ADDITIONAL USEFUL TERMINOLOGY

The workshop organizers asked speakers and panelists to submit any terminology they wanted participants to be aware of. This document includes all the terminology and explanations that were submitted. It provides a useful reference to help understand the keynote talks and the discussion that the panelists will engage in.

KEYNOTE TALKS

Interaction-Free Measurement – A measurement that takes advantage of quantum wavefunction collapse to reduce the interaction of a probe particle with the object to be sensed.

Cryo-Electron Microscopy - The use of transmission electron microscopy at cryogenic temperatures. Flash-freezing samples prevents water from forming crystals, preserving the molecular structures as they would be in their native environment. Typically, cryo-EM involves computational methods to reconstruct the structure of molecules and cells in 3-D at unprecedented resolution (atomic or near atomic).

SESSION I: PROBING INTRACELLULAR AND INTERCELLULAR CORRELATIONS IN BIOLOGY

Terahertz Radiation – Electromagnetic fields oscillating at frequencies within the terahertz range.

Bose-Like Phonon Condensation – A phenomenon channeling all or almost all the energy fed to a macromolecule into a synchronized oscillatory motion of the atoms and groups of atoms composing the macromolecule.

Intermolecular Electrodynamic Interactions – Biomolecules (proteins and nucleic acids) are usually charged and have non-vanishing electric dipole moments, thus, when vibrating, these molecules can produce electromagnetic fields and can mutually attract or repel through these fields. Thermally driven random vibrations generate very weak fields, which is not the case of coherent collective vibrations that can bring about stronger force fields.

Metallome – The ionic content and composition of a cell.

SESSION 2: BIOELECTROMAGNETIC FIELDS

Blastema – A mass of progenitor cells that are produced at a wound site, which will go on to form tissues and organs.

Proliferation – The process of cell division to increase the number of cells.

Radical Recombination – The bonding of radical molecules to reform the parent (non-reactive) molecule.

ROS (Reactive Oxygen Species) – Reactive molecules such as the radical superoxide, and its downstream derivative hydrogen peroxide, that can act as signaling molecules to regulate many biological activities including cell growth and cell death.

Static Weak Magnetic Fields (WMFs) – Static magnetic fields less than 1 mT.

SESSION 3: QUANTUM PHOTONICS IN BIOLOGICAL SYSTEMS

Spontaneous Parametric Down Conversion – How entangled photons are generated.

Transient Absorption – A popular laser method for measuring femtosecond to nanosecond lifetimes and chemical kinetics (many variations).

Fluorescence Correlation Spectroscopy (FCS) – The diffusing of fluorescent molecules in a small volume of excitation that behave according to Poisson statistics. As a function of time, fluctuations emitted by the same individual fluorophore diffusing through the volume can be analyze statistically, by using the autocorrelation function to obtain the diffusion transit time within the volume of excitation.

Photon Counting Histogram (PCH) – The variance of spontaneous fluorescence fluctuations is equal to the molecular brightness of that particle.

Fluorescence Resonance Energy Transfer (FRET) – Radiationless transmission of energy from a donor molecule to an acceptor molecule.

Fluorescence Lifetime Imaging Microscopy (FLIM) – The mean lifetime of the fluorescence emission.

SESSION 5: BROADBAND SPECTROSCOPIES OF COLLECTIVE DYNAMICS IN BIOLOGY

Optically Detected Magnetic Resonance (ODMR) – A change in fluorescence intensity depending on the spin state of an optical emitter. Especially when this spin state is manipulated by a microwave or radio-frequency magnetic field.

Inelastic Electron Tunneling Spectroscopy – An experimental technique to study the vibration modes from molecules absorbed on a metal.

SESSION 6: ULTRAFAST SPECTROSCOPY AND BIOLOGICAL REPORTERS

Photoenzyme – Enzymes that use light to initiate catalytic reactions.

Photoreceptor – Proteins that use light to trigger conformational changes for signal transduction.

SESSION 7: CURRENT CAPABILITIES AND LIMITATIONS IN PLANT IMAGING

Phytosequestration – Carbon biosequestration by plants.

Root Exudation – Root secretion of organic molecules into the soil.

Rhizosphere – The area of chemical/biological/physical influence surrounding a root.

No terminology were submitted for Sessions 4, 8, or 9, although we encourage you to view the other pre-meeting resources that include additional terminology, videos, and readings.