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Observed Magnetic Island Rotation and Reconnecting Modes with Phase Velocity in the Ion Diamagnetic Velocity* P. BURATTI, ENEA, Frascati, B. COPPI, B. BASU, MIT — The modes that can produce magnetic reconnection in low collisionality regimes and that are driven by the plasma current density gradient are shown to have a characteristic phase velocity in the direction of the ion diamagnetic velocity [1]. Thus the initially formed magnetic islands rotate in the same direction. This result is consistent with the experimental observations of rotating magnetic islands, produced by "internal modes" excited in magnetically confined toroidal plasmas, with the caveat that the observed islands have gone through a non-linear evolution that is not covered by the presented theory. In the low collisionality regimes of interest there are to types of singularity to be removed i) that of the perturbed plasma current density removed by a local plasma finite "inductivity"; ii) that of the perturbed electron temperature (due to a large longitudinal thermal conductivity) removed by a finite transverse electron thermal conductivity. *Sponsored by the U.S. D.O.E. [1] P. Buratti, Nucl. Fusion, 56, 076004, (2016). [2] B. Coppi, Plasma Phys. Report, 42, 5, 383 (2016).

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