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High Energy Particle Populations and Momentum Transport Associated with Collisionless Reconnection Processes[1] B. BASU, B. COPPI, MIT — In the two-fluid description [1] of reconnection processes a new type of "magneto-thermal" mode producing reconnection is found [2,3] when the longitudinal electron thermal conductivity is relatively large. The mode is associated with the electron temperature gradient and can have a phase velocity in either directions of the electron or the ion diamagnetic velocity. High-energy particle populations are proposed to be produced as a result of reconnection events through mode-particle resonances that transfer the energy of the reconnecting mode to super-thermal particle populations. The spatial near-singularity of the perturbed electron temperature, that can enhance the thermal energy of particles in one region while depleting that of particles in the adjacent region, may be an additional contributing factor in this context. The modes can extract momentum from the plasma body and in an axisymmetric toroidal confinement configuration could sustain a "spontaneous rotation" [4] of the plasma column by carrying away angular momentum of the opposite sign. [1] B. Coppi, Phys. Fluids 8, 2273, 1965. [2] B. Coppi, Plasma Physics Reports (Fizika Plazmy) 42, 5, 383, 2016. [3] B. Coppi, B. Basu and A. Fletcher, Nucl. Fus., to appear, 2017. [4] B. Coppi, Nucl. Fus. 42, 1, 2002.

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