

Abstract Submitted
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Resolution **of**
the Mesoscopic Reconnection Theoretical Dilemma* B. COPPI, C. CRAB-
TREE, V. ROYTERSHTEYN, M.I.T. — The drift-tearing mode¹ involves magnetic
reconnection and the gradients of electron temperature and density as well as that
of the current density. Experiments with lower degrees of collisionality than those
for which the mode was identified have shown that magnetic reconnection lead-
ing to relatively large islands persists, while according to subsequent theories² the
effects of electron temperature gradients and Landau damping or longitudinal ther-
mal conductivity² prevent, in practice, the excitation of this mode. To resolve this
paradox, we consider³ that mesoscopic reconnecting modes develop from a coherent
background of micro-reconnecting modes with short scale distances ($< c/\omega_{pe}$) gen-
erating a series of strings of small magnetic islands that are driven by the electron
temperature gradient. Thus a reduction of the electron thermal conductivity along
the field lines and an increase of the transverse thermal conductivity can take place.
The combination of both effects is shown to restore the excitation of mesoscopic
modes involving the effects of finite resistivity, electron thermal conductivities, and
temperature and current gradients. *Sponsored by the U.S. D.O.E.

¹B. Coppi, *Phys. Fluids* **8**, 2273 (1965)

²B. Coppi, et al., *Phys. Rev. Lett.* **42**, 1058 (1978)

³B. Coppi, et al., 21 IAEA FEC(Chengdu, China), TH/R2-19, 2006

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