

BIOINFORMATICS SEMINAR

BIN WU

Assistant Professor

JOHNS HOPKINS UNIVERSITY

PROBING SINGLE ALLELES AND MRNAS IN LIVE CELLS

My lab is interested in how cell regulates its gene expression at the right time and place. We use single molecule imaging approach to visualize various processes in central dogma. We apply genetic method to label nucleic acid in order to visualize genomic locus, transcription and translation. We also develop optogenetic and chemigenetic to manipulate protein and nucleic acid to perturb gene expression. These tools allow us to probe central dogma at the single molecule resolution in live cells.

BIOGRAPHY

Dr. Bin Wu is an Assistant Professor in the Department of Biophysics and Biophysical Chemistry at the Johns Hopkins University. Dr. Wu received his doctorate in Biophysics from the University of Minnesota. His lab is interested in visualizing and quantifying biological events as they happen in situ at real time. They use single molecule imaging and spectroscopy technology in live cells, combined with theoretical modeling to extract dynamic biological information. Currently, the lab is working on how cells regulate gene expression. Gene expression has to be tightly controlled both temporally and spatially for an organism to survive and prosper. Dysfunction in local regulation of gene expression is one of the most common sources of developmental and neurodegenerative disease. The laboratory focuses on this fundamental process by visualizing and manipulating the birth, trafficking, translation and decays of single RNA molecules in live cells and tissue. They recently developed a method called single molecule imaging of nascent peptides (SINAPS) to visualize translation of single mRNAs. With SINAPS, one can answer biological questions that are intractable before, such as the location of translation, the translation speed of ribosome in cells, the initiation and release rate of ribosome, the relationship between splicing, decay and translation, the effect of untranslated region on translation, etc. We are also interested in local translation in neuronal, such as the effect of synaptic stimulation and dendritic translation, local translation in the axonal growth cone. Besides purely observation, the lab is also focused on developing optic method to manipulate gene expression in live cells in hope to turn on or off expression of particular gene anywhere in a cell.

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