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Finding equilibrium statistical mechanics in spatiotemporal chaos[1] C. CLARK ESTY, CHRISTOPHER C. BALLARD, JOHN A. KERIN, DAVID A. EGOLF, Department of Physics, Georgetown University — Ruelle has argued that the extensivity of the complicated dynamics of spatiotemporal chaos is evidence that these systems can be viewed as a gas of weakly-interacting regions of a characteristic size. We have performed large-scale computational studies of spatiotemporal chaos in the 1D complex Ginzburg-Landau equation and have found that histograms of the number of maxima in the amplitude are well-described by an *equilibrium* Tonks gas (and variants) in the grand canonical ensemble. Furthermore, for small system sizes, the average number of particles in the Tonks gas (with particle sizes and temperatures determined from fits to the CGL histograms) exhibits oscillatory, decaying deviations from extensivity in agreement with the deviations in the fractal dimension found by Fishman and Egolf. This result not only supports Ruelle's picture but also suggests that the coarse-grained behavior of this far-from-equilibrium system might be understood using equilibrium statistical mechanics.

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