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PHYS 493 Dr. Lau
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Colloquium Date: 28 February 2018
Colloquium Speaker: Dr. Brandon Choi
Colloquium Title: Single Molecule Florescence Reveals Dynamic Structures of Synaptic Protein Assemblies
Speaker Affiliation: Brunger Lab, Howard Hughes Medical Institute, Department of Molecular and Cellular Physiology at Stanford University

Dr. Choi uses optical instruments and biological tagging to isolate single molecules in a sample of about 200 molecules. Through the use of prisms, his lab is able to achieve this isolation and look at the distance between molecules and their binding partners through their florescence. This distance is found through the absorption and emission of light from the tagged molecules, and their relative intensities. From this information, he is able to determine if the molecules are in a bound or unbound state through the analysis of the relative intensity of the light. The analysis involves finding the energies associated with the distance from the intensities, and plotting a Gaussian curve form many measurements. This plot can help determine the effects of other proteins and molecules in the solution on the fusion of membranes, assembly of protein complexes, and the disassembly of the complexes in synaptic cells. Specifically, Dr. Choi has studied the effects of the munc 13 and munc 18 protein structures on the assembly process, the effect that these proteins have on the calcium dependence of the binding, as well as the effect that the NSF protein has on the disassembly process. I very much enjoyed his talk, even though much of the terminology went over my head. I enjoyed that he briefly mentioned his future work with the p97 protein, whose mutations have been linked with the ASL disease. I would have like him to discuss the statistical mechanics of these experiments further, and give some estimated for the binding energies of the assembly process. Overall, I thought that this talk was excellent, and I truly hope to hear more about the progress of the work with the p97 proteins, as the binding information could help lead to a cure for ALS. Protein dynamics deeply interests me, and I hope to study it in graduate school more.