

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Sampling networks with prescribed degree correlations¹ CHARO DEL GENIO, University of Warwick, KEVIN BASSLER, University of Houston, PÉTER ERDŐS, ISTVÁN MIKLOS, Hungarian Academy of Science, ZOLTÁN TOROCZKAI, University of Notre Dame — A feature of a network known to affect its structural and dynamical properties is the presence of correlations amongst the node degrees. Degree correlations are a measure of how much the connectivity of a node influences the connectivity of its neighbours, and they are fundamental in the study of processes such as the spreading of information or epidemics, the cascading failures of damaged systems and the evolution of social relations. We introduce a method, based on novel mathematical results, that allows the exact sampling of networks where the number of connections between nodes of any given connectivity is specified. Our algorithm provides a weight associated to each sample, thereby allowing network observables to be measured according to any desired distribution, and it is guaranteed to always terminate successfully in polynomial time. Thus, our new approach provides a preferred tool for scientists to model complex systems of current relevance, and enables researchers to precisely study correlated networks with broad societal importance.

¹CIDG acknowledges support by the European Commission's FP7 through grant No. 288021. KEB acknowledges support from the NSF through grant DMR?1206839. KEB, PE, IM and ZT acknowledge support from AFSOR and DARPA through grant FA?9550-12-1-0405.

Charo Del Genio
University of Warwick

Date submitted: 15 Nov 2013

Electronic form version 1.4