Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Generation and Stability of Runaway Electrons During Rapid-Shutdown in DIII-D[1] A.N. JAMES, E.M. HOLLMANN, V.A. IZZO, G.R. TYNAN, UCSD, D.A. HUMPHREYS, P.B. PARKS, E.J. STRAIT, J.C. WESLEY, GA — We present results of runaway electron (RE) experiments with argon killer pellet induced rapid shutdowns. RE generation observed in x-ray emission before the current quench (CQ) presents a paradox where generation occurs before any loop voltage from the CQ. To explore this paradox, we conducted new JFIT analysis of magnetic data during rapid-shutdowns revealing an inductance drop during the thermal quench (TQ) before the CQ begins. In this loop voltage analysis, the often-neglected inductance drop term exceeds the current drop term and occurs earlier. RE generation via the Dreicer effect using this term is large, where prior neglect of this term predicted small RE generation. Many of these RE escape before avalanche in diverted shape, but less so in a limited shape. The RE plateau later terminates with a drop in edge q and toroidally asymmetric hard x-ray emission, both signatures of a kink instability, suggesting ideal MHD-like stability criteria for runaways.

[1]Work supported by US DOE under DE-FG02-07ER54917, DE-FG02-95ER54309, DE-FG02-07ER54912, & DE-FC02-04ER54698.

Alex James
University of California-San Diego

Date submitted: 17 Jul 2010 Electronic form version 1.4