ASU Department of Physics
Arizona State University

COLLOQUIUM

Thursday, December 5, 2024

Refreshments at 3:15pm outside PSF 101
Colloquium from 3:30pm - 4:30pm in PSF 101

The Blob: Topologically Entangled Living Matter

Professor Saad Bhamla

Georgia Institute of Technology

Abstract:

Tangled active filaments are ubiquitous in nature, from chromosomal DNA and cilia carpets to root networks and worm collectives. How activity and elasticity facilitate collective topological transformations in living tangled matter is not well understood. In this talk, I will share our discoveries on why aquatic worms braid, tangle, and knot with their neighbors to form extraordinary mechano-functional living blobs - the stuff of science fiction. I will discuss how these soft, squishy, and 3-D blobs rapidly morph their shape, crawl, float, climb, self-assemble, and disassemble topological tangles. Using both mathematical models and robotic analogs, I will discuss how these “living polymers” solve Gordian knot problems using clever biophysics mechanisms that open a path to new classes of active topologically tunable robotic swarms.

Biography:

Dr. Bhamla studies biomechanics across species to engineer knowledge and tools that inspire curiosity. A self-proclaimed "tinkerer," his lab is a trove of discoveries and inventions that span biology, physics and engineering. His projects include studying insect hydrodynamics, worm blob locomotion, and ultra-low-cost devices for global health. His work has appeared in the New York Times, the Economist, CNN, Wired, NPR, the Wall Street Journal and more. Dr. Bhamla is an Associate Professor at Georgia Tech.

Dr. Bhamla is also a prolific inventor. His most notable inventions include a 20-cent paper centrifuge, a 23-cent electroporator, and the $1 hearing aid. His work is recognized by numerous awards, including the DARPA Young Faculty Award, Moore Inventor Fellowship, NIH Outstanding Investigator Award, NSF CAREER Award, Junior Faculty Teaching Excellence Award, and INDEX: Design to Improve Life Award. He is a National Geographic Explorer and TED speaker. His dedication to making science accessible has been honored with the National Academies' Eric and Wendy Schmidt Award for Excellence in Science Communication. In 2023, Newsweek recognized Dr. Bhamla as 1 of 10 Innovators disrupting healthcare.

Host: Prof. Rizal Hariadi

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