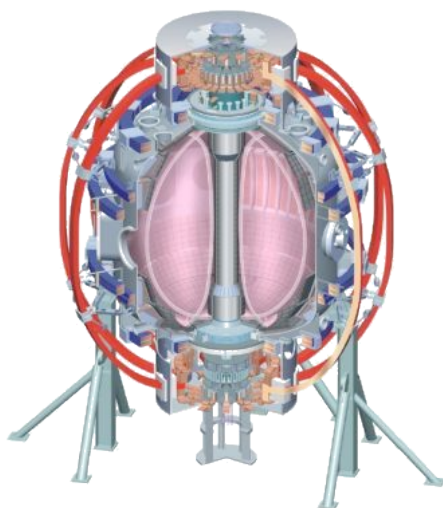


Error field modulation of TAEs

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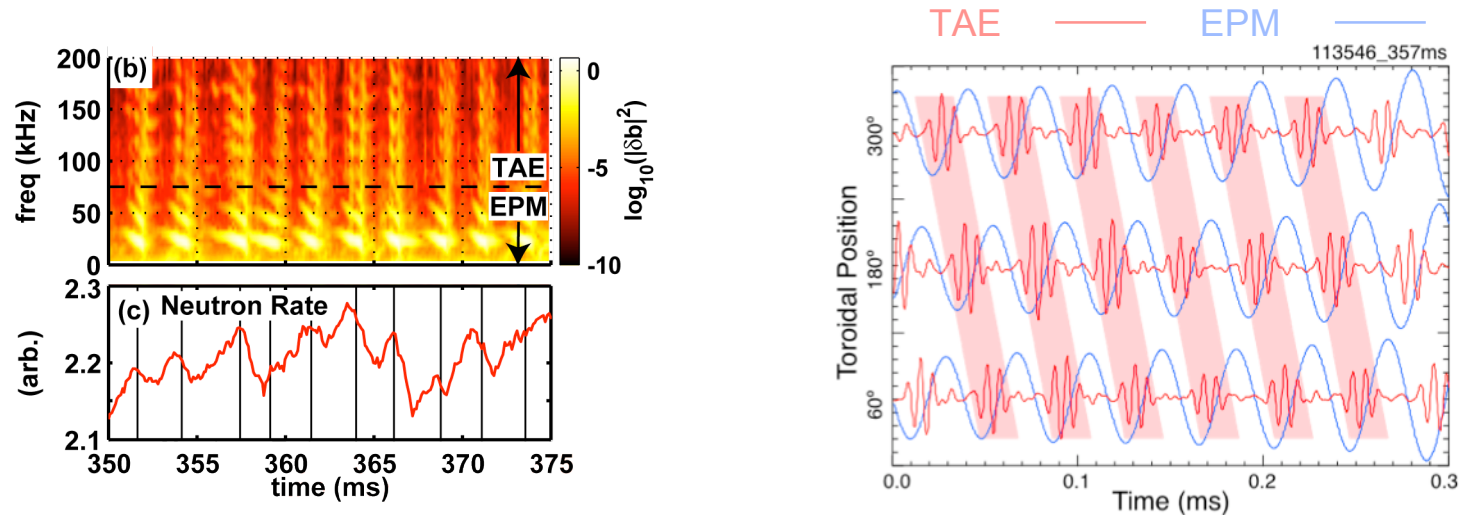
N. A. Crocker and E. D. Fredrickson

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Three-wave interaction impacts fast-ion transport



- Three-wave interaction of fast-ion modes common in NSTX neutral beam heated plasmas
- Three-wave interactions influence fast-ion transport — often observed during fast-ion loss events
- Interaction with the EPMs toroidally localizes TAEs into wave-packets

Proposed Experiment: Error field modulation of TAEs

- Impose rotating $n=1$ & $n=3$ error fields with error field coils ($\sim 10 \text{ Hz} < f_{\text{rot}} < \sim 50 \text{ Hz}$)
 - error field replaces spontaneously occurring EPM
 - vary error field below locking threshold to control strength of modulation
 - rotation speed limited by interaction with vacuum vessel (penetration, stresses)
- Look for TAE amplitude modulation (edge coils, reflectometers)
 - need long duration ($\gg 1/f_{\text{rot}}$) stationary TAE spectrum — may need development
- Look for toroidal variation in fast-ion population (FIDA, sFLIP, NPA+ssNPA)
 - slow rotation (compared to EPM) conducive to good statistics vs. error field phase
- May aid characterizing effect of static field ripple since a field ripple effectively moves past available diagnostics.
- Diagnostics:
 - equilibrium: MPTS, MSE, CHERS and PCHERS
 - mode structure: edge magnetic coils, UCLA 30-50 GHz reflectometer array, FIRE TIP, USXR poloidal arrays; BES and UCLA 55-75 GHz reflectometer array desirable.
 - fast-ions: FIDA, ssNPA, NPA, sFLIP
- Run time need: 1/4 to 1/2 day