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[] Theory [

] Experiment

Motional Stark Effect and ECE Measurements of Rotating and Interacting Magnetic Islands on DIII-D,* F. Volpe, *Max-Planck-Gesellschaft*, M.E. Austin, *U. Texas-Austin*, R.J. La Haye, C.C. Petty, *General Atomics*, M.A. Makowski, *LLNL* – 2D images of magnetic islands rotating at few kHz prior to locking and/or with balanced neutral beams were resolved in electron cyclotron emission (ECE) measurements and corroborated by fast motional Stark effect measurements. Islands of various poloidal/toroidal mode numbers m/n were identified, including modes ambiguous on the basis of magnetics alone. O- and X-points were radially and toroidally localized by ECE. A real-time application to neoclassical tearing mode suppression by modulated EC current drive is proposed. The shape and internal structure of islands was also measured and transport and confinement within the island were inferred. When locked to each other, a well-developed $3/2$ mode deforms the $2/1$ island and gives rise to a $4/2$ component, or amplifies it if it is already present. This is ascribed to the attraction between parallel filaments of current. Ergodization of the islands is also observed in the very last stage before locking.

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