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Experimental investigation of the transition to spatiotemporally chaotic convection with a system-size control parameter. DAN SPIEGEL, Trinity University — We employ soft-boundary electroconvection experiments with a system size that is controlled by modest laser heating to examine how the onset of spatiotemporal chaos (STC) depends on the size of the system. The experiment was motivated by recent computer simulations showing that Ginzburg-Landau STC is composed of definite interacting building blocks whose presence and size can be measured when the system size is only large enough to contain two or three building blocks. When we Fourier transform along the time axis of our spacetime diagrams for different system sizes, it becomes clear that temporal periodicity, averaged over spatial positions, is strongly quenched as the system size increases. The loss of temporal periodicity can be monitored quantitatively by measuring the fourth moment (kurtosis) of the temporal power spectra. From the kurtosis measurements one may then extract a natural chaotic length scale for the STC. We employ this length scale to attempt to determine the physical characteristics of the fundamental STC building blocks.

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