NATIONAL ENERGY RESEARCH SCIENTIFIC COMPUTING CENTER

Fusion: Gyrokinetic Modeling

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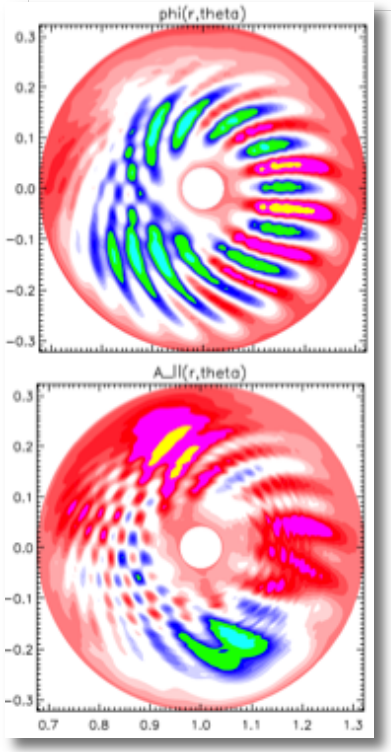
***Objective*: Comprehensive first-principles simulation of energetic particle turbulence and transport in ITER-scale plasmas.**

***Implications*: Improved modeling of fusion systems is essential to achieving the predictive scientific understanding needed to make fusion safe and practical.**

***Accomplishments:* GTC simulation successfully explains measurement of fast ion transport in General Atomics DIII-D tokamak shot.**

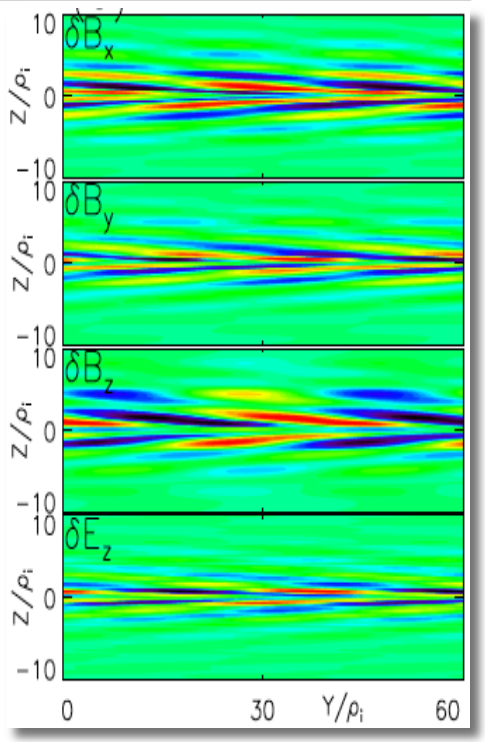
- **Diffusivity decreases drastically for high-energy particles due to averaging effects of large gyroradius and banana width, and fast wave-particle decorrelation.**
- **Work in preparation for 3 Fall 2009 invited talks; add'l allocation requested.**

***NERSC:* 4M hours used in 2009; GTC part of NERSC6; 15-hour, 6,400-node run in March, 09**



Gyrokinetic simulation with kinetic electrons using a hybrid model in GTC.

Comm Comp Phys 2009



2-D Electromagnetic field fluctuations in a simulated plasma due to microinstabilities in the current.

Phys Rev Lett (2008)
Phys Plas. (2008)

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