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Energy dissipation in sub-ion-Larmor-radius kinetic turbulence ZHUO LIU, MUNI ZHOU, NUNO LOUREIRO, Massachusetts Institute of Technology MIT — In a weakly collisional, low-beta plasma, the transfer of free energy to small scales in phase space by kinetic turbulence can in principle proceed via two channels: fluid-like nonlinear advection and linear phase mixing. Recent numerical studies of electrostatic drift-kinetic turbulence (Parker et al. 2016) reported the suppression of phase mixing due to "anti-phase mixing" modes caused by plasma echo effects. This result was confirmed by a recent numerical study of electromagnetic turbulence at MHD scales (Meyrand et al. 2019). However, it has also been shown that turbulent eddies can be strongly anisotropic and unstable to tearing modes (e.g., Loureiro and Boldyrev 2017), causing the turbulence to be affected by magnetic reconnection. As reconnection is known to trigger efficient phase-mixing (Loureiro et al. 2013; Numata and Loureiro 2015), it is possible that phase mixing remains an significant energy dissipation mechanism in electromagnetic sub-ion-scale turbulence. To test this conjecture, we performed numerical studies of kinetic turbulence with a reduced gyrokinetic model valid at low plasma beta. We observe strong energy dissipation at high velocity-space moments, supporting the idea that phase mixing indeed plays a key role in energy dissipation in sub-ion turbulence.

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