Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Extinction Dynamics and Control in Adaptive Networks[1] IRA SCHWARTZ, Naval Research Lab, LEAH SHAW, College of William and Mary, JASON HINDES, Naval Research Lab — Disease control is of paramount importance in public health. Moreover, models of disease spread are an important component in implementing effective vaccination and treatment campaigns. However, human behavior in response to an outbreak has only recently been included in epidemic models on networks. Here we develop the mathematical machinery to describe the dynamics of extinction in finite populations that include human adaptive behavior. The formalism enables us to compute the optimal, fluctuation-induced path to extinction, and predict the average extinction time in adaptive networks as a function of the adaptation rate. We find that both observables have several unique scalings depending on the relative speed of infection and adaptivity. Finally, we discuss how the theory can be used to design optimal control programs in general networks, by coupling the effective force of noise with treatment and human behavior.

[1]Research supported by U.S. Naval Research Laboratory funding (Grant No. N0001414WX00023) and the Office of Naval Research (Grant No. N0001414WX20610)

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Date submitted: 08 Nov 2016 Electronic form version 1.4