

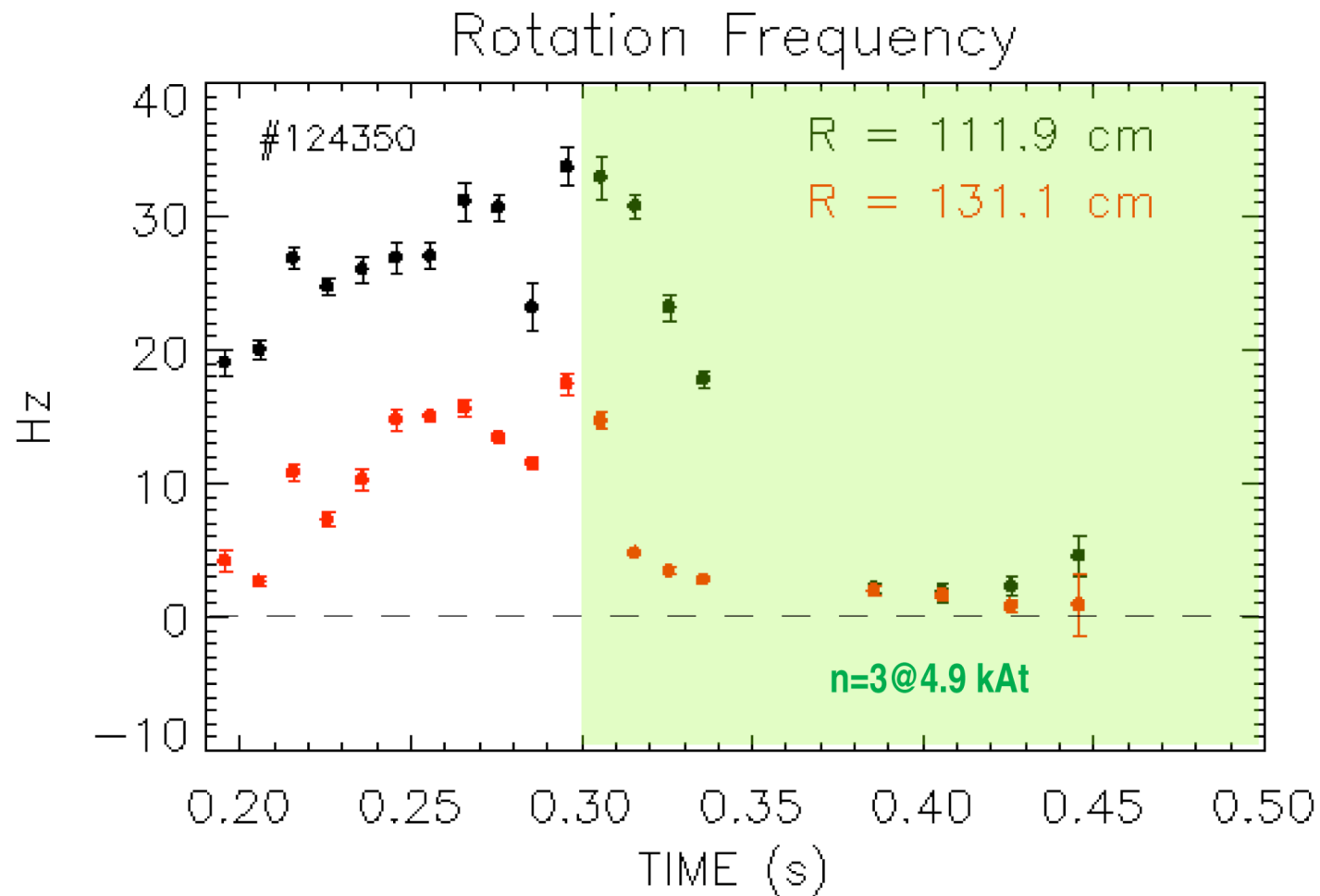
NSTX/DIII-D RMP comparison discharges to address ITER coil design issues

ITER RMP coil design decision hinges on differences in the toroidal flow damping rate with single-row versus multi-row coils

Experimental data is needed to compare with theory

- Acquire resonant and non-resonant toroidal flow damping data
 - Single-row external equatorial plane coils (NSTX & DIII-D) compared to single-row internal coil (DIII-D)
 - Compare data with ntv inverse aspect ratio scaling ($\epsilon^{-3/2}$)
 - Obtain toroidal field scaling data (NSTX 0.5 T, DIII-D 1.9 T)
 - Obtain ntv density and ion temperature scaling data from NSTX and DIII-D

Rotation frequency approaches zero during RMP discharge with $n=3$ and 4.9 kAt



Preliminary NSTX rotation suggests a weaker dependence on n=3 RMP amplitude than in DIII-D

Reference parameters for RMP Control Coils on current tokamaks ⁽¹⁾ (rev. 1, Sept. 11, 2007)					
Indicator Name	DIII-D I-coil + C-coil 3 rows of 6 coils n=1 7.2 kA·t peak ⁽²⁾ 128947:02320	DIII-D I-coil + C-coil 3 rows of 6 coils n=1 6.5 kA·t peak ⁽²⁾ 128946:02500	DIII-D I-coil 2 rows of 6 coils n=3 3.9 kA·t (4.4 kAt n=1 C-coil) 126006:04400	DIII-D I-coil 2 rows of 6 coils n=3 4.0 kA·t (4.6 kAt n=1 C-coil) 125900:04400	NSTX RWM/EFC coil 1 row of 6 coils n=3 4.9 kA·t peak 124350
B_{res} [10^{-4} T] ⁽³⁾	3.1	3.0	6.5	6.2	5.6
B_{res}/B_0 [10^{-4}] ⁽³⁾	1.6	1.6	3.5	3.2	11.4
Radius for half B_{res} ⁽⁶⁾ [$\sqrt{\psi}$]	n.a.	n.a.	0.68	0.63	0.66
q at half B_{res}	n.a.	n.a.	1.25	1.33	6.0
B_{res} at q = 2 [10^{-4} T]	3.3	3.1	4.9	4.5	0.2
Non resonant Braking Factor [10^{-8}]	86.5	75.6	360	337 ⁽⁴⁾ (n≤10), 363 (n≤20)	4800 ⁽⁴⁾ (n≤10), 4920 (n≤20)
Edge Rotation Prior to RMP (km/s)	75	62	74	63	135
Minimum Edge Rotation During to RMP (km/s)	0	44	4	45	0
Core Rotation Prior to RMP (km/s)	242	277	207	no data	255
Minimum Core Rotation During to RMP (km/s)	24	165	-25	no data	0
Locked Mode	Yes	No	Yes (ctr-NBI phase)	No (ctr-NBI phase)	No

Notes:

- (1) Taken from experiments on DIII-D and NSTX for various operating conditions.
- (2) With combined n=1 I- and C-coil.
- (3) Taken on the q = 3 resonant surface.
- (4) 4200 from n=3 and 600 from n=9 with no other toroidal modes contributing significantly.