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PHYSICS COLLOQUIUM 293

Molecular Biophysics of Hearing

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ABSTRACT

Our sense of hearing has four remarkable characteristics: amplification, frequency selectivity, nonlinear compression, and otoacoustic emissions–pure tones emitted from our ears. These cardinal features must stem from an active process, because no passive system at equilibrium could account for such phenomena. Research over the last decades has suggested that this activity stems from a complex interplay between the transduction channels and the adaptation motor powered by myosin molecules. To better understand the motor's remarkable function, we introduce a theoretical description of myosin's chemomechanical cycle based on experimental data from recent single-molecule studies. By combining findings on different spatial scales in a consistent manner, mathematical descriptions help us understand how physiologically relevant function is determined by the interplay of molecular components.

BIO:

Dr. Berger applies concepts from stochastic and nonequilibrium physics to understand the molecular basis of intracellular transport and auditory function. Before joining the Laboratory of Sensory Neuroscience at the Rockefeller University in New York as a postdoctoral researcher, he obtained his Ph.D in theoretical physics at the Max-Planck Institute Potsdam in Germany. He is a fellow of the Alexander von Humboldt society.