Program Synergies

Erin Adams

Research Interests
Protein/protein, protein/ligand interactions in the immune system.

Specific Questions
Ligand recognition of gamma-delta T cells through their T cell receptors.
Trans-membrane signaling mechanisms of T cell receptors.
Store operated calcium channels in T cell activation.
The role of post-translational modification in immune system stimulation.

Technologies
Protein production in a variety of expression systems, protein purification, x-ray crystallography, SPR, ITC, cell stimulation assays, lipid-loading assays.

Potential Points of Collaboration
Protein production/Crystallography

Stephen Berry

Research Interests
Complex many-body systems, e.g. proteins and atomic and molecular clusters.

Specific Questions
What characteristics of the interparticle interactions guide foldable proteins and other "structure-seekers" to very select minima on complex potential surfaces?
How can we characterize folding pathways?
How do proteins interact with other molecules, from water and small ligands to other proteins and glycans?

Technologies
Simulations and analytic theory.

Potential Points of Collaboration
Developing theory-experiment interactions, including testing models and interpreting unusual experimental results; collaborations with other theorists also.

Francisco Bezanilla

Research Interests
Structure-function relation in voltage dependent membrane proteins.

Specific Questions
How membrane potential induces conformational changes that lead to function.

Technologies
Electrophysiology, fluorescence spectroscopy *in vivo* and in reconstituted proteins.

Potential Points of Collaboration
In vivo applications of fluorescence spectroscopy (LRET, time resolved anisotropy).

Program Synergies

David Biron

Research Interests

Neuroethology, Small neural circuits of C. elegans

Specific Questions

What are the relative contributions of the intra- and inter-cellular processes to the function of (small) neural circuits? How does the coordinated regulation of gene expression that enables the homeostatic function of neurons in a noisy setting work? What are the neuronal origin of stochastic and deterministic behavioral patterns? What are the nature and limitations of information flow between neurons and inside neurons? Do worms sleep?

Technologies

Automated recording and analysis of behavior, Optical imaging of physiological activity in neurons and muscle (e.g., calcium imaging), Quantitative image analysis, Femtosecond laser axotomy, In vivo fluorescence spectroscopy, C. elegans genetic and genomic techniques - although listed as "another technique" on the list it should be noted that these are pivotal to our work.

Potential Points of Collaboration

In vivo fluorescence spectroscopy, cellular signal recognition and transduction, Quantitative image analysis, Ion channels, signaling network analysis, microfluidics, novel fluorescent proteins, In vivo applications of light-triggered proteins, Neuroscience, Neuroethology.

Sean Crosson

Research Interests

A multi-scale analysis of cellular signal recognition and transduction.

Specific Questions

Defining environmental signals (both chemical and physical) that regulate bacterial two-component sensory systems.
Quantifying metabolite flux across a bacterial cell division cycle.
Exploring photosensory perception from the atomic to the cellular levels.

Technologies

Visible fluorescence microscopy, X-ray fluorescence microscopy, molecular genetics, atomic emission spectroscopy, protein chemistry, x-ray crystallography, NMR spectroscopy, CD spectroscopy, small-angle X-ray and visible light scattering.

Potential Points of Collaboration

Engineering cellular control systems to generate novel biological responses.

Program Synergies

Aaron Dinner

Research Interests
Modeling DNA-protein dynamics.
General theoretical methods for treating dynamics in stochastic systems for interpretation of single-cell and single-molecule data.

Specific Questions
Modeling gene expression with application to understanding development of the immune system.

Technologies
Theory, Computation, and Modeling

Potential Points of Collaboration
Current collaborators: Harinder Singh, Norbert Scherer, Chuan He

Greg Engel

Research Interests
Photochemical Dynamics, Energy transfer in biology

Specific Questions
Photochemistry and conical intersections.
Control of photochemistry.
Novel photocatalysts

Technologies
Ultrafast laser spectroscopy, computer simulations, evolution of nucleic acid sequences

Potential Points of Collaboration
Chemical biological techniques for evolution of nucleic acids, fundamental reaction dynamics, photosynthesis.

Karl Freed

Research Interests
Protein folding, dynamics, and aggregation.

Specific Questions
Predicting protein structure.
Developing improved electrostatic models for implicit solvent methods for protein and RNA dynamics simulations.
Theoretical description of WAXS data for proteins in solution.

Technologies
Theory, computer simulations, comparisons with experimental data.

Potential Points of Collaboration
Dynamics of aggregation of beta amyloids, refining X-ray structures of proteins.

Program Synergies

Margaret Gardel

Research Interests

Biophysical Behaviors of the Cellular Cytoskeleton.

