Nonlinear interaction of turbulence and energetic particles in tokamak plasmas, De Vinci Research Center, Paris

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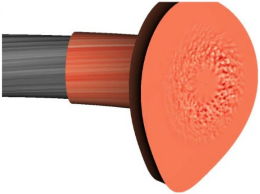
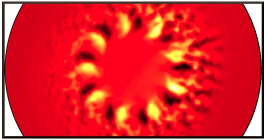
- Turbulence develops in tokamak plasmas due to temperature gradients between the core and the edge
- Alfvén Modes (AM) are electromagnetic oscillations, driven unstable in tokamak plasmas by energetic particles (EP)
- Coexistence of microturbulence, mesoscale zonal flows, and global AMs has been observed in gyrokinetic simulations





A. Biancalani, et al, *Plasma Phys. Control. Fusion* 63, 065009 (2021)

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- Two mechanisms have been isolated: the effect of the profile relaxation by the AM, and the effect of the zonal flow forced-driven by the AM
- The heat flux carried by turbulence is found to be reduced when the profiles modified by the AM are used
- The turbulence modes are also found to be stabilized when the zonal flow forced-driven by the AM are imposed

A. Biancalani, et al, J. Plasma Phys., 2023

J. N. Sama, et al, Phys. Plasmas, 2024