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**Turbulent transport and heating of trace heavy ions in hot, magnetized plasmas** MICHAEL BARNES, FELIX PARRA, MIT, WILLIAM DORLAND, University of Maryland — Heavy ions are present in hot, magnetized plasmas both in laboratory experiments and in nature. These ions are important in numerous contexts: main ion properties are often inferred from heavy ion measurements because heavy ions radiate more readily; accumulation of heavy ions leads to dilution and increased radiative energy losses in magnetic confinement fusion; and temperature measurements of minority ions in space and astrophysical plasmas indicate the existence of a novel mass-dependent heating mechanism. We present a derivation of scaling laws for the transport and heating of trace heavy ions in low frequency, magnetized plasma turbulence. The predicted dependences of turbulent fluxes and heating on ion charge and mass number are shown to agree with numerical results from nonlinear gyrokinetic simulations of both stationary and differentially rotating plasmas. Heavy ion momentum transport is found to increase with mass, and heavy ions are preferentially heated, implying a mass-dependent ion temperature for very weakly collisional plasmas and for partially ionized heavy ions in strongly rotating plasmas. These predictions are consistent with temperature measurements in the solar wind and indicate that errors may be present in ion temperature measurements in experiment.

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