MONDAY

COLLOQUIUM

The Dynein Motor, it's Catch-Bond, and Beyond

Roop Mallik (IIT, Bombay)

22 Jun 2026 (Monday) | 16:00 Hrs (Tea / Coffee 15:45 Hrs) | Venue: TIFRH Auditorium

Biology often shows examples of a counter-intuitive "Catch-bond" state, where mechanical shear force causes Receptor-Ligand interactions to get stronger. The Kinesin and Dynein Motor proteins generate force in opposite directions, engaging in Tug-of-Wars to transport vesicles in back-and-forth manner inside cells. Tug-of-Wars likely cause Dynein to get catch-bonded to the microtubule and resist detachment against force from Kinesin. Beyond this possibility, we now propose that a structural deformation in Dynein during Tug-of-wars forces Dynein into an off-pathway inactive state. Dynein needs time to recover from this inactive state, permitting Kinesin to engage, thus allowing for the back-and-forth transport of vesicles. We present direct evidence for this phenomenon by inducing a Catch-bond in Dynein using an Optical trap. To the best of our knowledge, a post-catch bond inactive state has never been discussed for any Receptor-Ligand interaction interaction in Biology.

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