UNIVERSITY OF UTAH
CENTER FOR CELL AND GENOME SCIENCE

SEMINAR

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"Optical Tweezers: Gene Regulation, Studied One Molecule at a Time"

Advances have led to the new field of *single molecule biophysics*. Single-molecule techniques can record characteristics that are obscured by traditional biochemical approaches, revealing behaviors of individual biomolecules. Prominent among the techniques is the laser-based optical trap, or 'optical tweezers,' which uses radiation pressure. Optical traps can now measure biomolecular properties with a precision down the atomic level—achieving a resolution of 1 angstrom over a bandwidth of 100 Hz—while exerting controlled forces in the piconewton range. Among the successes for optical traps have been measurements of the molecular steps produced by motor proteins (for example, kinesin and myosin) and by processive nucleic-acid enzymes (for example, RNA polymerase), determinations of the strengths of noncovalent bonds between proteins, and studies of the energetics and kinetics of structure formation by nucleic acids. Optical trapping instruments have been particularly useful in mapping the energy landscapes for folding RNA molecules. Beyond that, we're now able to follow the co-transcriptional folding of RNA in real time, as it's synthesized, revealing how such folding can regulate downstream genes, mediated by structured elements called *riboswitches*. In recent developments, optical traps have been used in conjunction with single-molecule FRET (Förster Resonance Energy Transfer) to report on the folding configurations and internal degrees of freedom in biomolecules.

Wednesday, February 22, 2017
4 pm, Room 210 ASB

Refreshments before seminar

Host: Dr. Michael Vershinin

Questions? Jason Socci 1-6517