Abstract Submitted
for the DPP98 Meeting of
The American Physical Society

Sorting Category: 5.1.1.2 (experimental)

**Evidence for Self-organized Criticality in Tokamak Plasma Transport**[1] R.A. MOYER, R. LEHMER, University of California, San Diego, T.H. RHODES, E.J. DOYLE, W.A. PEEBLES, C.L. RETTIG, University of California, Los Angeles, R.J. GROEBNER, General Atomics — Measurements of turbulence spectra and particle flux probability distributions from the DIII–D tokamak exhibit significant agreement with predictions of self organized criticality (SOC) theories. Power spectra of density $\tilde{n}$, floating potential, and particle flux $\Gamma$ have three regions of frequency dependence: low frequency $f^0$, intermediate frequency $f^{-1}$, and high frequency $f^{-4}$, consistent with power spectra observed in SOC modeling of various systems. The particle flux probability distribution function $P(\Gamma)$ for radially outgoing flux shows a $\Gamma^{-1}$ dependent region extending over two decades of $\Gamma$, a clear indication of self organized behavior. Radially inward flux, representing toppling events up the density gradient (which are outside the scope of the models), also displays a $\Gamma^{-1}$ dependent region. These measurements indicate that the plasma is in a state consistent with self organized criticality, and place a significant constraint on plasma transport models.

[1]Supported by U.S. DOE Grants DE-FG03-95ER54294, DE-FG0386-ER53225, DE-FG03-86ER-53266, and Contract DE-AC03-89ER51114.

[X] Prefer Oral Session
[ ] Prefer Poster Session

Richard Moyer
rmoyer@ucsd.edu
University of California, San Diego

Special instructions: DIII–D Oral Session I, immediately following DeBoo

Date submitted: July 16, 1998 Electronic form version 1.3