Particle Acceleration by Magnetic Reconnection: Old and New Paradigms

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The understanding of particle acceleration in magnetic reconnection has undergone significant advancements in recent years. Early paradigms focused on nonthermal particles with single power-law energy distributions and isotropic pitch angle distributions. Recent developments, however, demonstrate the emergence of more complex broken power laws and anisotropic pitch angle distributions. These findings carry important implications for interpreting high-energy processes in space and astrophysical environments, which I will discuss in the context of understanding the radiation emitted by accelerated particles.

[1] L. Comisso and B. Jiang, The Astrophysical Journal **959**, 137 (2023).
[2] L. Comisso, The Astrophysical Journal **972**, 9 (2024).