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Quantifying the complexity of random Boolean networks[1] XINWEI GONG, JOSHUA E.S. SOCOLAR, Department of Physics, Duke University — We study two measures of the complexity of spatially extended systems in the context of random Boolean networks. A measure defined by Shalizi et al. for cellular automata, based on a criterion for optimal statistical prediction [1], does not distinguish between the spatial inhomogeneity of the ordered phase and the dynamical inhomogeneity of the disordered phase. A modification in which complexities of individual nodes are calculated yields vanishing complexity values for networks in the ordered and critical regimes and for highly disordered networks, peaking somewhere in the disordered regime. Individual nodes with high complexity are the ones that pass the most information from the past to the future, a quantity that depends in a nontrivial way on both its own Boolean function and the location of the node within the network.

[1] C. R. Shalizi, K. L. Shalizi, and R. Haslinger, Phys. Rev. Lett. 93, 118701 (2004).

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[ ] Prefer Poster Session

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