Plasma Turbulence studied by means of Correlation-ECE in the TEM domain in TCV

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Heat diffusivity modified by Shape $\delta$ & Collisionality $\nu_{\text{eff}}$ (TEM)

- Lower $\chi_e$ at high collisionality $\nu_{\text{eff}}$
- Negative triangulation $\delta$
- Trends qualitatively reproduced by GS2 (local, flux tube, non-lin., $\rho \sim 0.7$), but radial dependence disagrees (global effects not taken into account!)

Marinoni PPCF 09
Global TEM simulations

LORB simulations (gyrokinetic, global, linear, no collisions)

electrostatic potential fluctuations

Negative $\delta < 0$:
- $\Rightarrow$ stronger tilt of eddies at LFS equator!
- $\Rightarrow$ higher $k_\perp$
- $\Rightarrow$ lower mixing-length transport

ORB5: for TEM: non-lin. results are close to linear  
Camenen PPCF05  
Jolliet Thesis 09
$T_e$-fluct. ampl. (corr-ECE diag.) decrease with $\nu_{\text{eff}}$, as in GS2

$T_e$-fluctuation spectra decrease with density from expt. Ohmic, $q \sim 10$, $\kappa \sim 1.4$, $\delta \sim 0.3$

$T_e$- & $n_e$-fluctuations from GS2 decrease with $\nu_{\text{eff}}$ (as in experiment)

consistent with TEM ampl. reduction with collisions ($e^-$ collisional detrapping)

Udintsev, Fable US-TTF09
What will we find at the turbulence level?

With correlation-ECE, investigate:

- Spatial structure of turbulence radial structures with size $\Delta \rho > 10\%$ seen

- Changes expected with e.g. triangularity $k_{\perp}$, orientation of cells, ...

- Shaping: a tool to vary continuously transport parameters
  - helpful to test models
  - and compare with gyro-kinetic codes

- How close are expts from linear/non-linear global gyro-kinetic simulations?