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Laplacian Spectra of Random Hyperbolic Geometric Networks[1]
FLORIAN GREIL, KEVIN E. BASSLER, Department of Physics, University of Houston — Random geometric networks embedded in hyperbolic 2D space have been suggested as models of social networks where the spatial metric implements an interplay between popularity and similarity. [F. Papadopulos et. al., Nature **489**, 589 (2012)] We show that the eigenvalue spectrum of their combinatorial Laplacian matrix can be employed as a useful tool to understand the structural and dynamical properties of these networks. Features of the spectrum, including eigenvalue separation and localization, are associated with specific network properties. These properties are studied as a function of average node connectivity and curvature of the embedding space. For large networks, a transition in the properties of the network is found as the curvature varies. This transition is indicated by the development of power-law spectra at high curvature.

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