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**Micro-reconnection at the $c/\omega_{pe}$ Scale Length*** K. TUMMEL, B. COPPI, MIT — A phase space (non-fluid) approach is needed to describe modes that perturb the magnetic field in a sheared field geometry, lead to the formation of strings of magnetic islands, and have transverse scale distances that are of the order of $c/\omega_{pe}$. The driving factor is the transverse electron temperature gradient. The plasma density gradient has a strong influence and is shown to reduce the mode frequency considerably relative to its upper bound $k_\perp c|dT_e/dr|/(eB)$. The mode characteristics are intrinsically different from the commonly known electrostatic ETG modes, that do not produce magnetic islands and have shorter wavelengths. The effect of the present modes is to decrease the anisotropy of the electron thermal conductivities by increasing the ratio of $D^{th}_{\perp e}/D^{th}_{\| e}$ relative to its very small classical value. In particular $D^{th}_{\perp e}$ is estimated as $\alpha_D(c/\omega_{pe})c|dT_e/dr|/(eB)$ where $\alpha_D$ is a finite numerical coefficient. The theory of mesoscopic reconnecting modes (so-called drift-tearing) that can produce macroscopic magnetic islands depends heavily[1] on the finiteness of $D^{th}_{\perp e}/D^{th}_{\| e}$ besides that of electrical resistivity. Therefore it has been assumed that these mesoscopic modes develop[1] from a background of micro-reconnecting modes of the kind we have described. *Sponsored in part by the US D.O.E.

[1]B. Coppi in "Collective Processes in Macroscopic Systems" Eds. G. Bertin *et al.*, Publ. *World Scientific* (2007) and MIT-LNS Report 06/11 (2006).

B. Coppi
MIT

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