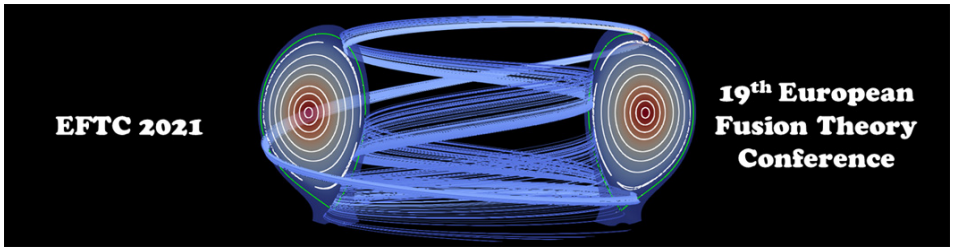

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Electromagnetic plasma instabilities and turbulence driven by electron-temperature gradient

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A simplified local model of a tokamak plasma is derived in the low-beta limit of gyrokinetics in a slab of constant magnetic field curvature and gradient. The ordering adopted was chosen in order to retain Alfvénic perturbations to the magnetic field, while ordering out compressive perturbations, in a similar manner to previous work. In the electromagnetic regime, we demonstrate the existence of the novel "Thermo-Aflvénic instability"that arises due to a deviation from isothermality of the total temperature along the (exact) perturbed field line. This instability both destabilises kinetic Alfvén waves and enhances the conventional curvature-mediated ETG instability, driving turbulence on scales above the electron skin depth. Assuming critical balance, it is shown that the resultant turbulent heat flux is larger than that due to the electrostatic ETG modes, presenting a significant departure from the expected picture of the electron turbulent heat transport.

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