Departments of Physics Colloquium

Modeling Biophysical Processes at the Bio-Nano Interface

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Friday, Sept. 30, 2016
1:30 – 2:30 PM
Venue: RB 130, MMC

Abstract: Recent advances in fabrication techniques permit the application of nanomaterials in a wide range of biological research. In the first part of the talk, I will discuss the synthetic nanopore sensors that could be used to analyze DNA and proteins. The Transport process of a biomolecule through a nanometer-sized hole cannot be directly observed in experiment and is commonly inferred only from ionic currents through the pore. From all-atom molecular dynamics (MD) simulations, I will reveal the underlining physics of molecular transport through a nanopore. In the second part of the talk, I will talk about the potential toxicity of synthesized nanomaterials to human. While nanoparticles (e.g. TiO_2, graphene and MoS_2) are promising in many applications, their potential toxicity to human is still largely unknown. Accompanied with existing experimental studies, extensive MD simulations have unveiled many surprising interactions between biological molecules (e.g. membrane lipids and proteins) and nanoparticles, suggesting potential nanotoxicity.

Biography: Binquan Luan is a research staff member in IBM computational biology center. He received his PH. D. in physics from Johns Hopkins University, after visiting the Institute of Theoretical Physics at the University of California Santa Barbara as a graduate fellow. After the postdoctoral training in the University of Illinois at Urbana-Champaign, he joined IBM T. J. Watson research center as a research scientist and subsequently became a staff member in the group of soft matter theory and simulation. He has received IBM invention achievement award and the outstanding technical achievement award. His current research is focused on nanoscale mechanics and energetics in a biological or biomimetic system.

The event is free and open to the public.

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