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Walking and searching in time-varying networks NICOLA PERRA, ANDREA BARONCHELLI, DELIA MOCANU, BRUNO GONCALVES, Northeastern University, ROMUALDO PASTOR-SATORRAS, UPC, ALESSANDRO VESPIGNANI, Northeastern University — The random walk process lies underneath the description of a large number of real world phenomena. Here we provide a general framework for the study of random walk processes in time varying networks in the regime of time-scale mixing; i.e. when the network connectivity pattern and the random walk process dynamics are unfolding on the same time scale. We consider a model for time varying networks created from the activity potential of the nodes, and derive solutions of the asymptotic behavior of random walks and the mean first passage time in undirected and directed networks. Our findings show striking differences with respect to the well known results obtained in quenched and annealed networks, emphasizing the effects of dynamical connectivity patterns in the definition of proper strategies for search, retrieval and diffusion processes in time-varying networks.

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