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Report on Davide Borrello thesis

Overall, this is a very good PhD thesis with some new and interesting ideas.

I particularly enjoyed the model on the Allee effect. As far as I know this is the first interacting particle modeling the Allee effect. The other models I know of are differential equations which in my opinion are less suitable.

Theorem 1.11 is interesting for several different reasons. From an ecological point of view it shows that if under environmental pressures the death rate for sparse local population δ_A increases too much then the population is doomed even if the local population is initially high everywhere. By stochastic effects the local populations will fluctuate and there will be a high probability that at a given site the local population will not bounce back after going down. The whole population will eventually disappear. This hypothesis: 'random fluctuations coupled with the Allee effect doom even a very large population' may be new in the ecological literature and may explain some of the mass extinctions.

Rinaldo Schinazi, Professor