Abstract: Unlike traditional materials, living cells actively generate forces at the molecular scale that change their overall structure and mechanical properties. This nonequilibrium activity is essential for cellular function, and drives processes such as division, migration, and organization. In the first part of this talk, I will discuss how cells throughout the body (e.g. muscle, heart, tissue, and brain) must act as active mechanical systems to keep us alive. In the second part, I will discuss recent advances that allow quantification of nonequilibrium activity in living cells and insight on the molecular-scale driving forces. An understanding of active mechanics in living cells will uncover the basic physical principles driving biological processes and inspire new advances in nonequilibrium physics and materials science.

Biography: Wylie Ahmed is a Marie Skłodowska-Curie Fellow in the Physical Chemistry Department at the Institut Curie in Paris, France. He received his Ph.D. from the University of Illinois at Urbana-Champaign for studying the mechanics of neurons in fruit flies and sea slugs. Before his Ph.D., he studied the mechanosensitivity of muscle stem cells at the Max Planck Institute for Intelligent Systems in Stuttgart, Germany. His current interests focus on understanding the nonequilibrium physics of soft, living, and active matter systems from the molecular to macroscopic scale.