

Summary slide for **EX/P7-48**: Confinement modes and magnetic-island driven modes in the TJ-II stellarator

- **Scope:** L-mode TJ-II plasmas prone to transit to H-mode: co-injected NB, $\langle n_e \rangle \sim 10^{19} \text{ m}^{-3}$, $T_i < T_e < 0.5 \text{ keV}$, high rotational transform ~ 1.5 at low magnetic shear (but phenomena and basic physics in common with general toroidal devices).
- **Phenomenon:** L-mode or confinement states with stable transport barriers (e.g. H-mode) coexist with magnetic activity and islands drifting with $E \times B$ velocity. Hybrid state of bursty chirping mode (BCM) nature is possible when the barriers, which develop by the magnetic resonances, collapse and re-establish cyclically ($\sim 1 \text{ ms}$). The chirping can be explained by transient island-drifting with added electron diamagnetic rotation.
- **Importance:** Added practical understanding of the role of rotational transform control as confinement knob in stellarators, including transport barrier dynamics. The appropriate frame of study seems to be MHD, e.g. tearing mode theory: Stable or modulated transport is linked to the resonant magnetic fluctuations as is H-mode and ELM control to RMP techniques in tokamaks.