

TH/P7-39: Multi-Time-Scale Energetic Particle Dynamics in JT-60U Simulated with MHD Activity, Sources and Collisions

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Global 3-D long-time hybrid simulations performed with realistic geometry and realistic fast ion source

Extended hybrid code MEGA:
Naturally produces dynamics on

- ▶ **Meso-time scale (0.1 ~ 10ms):**
cyclic bursts of mode activity and fast ion transport
- by self-consistently simulating
- ▶ **Short-time scale (1 μ s ~ 1ms):**
MHD, resonant interactions
 - ▶ **Long-time scale (1ms ~ 1s):**
N-NB source, collisional slow-down, scattering, etc.
- side-by-side in one single code, without artificial interfaces

Prospects:

- ① Study meso-scale dynamics:
chirping, burstiness
- ② Validate numerical models:
experiment \rightarrow self-consistent sim. \rightarrow integrated \rightarrow reduced models
- ③ Develop predictive capability

Reproduced cyclic bursts of chirping modes observed in N-NB-driven JT-60U plasmas

Power spectra of magnetic fluctuations

