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## STUDY OF ELECTRON CYCLOTRON HEATING AND CURRENT DRIVE ON THE DIII-D TOKAMAK

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Auxiliary heating and current drive by injection of electromagnetic waves of electron cyclotron range of frequencies (ECH and ECCD) has been considered a prominent method of pressure and current profile control in tokamaks for achieving high  $\beta$  operation. Recent advances in gyrotron source technology made possible megawatt-level ECH and ECCD experiments, which become a major focus of world-wide tokamak research. In this presentation, we describe recent proof-of-principle ECCD experiments on DIII-D, in which localized off-axis current generation was clearly demonstrated for the first time. Comparison between experimentally deduced and theoretically calculated magnitudes and profiles of the non-inductive current will be presented. Effects of electron trapping, Ohmic electric field synergism, and quasi-linear enhancement on current drive efficiency will be summarized, and projection to parameter regimes relevant to Advanced Tokamak operation discussed.

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