Specific Questions

How do assemblies of cytoskeletal proteins regulate force transmission from the molecular to the cellular level?
Role of actin-binding proteins in cellular force transmission to the extracellular matrix.
Physics of active, contractile actomyosin polymer networks
Development of methods to probe mechanical properties at micron length scale in live cells.
Force sensing and generation by adherent cells via focal adhesions.

Technologies

Rheology and "micro"-rheology, live cell imaging, high resolution confocal imaging, quantitative image analysis, cell biology, biochemistry, materials science, polymer physics.

Potential Points of Collaboration

Modeling and theory (Aaron Dinner, Leo Kadanoff, Tom Witten).
Reconstitution of actomyosin contractile networks *in vitro* (Dave Kovar, Ron Rock).
Protein engineering, focused siRNA screens, use of surface chemistry to control extracellular environment.

Ben Glick

Research Interests

Biogenesis of secretory compartments.
Self-organization of cellular structures.
Mechanistic analysis and directed evolution of fluorescent proteins.

Specific Questions

Pathways and mechanisms for organizing transitional endoplasmic reticulum sites and Golgi stacks.
Optimization of DsRed and analysis of its fluorescence maturation pathway.

Technologies

Molecular genetics. 4D confocal microscopy. Electron tomography. Directed evolution.

Potential Points of Collaboration

Quantitative image analysis.
Biophysics of fluorescence emission and photobleaching.

Michael Glotzer

Research Interests

Cytokinesis, Cytoskeleton, Cell Cycle Control.

Specific Questions

Assembly of the Central Spindle.
Spatial and temporal control of Rho GTPases and their effectors.

Technologies

4D confocal microscopy, biochemistry, spectroscopy, EM tomography, genetics, RNAi.

Potential Points of Collaboration

Biophysics of Motor Proteins, microfluidics, computer modeling.

Program Synergies

Steve Goldstein

Research Interests
Ion channel biophysics; S/F ion channel function; S/F ion channel disease.

Specific Questions
How ion channels work (molecular basis), Physiology of potassium channels in mammals and fungi, Role of accessory subunits in ion channel function and regulation, Sumoylation, Sodium and potassium channels in human disease, Designer toxins.

Technologies
Electrophysiology, Protein chemistry/structural biology, Cell biology, Spectroscopy/FRET.

Potential Points of Collaboration
Ion channels in health and disease; Structural and chemical methods.

Geoffrey Greene

Research Interests
Mechanism of action of steroid hormones and their receptors, especially estrogen receptors, in hormone sensitive tissues and cancers.

Specific Questions
Define structure/function relationships for ligand-receptor complexes.
Regulation of gene networks by steroid hormones.
Identification and roles of ER-associated coregulators.
Detailed structural requirements for ER ligand recognition and intra-domain communication.
Identification and role of ER posttranslational modifications.
Identify novel selective estrogen receptor modulators (SERMs).

Technologies
Protein crystallography, Drug discovery, High throughput assay development, Phage display, Yeast two hybrid, Nanoparticle development, Proteomics.

Potential Points of Collaboration
Drug discovery, proteomics, solid surface assay development, crystallization technologies, targeted nanoparticle development and characterization, signaling network analyses.

Adam Hammond

Research Interests
The lateral organization of the plasma membrane.
The role of cholesterol in cell signaling.

Specific Questions
How does dynamic crosslinking of membrane components change phase-like organization and partitioning within a non-equilibrium membrane?
What molecular mechanisms are responsible for introducing IgE receptors to Lyn kinase in the initiation of the degranulation cascade in mast cells?

Technologies
Model membrane vesicles, Molecular Biology, Fluorometry, Spectroscopy, Cell culture, Microscopy.

Potential Points of Collaboration
Lipid phase behavior, Modeling of membrane dynamics, Advanced spectroscopic methods for studying lipid motions in biological samples.

Program Synergies

Chuan He

Research Interests
Chemical biology on protein-nucleic acid interactions.

Specific Questions
DNA repair, virulence regulation in pathogens, metalloregulation.

Technologies
Chemistry, biochemistry, biophysics.

Potential Points of Collaboration
Most

Rustem Ismagilov

Research Interests
Complex networks, chemistry, biology, threshold responses, nonlinear systems, blood clotting, embryonic development, complex microbial communities, protein aggregation diseases, hormonal signaling.

Specific Questions
How do we simplify a complex reaction network and rebuild a simpler version from scratch?
What makes embryonic development robust?
What makes blood clotting robust?
What are the signatures of protein aggregation diseases, and are there rapid ways of classifying the physiological state of the brain using high-quality data from microfluidics and pattern recognition algorithms?
How do we read out chemical information in space and time?

Technologies
Microfluidics, chemistry, biochemistry, developmental biology, simulations.

Potential Points of Collaboration
truly many.

Richard Jones

Research Interests
Systems-level analysis of mammalian cell circuits.

