Abstract Submitted
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**Alfvénic turbulence in an expanding, collisionless, magnetized plasma**[1] ARCHIE BOTT, LEV ARZAMASSKIY, MATTHEW KUNZ, Department of Astrophysical Sciences, Princeton University, ELIOT QUATAERT, Astronomy Department, UC Berkeley, JONATHAN SQUIRE, Department of Physics, University of Otago — Using hybrid-kinetic particle-in-cell simulations, we study the evolution of an expanding, collisionless, magnetized plasma in which Alfvénic turbulence is persistently driven. Pressure anisotropy generated adiabatically by the plasma expansion (and consequent decrease in the mean magnetic-field strength) gradually reduces the effective elasticity of the field lines, causing residual energy build-up in the turbulent fluctuations and modifying their spatial anisotropy. Critical balance is maintained even as the linear frequency of the Alfvénic fluctuations is modified by this pressure anisotropy. For a sufficiently large plasma beta, the plasma eventually becomes unstable to the oblique firehose instability, which excites rapidly growing magnetic fluctuations at ion-Larmor scales. Through associated pitch-angle scattering of particles, the ion pressure anisotropy is maintained near marginal firehose stability, even as the plasma's expansion continues. The resulting evolution of parallel and perpendicular temperatures is non-adiabatic. Predictions may be tested by measurements of high-beta plasma in the near-Earth solar wind and have implications for understanding the interplay between macro- and micro-scale physics in hot, dilute, astrophysical plasmas.

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