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Magneto-thermal Reconnection Processes, Related Angular Momentum Transport issues and Formation of High Energy Particle Populations* B. COPPI, B. BASU, A. FLETCHER, MIT — The two-fluid theory of magnetic reconnection [1], when the longitudinal electron thermal conductivity is relatively large, shows that the perturbed electron temperature tends to become singular [2] in the presence of a reconnected field component and an electron temperature gradient. A transverse thermal diffusivity can remove this singularity while a finite "inductivity" can remove the singularity of the corresponding plasma displacement [1]. Then i) a new "magneto-thermal reconnection" producing mode, driven by the electron temperature gradient, is found [2]; ii) the characteristic widths of the layers where reconnection takes place remain significant even when the relevant macroscopic distances are very large; iii) modes with phase velocities both in the electron diamagnetic velocity direction and in the opposite one are found. Their growth rates depend on small dissipative factors. The found modes can extract angular momentum from the plasma and thereby sustain a "spontaneous rotation" process [3]. Sponsored by the U.S. D.O.E. [1] B. Coppi, Phys. Fluids 8, 2273 (1965) and B. Coppi, B. Basu, et al. Nucl. Fus., 55, 093018 (2015). [2] B. Coppi, Plasma Phys. Reports, 42, 5, 383 (2016). [3] B. Coppi, Nucl. Fus. 42, (2002).

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