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Dynamical properties of structured Boolean networks ANDREW POMERANCE, WOLFGANG LOSERT, MICHELLE GIRVAN, EDWARD OTT, University of Maryland, College Park — Boolean networks have been used since the 60s as a model for genetic control networks. In this model, each node takes on the value 0 or 1, modeling whether a gene is expressed or not, and updates at each time step according to a function of the value of its inputs. Random boolean networks (RBNs), where each node is randomly connected to other nodes and the function governing the dynamics is initially randomly generated, have been particularly well-studied. In particular, since these are deterministic, finite systems, the system must eventually settle into a periodic or fixed point attractor. A key question has been the scaling of the number of attractors with system size. In this talk we present results on how network structure effects the behavior of Boolean networks with randomly assigned dynamical rules. For example, we show that the number of attractors is dramatically increased by the addition of community structure to the network from the baseline RBN count with the same number of nodes. Furthermore, imposing bipartite structure on the network has little effect on the number of attractors.

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