Abstract Submitted
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Incentives for and Developments of the Accretion Theory of Spontaneous Rotation* J. THOMAS, B. COPPI, MIT — Since the "accretion theory"[1] of the spontaneous rotation phenomenon was introduced, the body of observations supporting this theory has grown considerably. Accordingly, angular momentum is ejected from the toroidal plasma column by modes excited at its edge while angular momentum in the opposite direction resulting from the associated "recoil" force is transported from the outer region of the plasma column toward its center by another kind of mode. In the H confinement regime, the inward transport of angular momentum is associated with "VTG modes"[2] that involve the gradients of both the ion velocity $V_{\|}(r)$ and temperature $T(r)$ and have a phase velocity in the direction of v_{di}. The frequency of these modes, which depends on the combined effects of the (quasi- linear) ion transverse thermal conductivity and viscosity, vanishes if $\mathrm{d}V_{\|}/\mathrm{d}r = 0$. Given the formation of a steep density gradient at the edge of the plasma column in the H-regime, resistive ballooning modes[3] that have a phase velocity in the v_{de} direction, are the best candidates for the ejection of angular momentum in this regime and are consistent with observations. In the case of a colder edge with smaller electron pressure gradients, characterizing the L-regime, the relevant unstable mode acquires a phase velocity[3,2] in the direction of v_{di}. *Sponsored in part by the US DOE.

[1]B. Coppi, *Nucl. Fusion* **42**, 1 (2002) and B. Coppi, Paper IAEA-CN- 94-TH/P1-02, (Lyon, 2002) and MIT-RLE Report PTP02/05 (2002) and B. Coppi, *et al.*, Paper IAEA-F1-CN-TH3/7 (Yokohama, 1998).
[2]B. Coppi *et al.*, Paper 04.017, Proceedings, 2006 EPS Meeting P.P.
[3]B. Coppi and M. N. Rosenbluth, *Plasma Phys. Control Fus. Res.* **1**, 617 (1966).

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