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**A lattice model of parasite-host population dynamics**[1] BRIAN SKINNER, BEATE SCHMITTMANN, ROYCE ZIA, Virginia Tech — The study of simple parasite-host population models may help us advance fundamental understanding of nonequilibrium steady-states and provide insight into potential applications for controlling epidemics. Using Monte Carlo techniques, we investigate a model of interacting parasite-host populations in which parasites must come into contact with a host in order to reproduce. We treat the parasites and hosts as random walkers on a two-dimensional lattice with reflecting boundary conditions and vary the parasite death rate and the relative diffusion rates of the two species. For low death rates and slow host diffusion, steady state populations can exist and the resulting non-trivial spatial distributions are measured. We also explore the consequences of allowing the hosts to respond to local gradients in the parasite concentration. If the hosts are biased to move away from regions of high parasite concentration, an effective repulsion between hosts emerges. Both the population levels and the spatial distributions are observed to depend sensitively on the details of this response. Some aspects of these phenomena can be understood analytically.

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