

# **Gyrokinetic particle-in-cell simulations of electromagnetic turbulence in the presence of fast particles and global modes**

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Results of global nonlinear simulations of confined plasmas using gyrokinetic particle-in-cell codes ORB5 and EUTERPE in the electromagnetic regime will be shown. In particular, we will investigate examples of electromagnetic Ion-Temperature-Gradient driven and Kinetic-Ballooning-Mode turbulence in tokamak and stellarator geometries, self-consistent evolution of electromagnetic turbulence in presence of collisionless tearing mode, and the effect of turbulence on evolution of Alfvén Eigenmodes where the chirping regime will be addressed. Furthermore, simulation results of several cases with tokamak shaped geometry (ASDEX-Upgrade) will be presented here.