Joint Physics and Bioengineering COLLOQUIUM:

Harnessing the wisdom of the crowd: Watching bacteria coordinate their behavior in groups

Dr. Sujit Datta
Associate Professor of Chemical & Biological Engineering
Princeton University

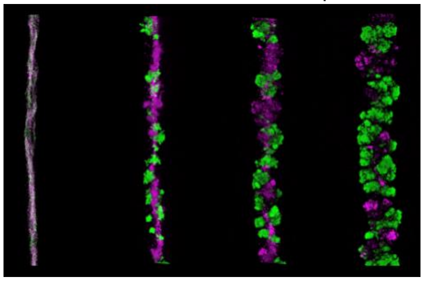
Date:
3/15/2024

Time:
10:30 AM – 11:50 AM

Location:
GRANITE PASS 135

About The Speaker:

Sujit Datta is an Associate Professor and Director of Graduate Studies of Chemical and Biological Engineering at Princeton University. He earned a BA in Mathematics and Physics and an MS in Physics in 2008 from the University of Pennsylvania, and then a PhD in Physics in 2013 from Harvard, where he studied fluid dynamics and instabilities in soft and disordered media with Dave Weitz. His postdoctoral training was in Chemical Engineering at Caltech, where he studied the biophysics of the gut with Rustem Ismagilov. Datta joined Princeton in 2017, where his lab (http://dattalab.princeton.edu) studies the dynamics, self-organization, and applications of complex, soft ("squishy"), and living systems. His scholarship has been recognized by awards from a broad range of different communities, reflecting its multidisciplinary nature, including through the AIChE Allan Colburn and 35 Under 35 Awards, ACS Unilever Award, Camille Dreyfus Teacher-Scholar Award, three awards from the APS (Early Career Award in Biological Physics, Andreas Arrivo's Award in Fluid Dynamics, and the Apker Award), the Arthur Metzner of the Society of Rheology, Pew Biomedical Scholar Award, NSF CAREER Award, and multiple commendations for teaching.



Abstract:

Bacteria are arguably the simplest form of life; and yet, as multi-cellular collectives, they perform complex functions critical, to environment, food, health, and industry. What principles govern how complex behaviors emerge in bacterial collectives? And how can we harness them to control bacterial behavior? In this talk, I will describe my group's work addressing this question using tools from soft matter engineering, 3D imaging, and biophysical modeling. We have developed the ability to (i) directly visualize bacteria from the scale of a single cell to that of an entire multi-cellular collective, (ii) 3D-print precisely structured collectives, and (iii) model their large-scale motion and growth in complex environments. I will describe how, using this approach, we are developing new ways to predict and control how bacterial collectives — and potentially other forms of "active matter" — spread large distances, adapt shape to resist perturbations, and self-regulate growth to access more space by processing chemical information in their local environments.

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