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Extensions of the magnetic pumping model for particle heating[1]
EMILY LICHKO, JAN EGEDAL, University of Wisconsin - Madison, WILLIAM DAUGHTON, Los Alamos National Laboratory — One of the outstanding problems across a variety of astrophysical phenomena is the generation of electron and ion power-law distributions with superthermal tails. Most theories of particle energization rely on energy injection at a specific scale, such as the energy injection at the kinetic scale after passing through the turbulent cascade. We have shown that magnetic pumping, a model in which particles are heated by the largest scale magnetic fluctuations, is a complementary heating mechanism to the turbulent cascade, resulting in power-law distributions like those observed in the solar wind [1]. The ability of compressional Alfvénic turbulence to magnetically trap superthermal particles renders magnetic pumping an effective Fermi heating process for particles with $v \gg \omega/k$, and produces superthermal power-law distributions. Recent progress and extensions of this model will be presented, including the application of this model to differential ion heating near the solar corona. [1] E. Lichko, J. Egedal, W. Daughton, and J. Kasper. *Astrophys. J. Lett.* **2**, 850 (2017)

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Emily Lichko
University of Wisconsin - Madison

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