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**Firehose, Mirror, and Magnetorotational Instabilities in a Collisionless Shearing Plasma** MATTHEW KUNZ, Princeton University, ALEXANDER SCHEKOCHIHIN, University of Oxford, JAMES STONE, Princeton University, SCOTT MELVILLE, University of Oxford, ELIOT QUATAERT, University of California, Berkeley — Describing the large-scale behavior of weakly collisional magnetized plasmas, such as the solar wind, black-hole accretion flows, or the intracluster medium of galaxy clusters, necessitates a detailed understanding of the kinetic-scale physics governing the dynamics of magnetic fields and the transport of momentum and heat. This physics is complicated by the fact that such plasmas are expected to exhibit particle distribution functions with unequal thermal pressures in the directions parallel and perpendicular to the local magnetic field. This pressure anisotropy can trigger fast Larmor-scale instabilities – namely, firehose and mirror – which solar-wind observations suggest to be effective at regulating the pressure anisotropy to marginally stable levels. Results from weakly nonlinear theory and hybrid-kinetic particle-in-cell simulations that address how marginal stability is achieved and maintained in a plasma whose pressure anisotropy is driven by a shearing magnetic field are presented. Fluctuation spectra and effective collisionality are highlighted. These results are placed in the context of our ongoing studies of magnetorotational turbulence in collisionless astrophysical accretion disks, in which microscale plasma instabilities regulate angular-momentum transport.

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