Core microturbulence and edge MHD interplay and stabilization by fast ions in tokamak confined plasmas

- Pressure gradients in electromagnetic simulations are a strong stabilizing mechanism for ITG turbulence.
- Non-linear stabilization is stronger than linear due to coupling with zonal flows.
- Fast ions provide a net source for stabilization as they increase pressure gradient without contributing to ITG drive.
- Increased core pressure by fast ions expand pedestal pressure stable boundary region through Shafranov-shift.
- More efficient than thermal particles as no turbulence contribution: mechanism efficiency increase with power.
- Core-edge coupling for improved confinement by means of plasma stiffness.
- Effects are similar for ITER hybrid scenario.

GENE nonlinear simulations of JET hybrid shot 75225 @ \( \rho=0.33 \). 4 ions species, finite-\( \beta \), collisions, real geometry, rotation.