

# New Type of Nonlinear Plasma Instability

**Objective:** Use magnetohydrodynamics code M3D to study large periodic instabilities called Edge Localized Modes (ELMs) in confined toroidal plasmas.

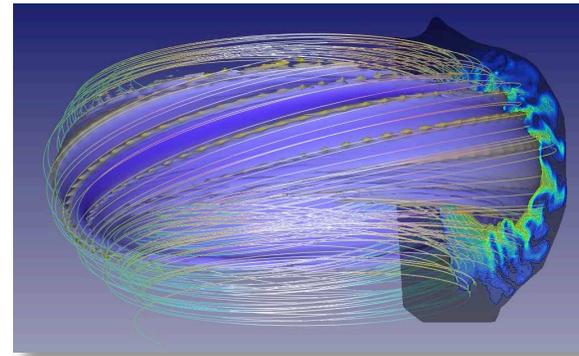
**Implications:** ELM properties have long resisted theoretical explanation; may be a constraint on the design of next generation fusion experiments such as ITER.

**Accomplishments:** Showed that ELMs are a new class of nonlinear plasma instability.

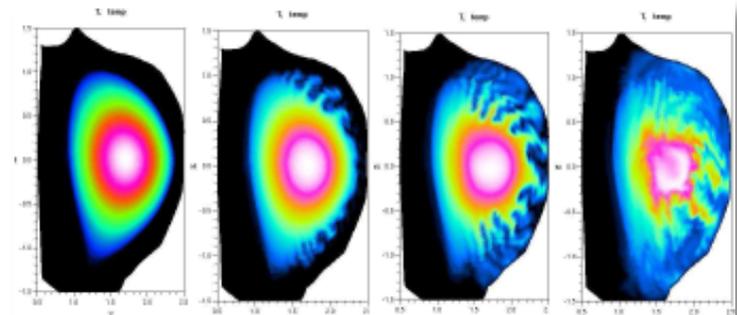
- The instability couples to the magnetic field, drives field perturbation deep into the plasma.
- APS invited talk + SciDAC09

**NERSC:** All computations, visualization done at NERSC; typically 360-768 cores.

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Temperature surface near plasma edge shows helical, field-aligned perturbation



Time evolution of an ELM.