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Fast Shocks in Magnetic Reconnection Outflows[1] ERIC BLACKMAN, University of Rochester, JARED WORKMAN, CHUANG REN, University of Rochester — Magnetic reconnection is commonly perceived to drive flow and particle acceleration in flares of solar, stellar, and astrophysical disk coronae but the relative roles of different acceleration mechanisms in a given reconnection environment are not well understood. Analytic theory predicts the existence of weak fast shocks in reconnection outflows. We show via direct numerical simulations that such weak fast mode shocks do indeed occur in the outflows of fast reconnection when an obstacle is present. These shocks are distinct from slow mode Petschek inflow shocks. If Fermi acceleration of electrons operates in the weak fast outflow shocks, the associated compression ratios will induce a Fermi acceleration particle spectrum that is significantly steeper than strong fast shocks commonly studied, but consistent with the demands of solar flares. While this is not the only particle acceleration mechanism operating in a reconnection environment, it is plausibly a ubiquitous one.

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Eric Blackman
University of Rochester

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