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Klug Room (Boelter Hall 8500)

Electronically Integrated Autonomous Microscopic Robots

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ABSTRACT: What would we be able to do if we could build electronically integrated machines the at a scale of 100 microns? At this scale, semiconductor devices are small enough that we could put the computational power of the spaceship Voyager onto a machine that could be injected into the body. Such robots could have on board detectors, power sources, and processors that enable them to sense, interact, and control their local environment. In this talk I will describe several cutting edge technologies we are developing to achieve this vision.

BIO: Professor Itai Cohen studies the physics of matter in motion. At Cornell, his research has focused on building microscopic robots, controlling the shear thickening behavior of microscopic and nanoscopic particles suspended in a fluid, exploring the mechanics of materials ranging from biological tissues to origami inspired metamaterials, discovering the aerodynamic and neuromuscular mechanisms used by insects during flapping flight, and determining how audiences at heavy metal concerts coordinate their movement. Understanding how emergent behaviors arise from the microscopic rules governing these systems remains one of the biggest challenges in Physics. Professor Cohen received his BS in Physics from the University of California at Los Angeles, and his PhD in Physics from the University of Chicago. Following his graduate studies, he was a Post-doctoral fellow in Physics and the Division of Engineering and Applied Science at Harvard University. In 2005 he joined Cornell and is currently a professor of Physics. Professor Cohen is an NSF Career grant recipient, he is a Fellow of the American Physical Society, and is the recipient of the Kappa Delta Ann Doner Vaughn Award for his work on cartilage mechanics. He has served as a Feinberg and Braginsky fellow (2012) and the Rosi and Max Varon Visiting Professor at the Weizmann Institute (2021) and the van der Waals Visiting Professor at the University of Amsterdam (2022). He has published over 110 research articles, given nearly 300 invited seminars, colloquia and conference presentations, and co-authored the book Finding Your Research Voice: Story Telling and Theater Skills for Bringing Your Presentation to Life. His work has been covered by various outlets ranging from the BBC, to Scientific American, NPR, and the NYTimes.