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Critical behavior of epidemic spreading in dynamic small world networks THOMAS STONE, SUSAN MCKAY, University of Maine — Dynamic small-world (DSW) contact networks model populations that have fixed short range links but time varying stochastic long range links between individuals, such as in mobile populations. The measure of mobility is given by a parameter p that is directly analogous to the rewiring parameter in standard small-world networks. This study investigates the relative effects of vaccinations and avoidance of infected individuals in a susceptible-infected-recovered (SIR) epidemic model on a DSW network. We derive (1) the critical mobility required for an outbreak to occur as a function of the disease's infectivity, recovery rate, avoidance rate, and vaccination rate and (2) an expression to calculate the amount of vaccination and/or avoidance necessary to prevent the disease-free to endemic transition. Agreement between these calculated points and numerical simulation is excellent. We then show via finite size scaling that the transition is indeed a continuous phase transition and find the associated critical exponent. From this and other scaling relations at the critical point we can comment on the model's potential universality.

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