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Electron energization during asymmetric magnetic reconnection[1]

JONGSOO YOO, JONATHAN JARA-ALMONTE, Princeton Plasma Phys Lab, LI-JEN CHEN, NASA-GSFC, VADIM ROYTERSHTEYN, Space Science Institute, BEN NA, MASAAKI YAMADA, HANTAO JI, WILL FOX, Princeton Plasma Phys Lab — Bulk electron heating and energetic electron generation during asymmetric reconnection are studied with space observations, laboratory measurements, and numerical simulations. In space, the increase of the bulk electron temperature is about two percent of the incoming magnetic energy, which is consistent with the previous report by Phan et al. 2013 [1]. During storm time events, the energy increase in the electron tail population is larger than that of the bulk electrons, which indicates that a significant incoming magnetic energy is converted to the energetic electrons in these events. In laboratory, the electron temperature increase is about 5 percent of the incoming magnetic energy, which is more consistent with the recent PIC simulation results [2]. The electron temperature profile becomes asymmetric with a higher temperature on the low-density side. Where and how electrons are energized during asymmetric reconnection will be discussed by using data from 2D numerical simulations.

[1] Phan et al. Geophys. Res. Lett. 40, 4475 (2013).
[2] Shay et al. Phys. Plasmas 21, 122902 (2014).

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