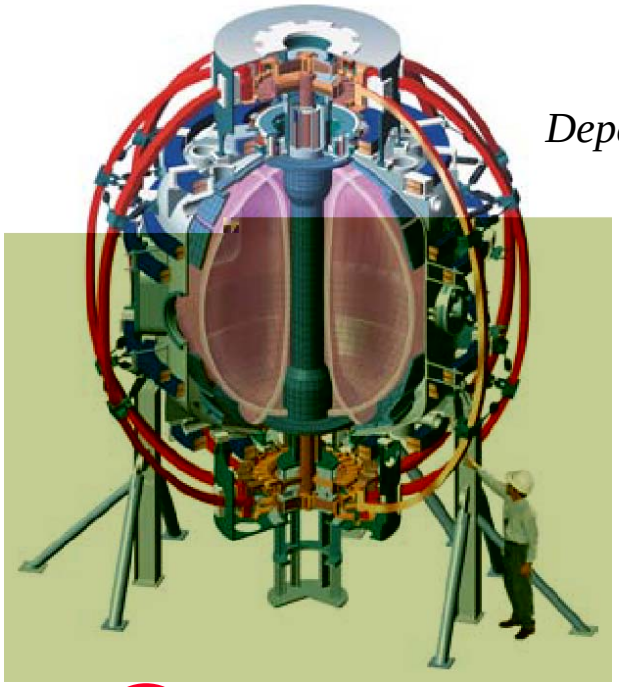

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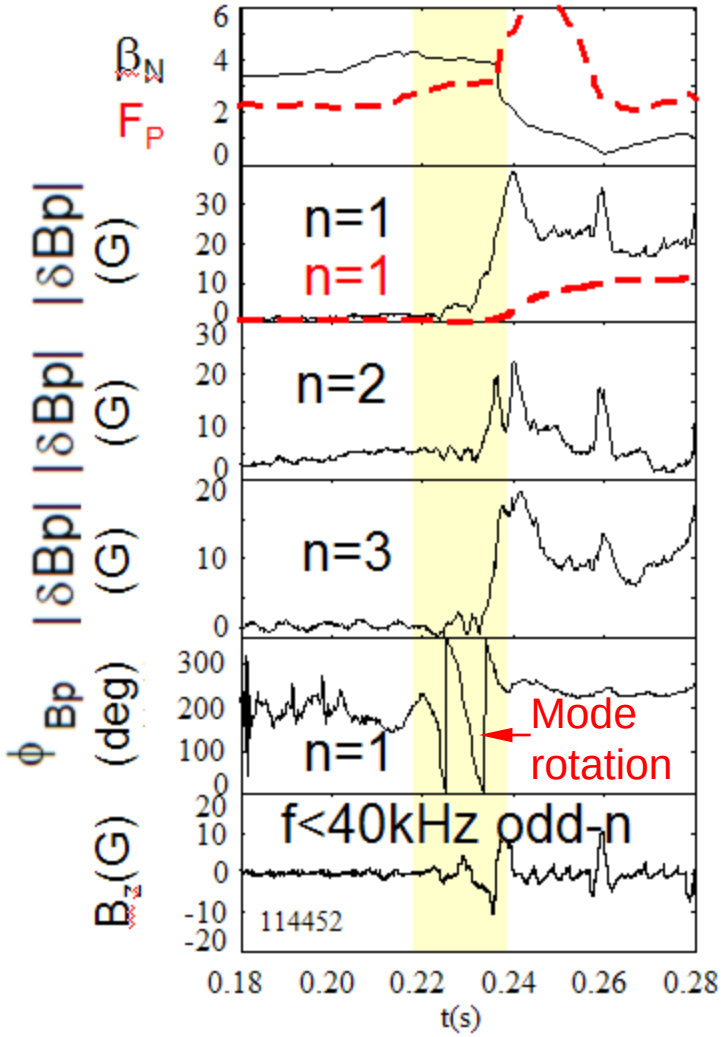
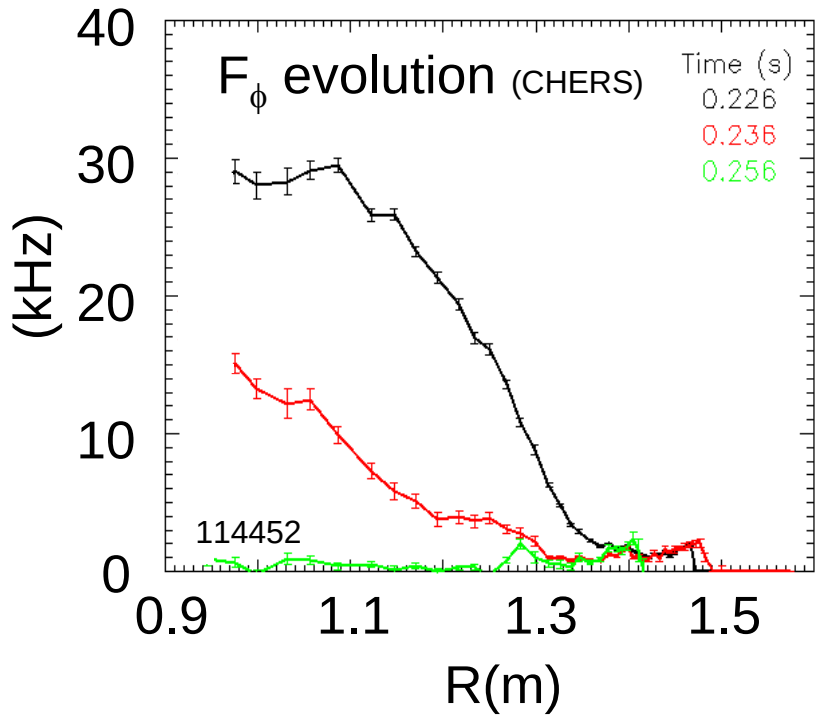
Longer RWM Growth Period Desired to Investigate RWM Rotation Damping

- Motivation
  - RWM induces fast global rotation damping
  - Slower growth, saturated, or stabilized RWM allows detailed investigation of rotation damping dynamics
  - Obtain data needed to complete thesis
- Goals
  - RWM growth and rotation control by new active coils
  - Acquire more CHERS data during RWM activity

RWM Growth Suppressed During Mode Rotation





We can …

- Study plasma rotation due to applied *n*=1,2 field
- Control mode rotation using CY2005 RWM coil capability

Active Rotation Control Allows a Broader Study of Rotation Damping

- Study rotation damping physics due to applied field
  - Create marginally unstable target plasma (β_N above $\beta_{N\ nowall}$)
  - Modify plasma rotation by scanning applied n = 1, 2 (3?) perturbation
  - Yields a study of rotation damping due to resonant field amplification
- Study rotation damping during RWM activity
  - Control RWM rotation
    - Scan pre-programmed applied field perturbation
    - Optionally use active feedback capability
- XP can be completed in 1.5 run days
  - Run over different days to change applied field parity

Active Rotation Control XP: Requirements

- Prerequisites
  - MHD spectroscopy XP
- Required diagnostics
  - CHERS toroidal rotation measurement
  - RWM sensor array measurements
  - Toroidal & toroidal Mirnov arrays
  - Thomson scattering
  - Neutron detectors
- Desired diagnostics
  - USXR
  - MSE