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Distributions of Betweenness in Cascades of Overload Failure in Random Regular Networks GILAD BARACH, MARK TUCHMAN, GABRIEL CWILICH, SERGEY BULDYREV, Yeshiva University — We study the Motter and Lai [1] model of cascading failures of a network by overload based on the betweenness centrality of the nodes, for the case of a random regular network. We study numerically by several means the disintegration of the network as a function of the fraction p of the nodes that survive an initial random attack: the size of the final giant component, the number of cascade stages, and the distribution of the betweenness of the nodes for different stages of the cascade. We find that the nature of the transition through which the network disintegrates changes from first order to second order as the tolerance increases. After this large drop, in which a substantial part of the network disintegrates, we find that the size of the final giant component does not decrease monotonically when increasing the size of the initial attack *(1-p)*, but rather presents a series of maxima and minima as a function of p. [1] Cascade-based attacks on complex networks, Phys. Rev. **E 66**, 065102(R) (2002)

Gilad Barach
Yeshiva University

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