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Fast stochastic algorithm for simulating evolutionary population dynamics[1] LEV TSIMRING, JEFF HASTY, WILLIAM MATHER, University of California, San Diego — Evolution and co-evolution of ecological communities are stochastic processes often characterized by vastly different rates of reproduction and mutation and a coexistence of very large and very small sub-populations of co-evolving species. This creates serious difficulties for accurate statistical modeling of evolutionary dynamics. In this talk, we introduce a new exact algorithm for fast fully stochastic simulations of birth/death/mutation processes. It produces a significant speedup compared to the direct stochastic simulation algorithm in a typical case when the total population size is large and the mutation rates are much smaller than birth/death rates. We illustrate the performance of the algorithm on several representative examples: evolution on a smooth fitness landscape, NK model, and stochastic predator-prey system.

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