Stability and diversity in random Lotka-Volterra systems with non-linear functional response

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Ecosystem stability is important for maintaining a healthy human microbiome, so understanding the factors that contribute to stability is of great relevance. We model an ecosystem of many interacting species, that evolve according to Lotka-Volterra dynamics, with interaction coefficients defined by a random payoff matrix. We investigate the effects of Holling type-2 inspired functional response on the stability of the ecosystem, and on its diversity. Our analysis is based on a path-integral approach, and verified with simulations. We find that non-linear functional response causes species growth to be bounded, increasing ecosystem stability. In the talk I will illustrate the model parameters, using examples of interactions found in nature. I will briefly discuss the generating-functional approach and the linear stability analysis, and discuss these results in terms of gut microbiota and explain how attributes of the host can influence its stability.
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