Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Electron Profile Stiffness and Critical Gradient Length Studies in the Alcator C-Mod Tokamak[1] SAEID HOUSHMANDYAR, DAVID R. HATCH, KENNETH T. LIAO, BINGZHE ZHAO, PERRY E. PHILLIPS, WILLIAM L. ROWAN, Institute for Fusion Studies, The University of Texas at Austin, NORMAN CAO, DARIN R. ERNST, JOHN E. RICE, Plasma Science and Fusion Center, MIT — Electron temperature profile stiffness was investigated at Alcator C-Mod L-mode discharges. Electrons were heated by ion cyclotron range of frequencies (ICRF) through minority heating. The intent of the heating mechanism was to vary the heat flux and simultaneously, gradually change the local gradient. The electron temperature gradient scale length ($L_{Te}^{-1} = |\nabla T_e|/T_e$) was accurately measured through a novel technique, using the high-resolution radiometer ECE diagnostic [Houshmandyar *et al*, Rev. Sci. Instrum. **87**, 11E101 (2016)]. The TRANSP power balance analysis (Q/Q_{GB}) and the measured scale length (a/L_{Te}) result in critical scale length measurements at all major radius locations. These measurements suggest that the profiles are already at the critical values. Furthermore, the dependence of the stiffness on plasma rotation and magnetic shear will be discussed. In order to understand the underlying mechanism of turbulence for these discharges, simulations using the gyrokinetic code, GENE, were carried out. For linear runs at electron scales, it was found that the largest growth rates are very sensitive to a/L_{Te} variation, which suggests the presence of ETG modes, while the sensitivity studies in the ion scales indicate ITG/TEM modes.

[1]Supported by USDoE awards DE-FG03-96ER54373 and DE-FC02-99ER54512.

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Date submitted: 13 Jul 2017 Electronic form version 1.4