

## Comparison of Particle Energy Distributions from Fully Kinetic Simulations and Observations of Magnetic Reconnection in Earth's Magnetotail

Magnetic reconnection enables rapid energy conversion and particle acceleration in space and astrophysical plasmas. Direct measurements of plasma parameters and particle distributions during reconnection are rare but possible within Earth's magnetosphere. Satellite observations, however, are limited in both temporal and spatial coverage, while numerical simulations can provide a more complete view of the process over extended timescales in the defined spatial domains.

To evaluate how well simulations reproduce observed particle energy distributions, we present fully kinetic simulations of magnetic reconnection initialized using plasma parameters derived from a well-studied event observed by the Magnetospheric Multiscale (MMS) mission in Earth's magnetotail. By initializing the simulations with realistic upstream conditions, we investigate particle energization during reconnection and quantitatively compare the resulting energy distributions with in-situ spacecraft observations.

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