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Renormalization describes distinct regimes of information flow in complex networks[1] HERNAN ROZENFELD, City College of New York, CHAOMING SONG, Northeastern University, HERNAN MAKSE, City College of New York — The speed at which information travels from one site to another in a complex system is largely determined by the number of short-cuts within the network topology. It remains an important open question how to optimize the connectivity of the links in the network structure to minimize the travel time. Here we show that ideas taken from renormalization group theory applied to complex self-similar networks are essential to define distinct regimes of information flow within the network. We find that networks that are human decision based such as the WWW are sufficiently randomized to give a topology that is close to optimal. On the other hand, biological evolution-based networks show evidence of clear sign of a modular deterministic structure shaped by evolution showing suboptimal large-world character which may be even so as a mean of protection, preservation and conservation.

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