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A Study of Electron Modes in Off-axis Heated Alcator C-Mod Plasmas[1] C.L. FIORE, D.R. ERNST, MIT-PSFC, D. MIKKELSEN, PPPL, P.C. ENNEVER, N.T. HOWARD, C. GAO, M.L. REINKE, J.E. RICE, J.W. HUGHES, J.R. WALK, MIT-PSFC — Understanding the underlying physics and stability of the peaked density internal transport barriers (ITB) that have been observed during off-axis ICRF heating of Alcator C-Mod plasmas is the goal of recent gyro-kinetic simulations. Two scenarios are examined: an ITB plasma formed with maximal (4.5 MW) off-axis heating power; also the use of off-axis heating in an I-mode plasma as a target in the hopes of establishing an ITB. In the former, it is expected that evidence of trapped electron mode instabilities could be found if a sufficiently high electron temperature is achieved in the core. Linear simulations show unstable modes are present across the plasma core from r/a=0.2 and greater. In the latter case, despite establishing similar conditions to those in which ITBS were formed, none developed in the I-mode plasmas. Linear gyrokinetic analyses show no unstable ion modes at r/a <0.55 in these I-mode plasmas, with both ITG and ETG modes present beyond r/a=0.65. The details of the experimental results will be presented. Linear and non-linear simulations of both of these cases will attempt to explore the underlying role of electron and ion gradient driven instabilities to explain the observations.

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