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The Onset of Ion Heating During Magnetic Reconnection with a Strong Guide Field JAMES DRAKE, MICHAEL SWISDAK, University of Maryland — The onset of the acceleration of ions during magnetic reconnection in the limit of a strong guide field is explored via PIC simulations that self-consistently follow the motions of protons and α particles. Heating parallel to the local field is strongly reduced compared with the anti-parallel reconnection. The dominant heating of thermal ions results from pickup behavior during entry into reconnection exhausts and produces heating perpendicular rather than parallel to the local field. Pickup behavior requires that the ion transit time across the boundary (with a transverse scale of order ρ_s) be short compared with the cyclotron period. This translates into a threshold in the strength of reconnecting field that favors the heating of ions with high mass-to-charge. A simulation with a broad initial current layer causes the amplitude of the reconnecting field upstream of the dissipation region to increase with time and a sharp onset of perpendicular heating when the pickup threshold is crossed. A comparison of the time variation of the parallel and perpendicular heating with that predicted establishes the scaling of ion heating with ambient parameters both below and above the pickup threshold. The relevance to observations in the solar corona is discussed.

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