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Quarantine generated phase transition in epidemic spreading
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We study the critical effect of quarantine on the propagation of epidemics on an adaptive network of social contacts. For this purpose, we analyze the susceptible-infected-recovered (SIR) model in the presence of quarantine, where susceptible individuals protect themselves by disconnecting their links to infected neighbors with probability w, and reconnecting them to other susceptible individuals chosen at random. Starting from a single infected individual, we show by an analytical approach and simulations that there is a phase transition at a critical rewiring (quarantine) threshold w_c separating a phase ($w < w_c$) where the disease reaches a large fraction of the population, from a phase ($w >= w_c$) where the disease does not spread out. We find that in our model the topology of the network strongly affects the size of the propagation, and that w_c increases with the mean degree and heterogeneity of the network. We also find that w_c is reduced if we perform a preferential rewiring, in which the rewiring probability is proportional to the degree of infected nodes.

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