

Abstract Submitted  
for the MAR16 Meeting of  
The American Physical Society

**Non-equilibrium relaxation in a two-dimensional stochastic lattice Lotka-Volterra model**<sup>1</sup> SHENG CHEN, UWE C. TÄUBER, Department of Physics, Virginia Tech — We employ Monte Carlo simulations to study a stochastic Lotka-Volterra model on a two-dimensional square lattice with periodic boundary conditions. There are stable states when the predators and prey coexist. If the local prey carrying capacity is finite, there emerges an extinction threshold for the predator population at a critical value of the predation rate. We investigate the non-equilibrium relaxation of the predator density in the vicinity of this critical point. The expected power law dependence between the relaxation time and predation rate is observed (critical slowing down). The numerically determined associated critical exponents are in accord with the directed percolation universality class. Following a sudden predation rate change to its critical value, one observes critical aging for the predator density autocorrelation function with a universal scaling exponent. This aging scaling signature of the absorbing state phase transition emerges at significantly earlier times than stationary critical power laws, and could thus serve as an advanced indicator of the population's proximity to its extinction threshold.

<sup>1</sup>This research is supported by the U. S. Department of Energy, Office of Basic Energy Sciences, Division of Materials Science and Engineering under Award DE-FG02-09ER46613.

Sheng Chen  
Department of Physics, Virginia Tech

Date submitted: 30 Oct 2015

Electronic form version 1.4