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XP proposal: study effects of toroidal rotation on dynamics of TAEs

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ITPA EP-2, EP-4

Stability and structure of TAEs may change as rotation profile affects TAE gap structure

- Study of TAEs in L-mode made good progress in 2010 with XP-1015
 - Collected data for detailed comparison theory/experiments
 - “Rotation” is an important element
- NSTX (low aspect ratio) has large rotation frequency
 - Rotation comparable with TAE frequency (plasma frame)
 - Stability and structure of TAE modes may change as TAE gap varies for different rotation profiles
- Detailed/systematic information on effects of rotation on TAEs missing from XP-1015
- Goal: explore dependence of TAE dynamics on rotation profile; compare results with predictions from codes such as NOVA-K, M3D-K

Run plan – ½ day experiment

- Target: “best shot” from 2010, shot no 141711 (XP-1015)
- Introduce $n=3$ braking
 - Start ramp as early as ~ 200 ms, flat-top at 250–280 ms
- Scan of $n=3$ braking
 - Start with 1kA; decrease shot-by-shot
 - If not successful, try with $n=3$ pulses and/or diverted plasma
- Optimize scenario for reduced TAE bursts/chirps
 - Density is a crucial parameter... but, in practice, it is a difficult knob to use
 - Modifying NB power and timing instead
- If time permits: revisit scenario with strong bursts
 - Repeat $n=3$ braking scan
- If time permits even more: back to *H-mode* scenario
 - Chose best case from XP-1011, perform $n=3$ braking scan