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Increased Efficiency of Off-Axis ECCD with Higher Electron Beta[1] R. PRATER, General Atomics, R.W. HARVEY, CompX, Y.R. LIN-LIU, J. LOHR, T.C. LUCE, C.C. PETTY, GA — Increased efficiency of off-axis electron cyclotron current drive (ECCD) has been obtained in DIII-D discharges with higher electron beta (β_e),[2] and these results have been understood in detail by studying computationally the particle fluxes in velocity space driven by the EC waves. Many applications of ECCD require driven currents at large minor radii where trapping of electrons in the magnetic well can significantly decrease the CD efficiency. However, the relativistic cyclotron resonance tends to shift in velocity space from the trapped-passing boundary for low-field-side launch as the electron temperature or density rise, reducing the counter-current and increasing the net efficiency toward that of the trapping-free Fisch-Boozer level. Calculations with the CQL3D Fokker-Planck code illustrate that the flux in velocity space due to rf-induced diffusion moves away from the trapping boundary for values of β_e which are realized in the experiments. Even for moderate β_e the resulting current drive efficiency approaches the value without trapping.

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[2]C.C. Petty, in Proc. 14th Topical Conf. on RF Power in Plasmas, Oxnard, California, 2001 (AIP, to be published).

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☐ Prefer Oral Session
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Special instructions: Poster 23, Stability, MHD, Current Drive, Advanced Tokamak

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