Determining the Dominant Acceleration Mechanism during Relativistic Magnetic Reconnection in Large-scale Systems

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While a growing body of research indicates that relativistic magnetic reconnection is a prodigious source of particle acceleration in high-energy astrophysical systems, the dominant acceleration mechanism remains controversial. Using a combination of fully kinetic simulations and theoretical analysis, we demonstrate that Fermi-type acceleration within the large-scale motional electric fields dominates over direct acceleration from non-ideal electric fields within small-scale diffusion regions. This result has profound implications for modeling particle acceleration in large-scale astrophysical problems, since it opens up the possibility of modeling the energetic spectra without resolving microscopic diffusion regions.

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