

Answering Questions at the Intersection of Biology and Physics



Raghuveer Parthasarathy
Assistant Professor, Physics Associate Professor, Physics

CURRENT RESEARCH


Using advanced microscopy approaches to gain a better understanding of the behaviors of biomaterials and multicellular systems

All biological phenomena are in a sense physical - every cell within our body divides, moves, transports cargo, and communicates with its environment. This simple perspective allows Dr. Raghuveer Parthasarathy at the University of Oregon to merge his studies of biology and physics to explore how life works. He is currently working to develop a physical, quantitative understanding of the principles underlying the behavior of various biomaterials and multicellular systems, with a particular focus on the diverse ecosystem of microbes that lives in all of our digestive tracts. In other words: how do the physical characteristics of biological systems impact their function? Are there general laws that describe phenomena like the growth of bacterial colonies, migrations of cells, and interactions between species that can allow us to make sense of biological complexity?

He and his team develop experiments that explore phenomena like the colonization of the gut by microbes and the mechanics of cellular membranes in order to illuminate general principles governing how these complex systems function.

- **Microscopy Methods:** Dr. Parthasarathy and his team develop new optical microscopy and image analysis methods to directly visualize structure and dynamics and translate them into biophysical insights. They measure, for example, the growth rates with which microbial species colonize the gut and how different species compete and spatially segregate, establishing niches that determine the structure of the microbial community. They also can create predictive models to see how they function and respond to perturbations like antibiotics.
- **Microbiota:** We have roughly 10x as many...

AFFILIATION

 University of Oregon

EDUCATION

- Ph.D., in Physics, 2002 , University of Chicago
- A.B., in Physics, 1997 , University of California, Berkeley

AWARDS

- Miller Research Fellow; Chemistry; University of California, Berkeley, 2002-2005

RESEARCH AREAS

Life Science, Health IT

FUNDING REQUEST

Dr. Parthasarathy's team develop new microscopy methods; this is costly in terms of equipment. They are at a transition point between developing methods and applying them to quantify population dynamics of systems of gut microbes. They expect that the next few years will be particularly important for demonstrating meaningful insights from their model system. Your contributions will help sustain lab costs and personnel - graduate students (currently five) at \$40-50K/year who are the biggest recurring cost.

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