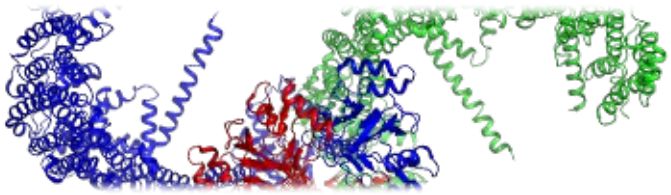

Sunday, February 19
1:30 PM – 3:00 PM
Room 9
Mad City Labs Inc

Open & Flexible Microscopy Systems For Combined Single Molecule Methods
Speaker: *Eric Drier, Senior Scientist, Mad City Labs Inc*
Open and flexible microscopy systems have distinct advantages for implementing novel biophysical methods. This session focuses on 3 such systems, each of which combines precision motion control with single molecule measurements.

Quantification of Lipid Diffusion Dynamics On Live Cell Membranes Through Interferometric Scattering Microscopy
Speaker: *Francesco Reina, Leibniz-Institut für Photonische Technologien e.V. and Institute of Applied Optics and Biophysics, Friedrich Schiller University Jena, Germany*
The study of single lipid dynamics on membranes requires simultaneously high localization precision and temporal resolution, a feat that few microscopy techniques are able to achieve. We show how Single Particle Tracking through Interferometric Scattering (ISCAT) microscopy has given us new insights in the compartmentalization of plasma membrane structure, and the diffusion modes of single, gold-nanoparticle tagged lipids. The tracked lipids appear to diffuse through a “hopping” motion between compartments of nanoscopic size (100-120nm) with a probability of crossing the boundary. These results were confirmed with the use of particle diffusion simulations in a corralled, two-dimensional plane, which also serve to estimate the “hopping” probability.

A Single-Molecule View On Dynamic Chromatin Access of Epigenetic Regulatory Factors
Speaker: *Beat Fierz, École Polytechnique Fédérale de Lausanne, Switzerland*
The dynamic organization of the eukaryotic genome into chromatin is integral to its regulation. We develop single-molecule colocalization imaging and single-molecule FRET approaches to directly observe the dynamic architecture of chemically defined chromatin fibers. We found that local chromatin undergoes structural fluctuations on the micro- to millisecond timescale. Internal chromatin dynamics are exploited by transcription factors to invade chromatin structure. Using single-molecule imaging, we recently revealed DNA access mechanisms for pioneer TFs, genome editors and centromeric proteins. Overall, our results show that compact chromatin structure hinders factor access, but mechanisms that open nucleosome contacts, including histone variants and chromatin remodeling complexes can help key factors to overcome these obstacles.

Magnetic Tweezers Investigations of the Type IA Topoisomerase of Mycobacterium Smegmatis
Speaker: *Maria Mills, Department of Physics and Astronomy, University of Missouri*
Type IA topoisomerases relieve torsional strain in supercoiled DNA. These enzymes work by cleaving the backbone of one strand of a DNA duplex, passing the other strand through the break, and re-ligating the DNA. We have used magnetic tweezers to characterize *Mycobacterium smegmatis* topoisomerase I (MsmTOP1). In addition to a conserved core domain common to all type IA topoisomerases, Mycobacteria type IA topoisomerases have unique DNA-binding C-terminal domains that are involved in passage of the second DNA strand through a protein-mediated DNA gate. In separate magnetic tweezers assays, we measured the supercoil relaxation activity and DNA-gate dynamics of the wildtype and mutants lacking portions of the C-terminus. Our results provide new information on the role of these C-terminal domains in the topoisomerase activity.