Physics Colloquium

Prof. Edward R. Lyman
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“You are what you eat, and there are biophysical consequences!”

The membranes of our cells are made of fats and protein, arranged into a very thin fluid sheet. The viscous and elastic properties of our membranes are critical to their function, since they control a variety of biological processes, including cell signaling and viral entry. Following recent advances in analytical methods, we now know that the lipid fraction of our cells is chemically complex, but what exactly is regulated? Surely it can't be the case that each of 800 different lipids is actively tracked and regulated by our cells! Indeed, it appears that cells care more about gross properties, like viscosity and bending stiffness, than about the detailed chemical zoo that underlies it all. In this talk, I will share some of our recent work towards rationalizing the continuum properties of membranes from molecular interactions. Our main tool is molecular simulations informed by theory, but I will present experimental data on membrane viscosity and lipid diffusion obtained by our friends and collaborators.

Prof. Lyman received his Ph.D. in physics from Virginia Tech, where he studied nonequilibrium critical phenomena with Beate Schmittmann. He then did a post-doc in the Department of Computational Biology at the University of Pittsburgh with Dan Zuckerman. While in Pittsburgh he focused on methods development for biomolecular simulation, with an emphasis on statistically rigorous approaches for sampling protein conformation space. He then moved to Salt Lake City, UT, where he joined the lab of Greg Voth. In Utah he worked on membrane protein simulation and multiscale simulation methods development. He joined the faculty at the University of Delaware in January 2011 with a primary appointment in Physics and Astrophysics and a secondary appointment in Chemistry and Biochemistry. He was promoted to Associate Professor with Tenure in May 2017.

Thursday, September 16 in LL 316 at 4:25

For Zoom participation, please see information below:

Meeting ID: 972 1274 7894

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