3yr Postdoc in ecosystem stability theory

Department of Biology, University of Maryland College Park

Application window

Open date: now
Review date: September 1, 2025 or earlier
Start date: late 2025 or 2026

Position description

Dr. Vadim Karatayev's Lab seeks a 3-year postdoctoral associate broadly interested in the effect of complexity on ecosystem stability. Despite much progress, ubiquitous features of nature remain unaddressed by theory on ecosystem stability, such as skewed species-abundance distributions at steady state, dynamic species interactions, environmental variation, and a gradient from short- to long-lived species as trophic levels increase. Numerical and analytical work shows that such natural features can weaken or even reverse May's paradox - making complexity stabilize ecosystems - but only under some conditions. Elucidating these conditions is a ripe area for theoretical and empirical work.

Research questions and methods will be primarily driven by the candidate's background and interests in linking features of nature with ecosystem stability theory. We are looking for candidates with existing or pending PhDs in theoretical physics, theoretical biology, mathematics, or a related field and a strong interest in biology. The ideal candidate will have a focus on analytical methods with experience in approaches such as random matrix theory, cavity method, or food web models. While not a core focus for this position, the postdoctoral associate can also lead or participate in theory-data projects leveraging the lab's experience in model-fitting, attractor reconstruction (Takens theorem), and large marine datasets.

The associate will be actively mentored by Vadim, and will also join an active community of theoretical biologists and physicists at UMD, including the labs of Bill Fagan, Joshua Weitz, Michelle Girvan, as well as a vibrant applied math community focused on theoretical biology.

The target start date is **November 2025**, but can also be anytime in 2026. The postdoctoral appointment will be three years. Anticipated annual salary is approx. $68,000, plus funds for relocation and conference/collaboration travel. As a postdoctoral associate, 20% of your time can be allocated to self-directed work.

Qualifications

Candidates that possess some but not all of these qualifications are still encouraged to apply, but the ideal candidate will:

- Have PhD in quantitative ecology, physics, applied math, or a closely related field
- Have experience building and simulating dynamical models
- Have some training and experience in statistics
- Have some experience in working with large datasets
- Be experienced in programming (e.g., Julia, R, Mathematica)

- Have excellent written and verbal communication skills
- Have experience leading independent research projects, and a record of first-author publications (commensurate with experience) in related topics
- Contribute to a supportive and inclusive professional culture in the Lab
- Be excited about theoretical biology

Application requirements

To apply please submit:

- Cover letter that includes:
  - ½ - 1 page on questions you'd like to pursue in this position,
  - your research accomplishments,
  - relevant training, and experience in analytical and numerical methods,
  - your future career interests, and
  - your anticipated start date.
- A CV.
- Contact information for three references.
- A writing sample, whether a published or draft manuscript.

Please send all materials by email to vadimk@umd.edu with the subject line "Ecosystem stability postdoc application".