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Candidates for the Observed Electron Thermal Energy Transport and Micro-reconnecting Modes* C. CRABTREE, B. COPPI, MIT — Two plausible candidates to explain the observed (anomalous) electron thermal energy transport in collisionless or weakly collisional plasmas are shown to be the trapped electron mode[1] (TEM) and the micro-reconnecting mode[2]. The first mode is driven by the combined effects of the plasma pressure and the magnetic field curvature. The second produces a string of magnetic islands and requires that the relative electron temperature gradient to be significantly larger than the relative temperature gradient. Both modes, when considering the largest transverse wavelengths for which they can be excited ($1/k_\perp \sim \rho_i$, for the first mode, $\rho_i =$ ion gyro-radius, and $1/k_\perp \sim c/\omega_{pe}$ for the second mode) require a phase space (non-fluid) description. For the second mode the transverse electron energy effective diffusion can be represented by $D^{th}_{e\perp} \sim (de/r_{te})cT_e/(eB)$ which does not involve a strong degradation of the energy confinement time as a function of the heating power. Here $r_{te} = -1/(d\ln T_e/dr)$. A more complete form of the composite transport coefficient that is suitable for the numerical simulation of the transport properties of experimentally produced plasmas with different degrees of collisionality has been derived from the characteristics of the modes. *Supported in part by the U.S. D.O.E. [1] B. Coppi and G. Rewoldt, *Phys. Rev. Letts.* **33** 1329 (1974) [2] B. Coppi, in *Collective Phenomena in Macroscopic Systems*, p. 59 publ. *World Scientific* (2007).

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