Design principles governing the motility of myosin motors

Dr. David Thirumalai
University of Maryland
Feb. 4 4:00 PM SERC 108A

Myosin V, two-headed motor protein and a member of the myosin super family, ferries cellular cargo by walking hand-over-hand on actin filaments. Interplay between ATD, driven conformational changes in the motor head and stress due to load produces a variety of stepping dynamics: the motor can step forward or backward, or "stomp", where one of the heads detaches and rebinds to the same site. I will present theory that captures all these behaviors, quantitatively matching a wide array of single molecule experiments. The theory lays out the structural and chemical design principles underlying the motor’s robust function, which provides a guide for how bioengineering might alter its dynamics[1]. The theoretical results will be complemented with simulations describing the role the internal dynamics of the motor domain plays in motility[2].