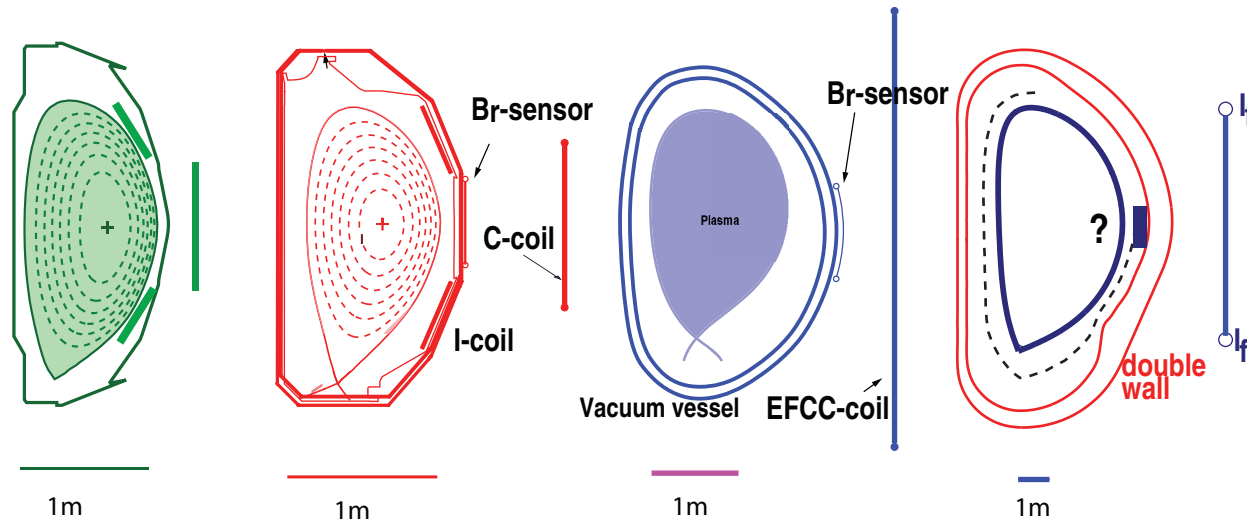


Possible subjects for RWM Feedback experiments

- Joint explorations by DIII-D/NSTX group

- RWM Controllability with External Coils and Extrapolation of the ITER Performance
- Comparative Study of NSTX “Thick shell” and DIII-D “Thin shell” with ELM Induced RWM



| | NSTX | DIII-D | JET | ITER |
|------------------------|-------------|--------------------------------|--------------|---------------|
| non-axisymmetric coils | External(6) | External (6) internal (6x2) | External (4) | External (9)? |
| R/a | 1.27 | 3.1 | 3.0 | 3.4 |
| R(m) | 1.10 | 1.69 | 2.85 | 6.35 |

RWM Controllability with External Coils and Extrapolation of the ITER Performance

- A joint exploration by DIII-D/NSTX group -

- **The DIII-D / NSTX are uniquely positioned for addressing crucial issues of RWM feedback.**
- **ITER external kink environment is a more complex geometry than DIII-D with the vacuum vessel as the stabilizer.**
- **NSTX: a double-shell like structure because of the additional complexity by the passive stabilizer plates.**
- **The different mode structures DIII-D/NSTX by aspect ratio difference will assess the robustness of RWM controllability.**
- **Proposition:**
 - To test external control coil performance in RWM stabilization in both NSTX and DIII-D in order to make reliable extrapolations to ITER (assuming no internal coils are added).**

- **Control methods identical for both devices, with flux sensors that are less sensitive to non-RWM phenomena and compensation logic (proposed by Y. Liu),**
 - assuming the performance comparison with Bp sensors to be carried out
- **Benchmarking / coefficient-setting with the same codes to the two different devices.**
MARS-F, VALEN, Morrell-Ming code
- **Magnetic breaking in NSTX (like what was done last year on DIII-D) to observe evidence for direct RWM feedback. On DIII-D, rotation breaking with the counter beam line to match data set for comparison to NSTX.**
- **Using identical feedback controls and sensors in low rotation plasmas will**
add more confidence to extrapolate to the external coil control option in ITER

Comparative Study of NSTX “Thick shell” and DIII-D “Thin shell” with ELM Induced RWM

