Joint CQSE and CASTS Seminar

Weekly Seminar
Apr. 28, 2017 (Friday)

TIME Apr. 28, 2017, 14:30 ~ 15:30
TITLE Beyond The Diffraction Limit By Light-Sheet Microsocpy
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Abstract

Unlike conventional fluorescence imaging based on the epi-illumination configuration, light sheet-based microscopy uses a separate excitation lens perpendicular to the wide-field detection lens to confine the illumination to the neighborhood of the focal plane. By combining the intrinsic optical sectioning with wide-field detection, light sheet microscopy allows fast imaging speeds to record multi-megapixel imaging of the selected plane in a single exposure. In order to break diffraction limit, coupled with structural illumination, we are now able to achieve final lateral and axial resolutions of 130 nm and 200 nm, respectively. On the other hand, one could combine the advantage of localization microscopy and light-sheet microscopy to have super-resolved cellular imaging in 3D across large field of view. With high-density labeled spontaneous blinking fluorophore and wide-field detection of light-sheet microscopy, these allow us to construct 3D super-resolution multi-cellular imaging at high speed (~minutes) by light-sheet single-molecule localization microscopy. Extended from cultured cells, the technique could be applied to Drosophila brain in synaptic-scale connectomics. Instead of sweating on the super-resolution techniques to pursuit high spatial resolution, expansion microscopy (ExM) is invented to detour the optical diffraction limit by physically expanding the samples to ~4 times larger than original with swellable polymer. Light sheet expansion microscopy provides a tool for visualizing the nanoscale structure inside subcellular component with large volume imaging in a second.