Experimental investigation and gyrokinetic simulations of multi-scale electron heat transport in JET, AUG and TCV

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A. Mariani, N. Bonanomi, P. Mantica, C. Angioni, F.J. Casson, J. Citrin, T. Goerler, D. Keeling, E. Lerche, O. Sauter, M. Sertoli, G. Staebler, D. Taylor, A. Thorman, Eurofusion JET1 contributors, Eurofusion MST1 contributors, ASDEX Upgrade team, TCV team and ITPA transport & confinement group

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- Analysis of pulses from the TCV, AUG and JET tokamaks: study the contribution of the Electron Temperature Gradient (ETG) modes to the electron heat transport, which could be detrimental for the fusion performance of dominantly electron heated tokamaks like ITER;
- Experiments interpreted with gyrokinetic simulations (GENE [Jenko F. *et al.* PoP 2000]), including nonlinear multi-scale runs, and quasilinear simulations (TGLF [Staebler G.M. *et al.* PoP 2007]); Results:
- ETGs could impact q_e for cases with $T_e \sim T_i$ and high R/L_{Te}, (conjunction of electron and ion heating);
- TCV, mixed NBI-ECH case: fast ions and ExB shearing stabilize ion scales, possibly destabilising ETGs;
- AUG and JET: high ion stiffness (ITGs): possible destabilisation of ETGs varying R/L_{Ti} within error bar;
- High impact of impurities on ETGs destabilisation for the JET case;
- Need of exp. measurements of density and temperature fluctuations at electron scales to say conclusive words about the role of ETGs in setting the electron heat transport.

GENE nonlinear ion-scale and multi-scale results, compared with experimental data, for TCV, AUG and JET: