Revealing the buidling blocks of chaos: Deviations from extensivity DAVID A. EGOLF, Dept of Physics; Georgetown University, MATTHEW P. FISHMAN, Dept of Physics; Georgetown University & Medical College of Wisconsin — Researchers have made relatively little progress in developing a predictive theory of far-from-equilibrium, spatially-extended chaotic systems. Even descriptions of the fundamental degrees of freedom and the nature of their interactions — central elements of statistical mechanics — are lacking. Using high- precision studies of the fractal dimension as a function of system length for the complex Ginzburg-Landau equation, we have uncovered deviations from extensivity on a length scale consistent with the chaotic length scale, indicating that this spatiotemporal chaotic system is composed of weakly-interacting building blocks, each containing about two degrees of freedom. Our results also suggest an explanation of some of the 'windows of periodicity' found in spatiotemporal systems of moderate size.

David A. Egolf
Dept of Physics; Georgetown University