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Comparison of Tokamak Plasma Transport with Self-Organized Criticality Modeling[1] R.A. MOYER, R.D. LEHMER, University of California, San Diego, T.L. RHODES, E.J. DOYLE, W.A. PEEBLES, C.L. RETTIG, University of California, Los Angeles, P.A. POLITZER, R.J. GROEBNER, General Atomics — Measurements of turbulence spectra, particle flux probability distributions, and T_e perturbations from the DIII–D tokamak are found to agree with predictions of self organized criticality (SOC) theories. Power spectra of density, floating potential, and particle flux Γ have 3 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 Γ^{-1} dependent region extending over two decades in Γ, demonstrating the self-similarity predicted by SOC modeling. Perturbations in T_e which propagate radially at 100 m/s have been detected by cross-correlation of T_e measurements in the plasma core, and display some characteristics of SOC avalanches. These results indicate that the plasma is in a state consistent with self organized criticality, and place a significant constraint on plasma transport models.

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