

Wright State University

Physics Department Seminar – Faculty Candidate

Thursday, March 23, 2017

2:00 pm, Medical Sciences Building 141

**"Electrostatic interactions play important roles
in molecular motors' motilities"**

Dr. Lin Li

Clemson University

Electrostatic interactions play important roles in many biology phenomena. Therefore, a lot of efforts have been made to model the electrostatic interactions in biological systems. However, it is extremely challenging to accurately calculate the electrostatic interactions in large biological systems such as dynein, a molecular motor important for cargo transportation and force generation in cells. Dysfunction of dynein is associated with many diseases, such as ciliopathies, lissencephaly and other neurodegeneration disorders. I will introduce a novel multi-scale simulation approach which is used to study dynein's motion along microtubules. The electrostatic binding funnel around microtubule is observed, which drags the dynein to the binding pocket. The electrostatic forces on dynein residues form a torsion which reorients the dynein when it is in an un-native orientation. Furthermore, the electrostatic component of the binding energy of dynein and microtubule strongly affects the velocity and run length of the dynein. These results reveal the mechanisms of dynein's motilities along microtubule. Understanding such fundamental mechanisms sheds light on curing many molecular motor related diseases.

Lin Li is a scientist in the area of computational biophysics. His research mainly focuses on two directions: developing novel computational tools; and applying computational tools on biological problems. One of his main interests in biophysics is revealing the mechanisms of molecular motors' motions. He received his Ph.D. at Huazhong University of Science and Technology in 2011. From 2011 to 2016, he worked a Postdoc and then Research Associate in Clemson University. He is currently a Research Assistant Professor in Clemson University. He has published 30 publications and obtained several Intellectual Properties.