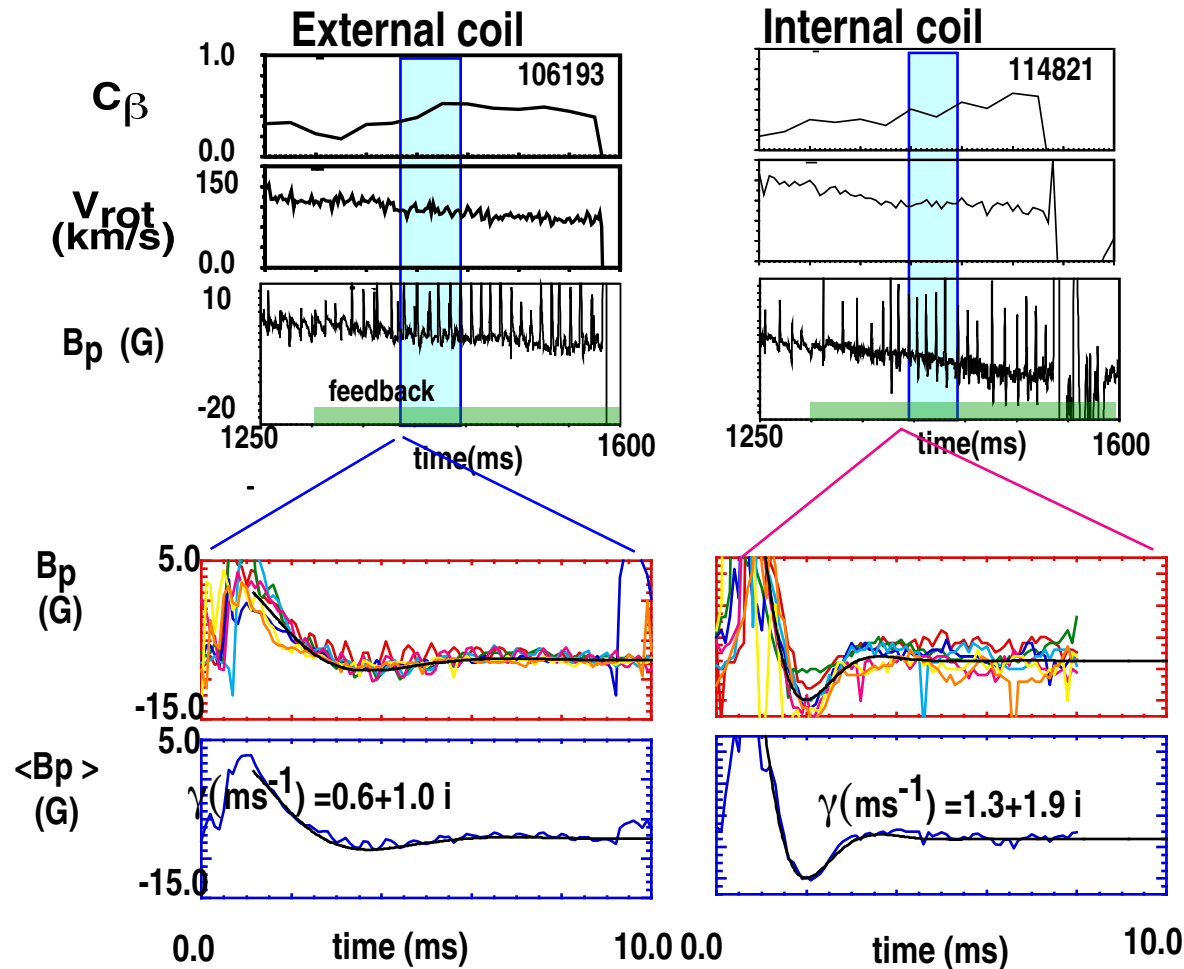
- ELM event induces **reproducible** $n=1$ RWMs
- Feedback reduces the RWMs activity
- Process reveals the resonant component of wall eddy current

Issues

- Observation of RWM time behavior

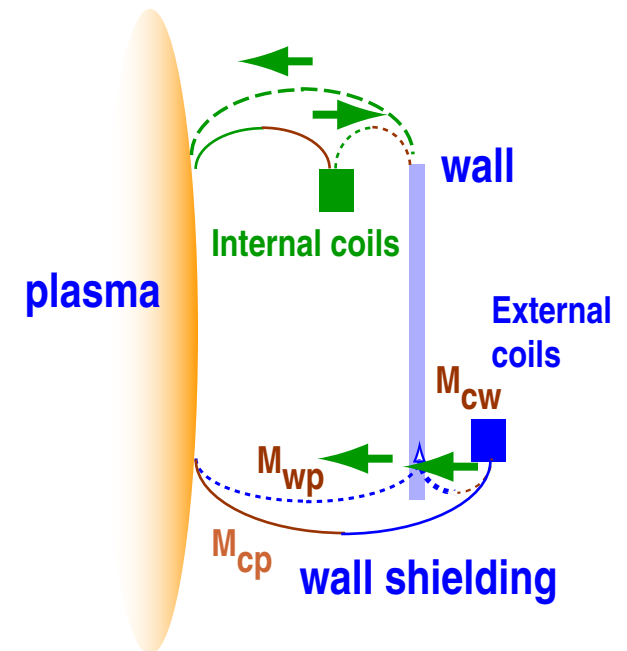
I-coils Are More Effective than C-coils in Reducing RWM in DIII-D

- $n=1$ component of ELM activity excites $n=1$ RWM



- Internal coil advantages

- Closer to Plasma
- Wall shielding can be compensated by higher feedback gain



- Feedback with internal-coils reduces $n=1$ RWM by a factor of 2 faster than with C-coils