

Interplay between confinement, turbulence and magnetic topology

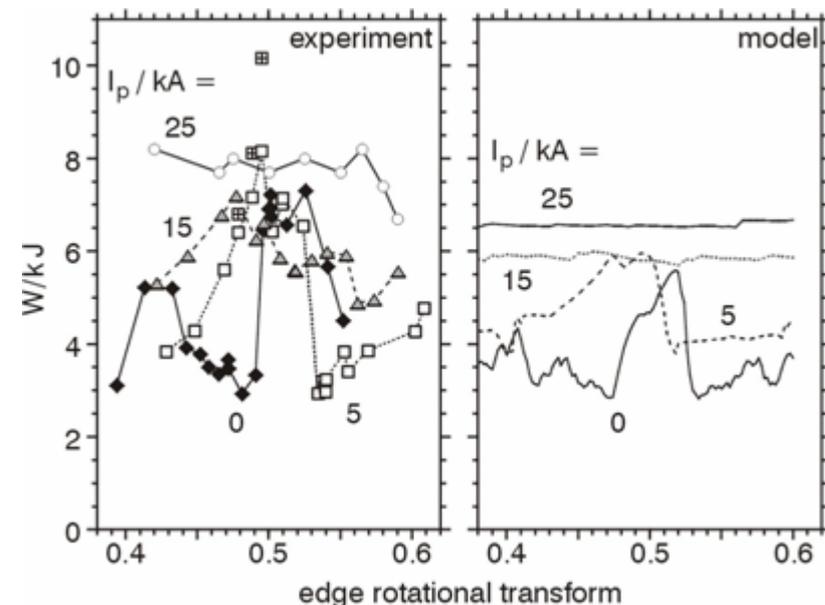
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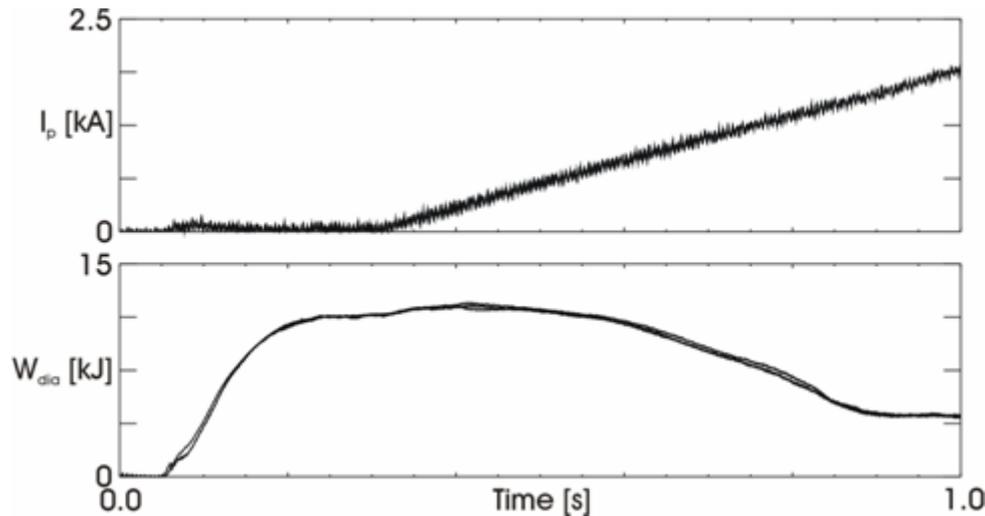
This proposal originates from density fluctuation studies of W7-AS plasmas with the LOTUS small-angle scattering diagnostic.

Observations on the connection between stored energy and the edge rotational transform:

- Low shear (no net plasma current):
The stored energy is very sensitive to small changes of the edge rotational transform, optimum values close to low-order rational values.
- High shear (net plasma current):
The stored energy is large regardless of the edge rotational transform.



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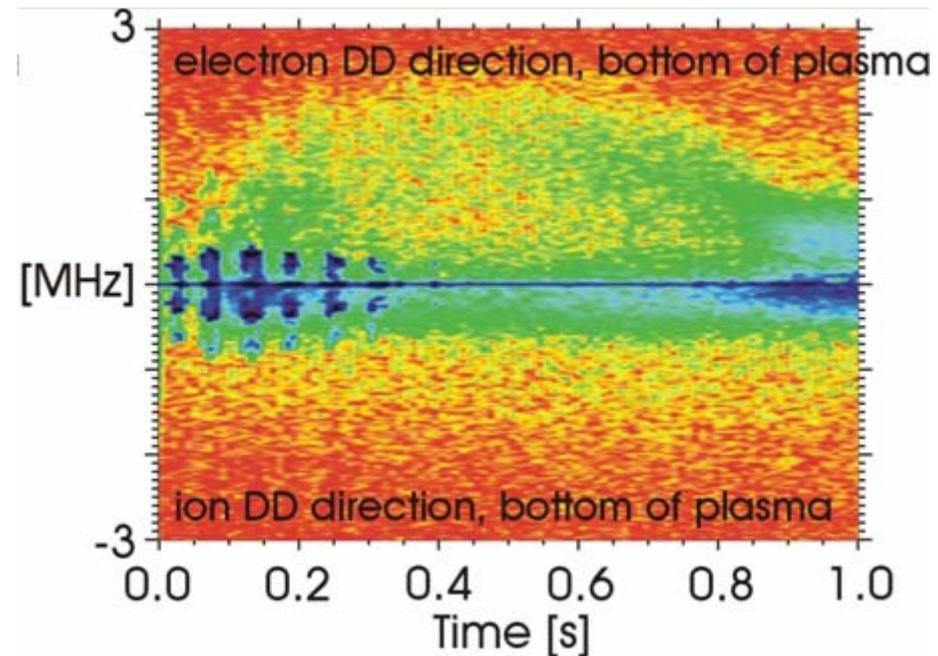


Model has been developed, where the electron heat conductivity is described by three contributions:

1. Neoclassical transport.
2. Turbulent transport.
3. Transport close to low-order rational surfaces.

To verify changes in turbulent transport when the edge rotational transform is modified in low-shear plasmas, discharges were developed where slow, reproducible confinement transitions were created by driving a small plasma current.

Large correlated changes were observed in density, magnetic and H-alpha fluctuations.



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Can we construct similar slow confinement transitions in C-Mod?

W7-AS current ramp target parameters:

- Medium density, kept constant by feedback gas puffing to minimize particle transport effects.
- Low ECRH power.
- Low shear.
- Transition is basically a collapse of the electron temperature.

C-Mod:

- Try Ohmic and low power ICRH.
- Low shear would certainly be an issue in C-Mod, are there ways to reduce the shear appreciably (fast ramping, early heating)?
- Current penetration time in C-Mod?
- If suitable target can be developed, document stored energy versus q_{95} .
- Thereafter, perform current ramp experiments.
- Later phase: Use LHCD to modify q -profile, create low shear areas.