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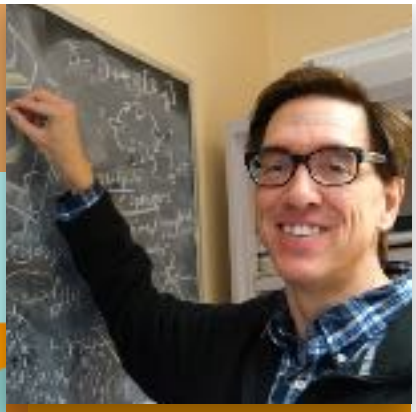
KAVLI INSTITUTE FOR THEORETICAL PHYSICS

Chalk Talk



Alien Technology 101:
From Cells to Neutron Stars

Eukaryotic cells (the cells that make up me and "eu") have an alien technology that is largely mysterious to us. By that I mean that cells function along principles that are quite different from our own technologies. Recently, a striking shape was glimpsed in the inner reaches of these cells — the so-called *Terasaki ramps*. This shape looks like a helical ramp connecting a stack of parallel layers, something like a multi-level parking garage. Finally, a design principle we recognize! Yet, surprisingly, very similar shapes are found in computer simulations of dense nuclear matter, the type of matter expected to occur in the crusts of neutron stars — this despite the fact that nuclear matter is 14 orders of magnitude denser than matter in our cells, and that it is a consequence of the strong interaction governing protons and neutrons. Nonetheless, the very similar structures suggest that both systems may have similar dynamics and that the shapes are indeed determined by geometry, independent of microscopic details. I'll discuss these mysterious connectors and connections and whether they can used to understand both new intracellular shapes as well as new phenomena in the crusts of neutron stars.

Wednesday, November 15, 2017

Kohn Hall, UCSB

5:30 Courtyard Reception

6:15 - 7:15 Presentation and Discussion

Attendance by Reservation Only
RSVP by Monday, November 13:
Online: https://www.kitp.ucsb.edu/chalk-talk-rsvp
Phone: (805) 893-6307 *or* friends@kitp.ucsb.edu

Lot 10 parking
As you enter campus from Hwy 217, turn right onto Mesa Rd, merge into the left lane, and at the stop light turn left into Parking Structure 10. Park, buy a permit from the dispenser (near the elevator and stairs), and display the permit on your dashboard. The KITP is right next door to the parking structure.

Greg Huber
Visiting Scholar, KITP

Huber is a biological physicist with a background in statistical mechanics, fluid mechanics and dynamical systems theory. He earned his B.S. degree from M.I.T., and his Ph.D. from Boston University. He has taught at the University of Arizona, the University of Massachusetts, and the University of Connecticut. He moved to UC Santa Barbara in fall 2012, when he became a Deputy Director at the Kavli Institute for Theoretical Physics. He has worked on a range of problems from phase transitions and turbulence, to pattern formation in soft matter, to how bacteria swim. Most recently, he has been working on the shapes of membrane-bound organelles in eukaryotic cells, and on the fluid mechanics of the swimming of spirochetes. As a Deputy Director at the KITP, he has been concerned with creating new ties between Physics and Biology, and with outreach to the broader community.