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Impact of compressibility and a guide field on Fermi acceleration during magnetic island coalescence[1] PETER MONTAG, Massachusetts Institute of Technology, JAN EGEDAL, EMILY LICHKO, BLAKE WETHERTON, University of Wisconsin Madison — Previous work has shown that Fermi acceleration can be an effective heating mechanism during magnetic island coalescence, where electrons may undergo repeated reflections as the magnetic field lines contract. This energization has the potential to account for the power-law distributions of particle energy inferred from observations of solar flares. Here, we develop a generalized framework for the analysis of Fermi acceleration that can incorporate the effects of compressibility and non-uniformity along field lines, which have commonly been neglected in previous treatments of the problem. Applying this framework to the simplified case of the uniform flux tube allows us to find both the power-law scaling of the distribution function and the rate at which the power-law behavior develops. We find that a guide magnetic field of order unity effectively suppresses the development of power-law distributions.

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