Biophysics 210: Biological Light Microscopy
Discussion Section 9: Super-resolution Microscopy

Topics for Discussion

- Consider the super-resolution approaches of structured illumination microscopy (SIM), stimulated emission depletion microscopy (STED), and localization microscopy (STORM, PALM). What are the underlying principles that allow each approach to resolve structures beyond the diffraction limit? Which approaches are most similar to each other?

- Consider the biological experiments that are most and least amenable to each super-resolution approach. Are there specific sample requirements for the different super-resolution approaches that would restrict the types of samples that can be imaged with them? What sorts of things should one consider before starting a super-resolution experiment? How would sample preparation impact the quality of the data collected, particularly for localization microscopy? What factors can degrade your image quality?

- What kind of spatial resolution can be achieved by SIM, STED, and STORM/PALM in x,y, and z? What factors impact this resolution? What are you giving up in order to improve spatial resolution?