Specific Questions
Protein abundance and modification changes during growth factor, cytokine, and small molecule perturbation, modular protein domain binding specificity and evolution.

Technologies
Protein microarray, micro-western array, mass spectrometry, protein biochemistry, focused proteomics, focused RNAi screens.

Potential Points of Collaboration
Systems analysis of cell signaling, microarray-based and microtiter based scaling approaches for generating larger order quantitative data sets of protein abundance and modification (e.g. phosphorylation, methylation, acetylation, and the like).

Program Synergies

Leo Kadanoff

Research Interests
Many, but including, network theory, assessing usefulness of large-scale computer simulations.

Specific Questions
Do "motifs" in biological networks help them to learn?

Technologies
Network theory, smaller scale computing, learning theory, genetic learning algorithms.

Potential Points of Collaboration
all of above.

Bob Keenan

Research Interests
Membrane protein biogenesis; protein engineering

Specific Questions
We are interested in the molecular mechanisms by which newly synthesized membrane proteins are targeted to and inserted into biological membranes. We also use directed evolution to engineer fluorescent proteins for imaging applications.

Technologies
- Protein biochemistry
- x-ray crystallography
- directed evolution

Potential Points of Collaboration
High-throughput screening for small molecule inhibitors; optimization of enzymatic activities through directed evolution; novel applications for fluorescent proteins; structural biology

Steve Kent

Research Interests
Chemistry of proteins.

Specific Questions
Chemistry of protein function; chemistry of enzyme catalysis.

Technologies
Chemical protein synthesis; atomic resolution site specific labeling to enable application of advanced physical methods (FRET; FTIR; NMR; Xray crystallography) to proteins, esp. enzymes.

Potential Points of Collaboration
Areas of potential overlap: semi-synthetic studies of complex proteins, especially integral membrane proteins.

Program Synergies

Shohei Koide

Research Interests

Design of novel protein function. Protein interaction networks. Protein evolution.

Specific Questions

- How can one construct a system that robustly generates diverse protein functions?
- What are the roles of conformational and chemical diversities in protein-protein interactions?
- How are signal transduction networks constructed and how diseases modify them?

Technologies

- Protein engineering: structure-guided design, directed evolution,.
- Biophysics: NMR spectroscopy, x-ray crystallography, surface plasmon resonance.
- Protein biochemistry.

Potential Points of Collaboration

- Design and applications of synthetic proteins to probe and perturb biology.
- Systems biology of protein post-translational modification.
- Chaperone-assisted crystallography.

Dave Kovar

Research Interests

Mechanism(s) of actin cytoskeleton assembly that drive diverse cellular processes.

Specific Questions

Actin nucleation mechanisms in fission yeast.

Technologies

Protein biochemistry, fluorescence spectroscopy, single actin filament TIRF microscopy, live cell fluorescent microsocopy, genetic manipulation.

Potential Points of Collaboration

Single molecule microscopy *in vitro* and live fission yeast cells, *in vitro* reconstitution of actin-based cellular structures, and quantification of actin assembly-mediated forces.

Steve Kron

Research Interests

Signaling, proteomics, molecular therapeutics.

Specific Questions

DNA damage response.
Biochip sensors for cell kinase activities.
Real-time mass spectrometry proteomics.

Technologies

Biochemistry, Peptide synthesis and ligation, Mass spectrometry, Informatics, Network analysis.

Potential Points of Collaboration

Peptide chemistry, Proteomics, Systems analysis, Networks.

Program Synergies

Ratneshwar Lal

Research Interests

Structure, activity and (patho-)physiological role of ion channels. Developing nanotechnologies for multi-scale and multimodality study of ion channel conformational states. Combinatorial structural biology-based drug design. Nanoparticle, nucleic acid and peptide-based drug delivery system.

Specific Questions

Conformational changes in voltage gated and ligand gated hemichannels.
Structure and conformational changes in ion channels formed by misfolded (amyloid) proteins. Mechanism of their action and effect on cell function.

Technologies

Mutli-modal integrated Atomic force microscopy with TIRF, FRET, double chamber electrical recording and deconvolution microscopy; Electrophysiology and single fluorophore imaging for ion channel conductance and permeability study; NanoMEMS and microfluidics; Membrane protein biochemistry; Computational biology; Nanoscale rheology

Potential Points of Collaboration

Anything at bio-nano interface that is challenging and capable of defining new paradigms.

Ka Yee Lee

Research Interests

Membranes, lipid-protein interactions, lipid-polymer interactions, interfaces.

Specific Questions

Collapse mechanism of lung surfactant.
Role of membrane in the aggregation of Alzheimer's beta amyloid peptides.
Membrane targeting selectivity and mechanism of disruption of antimicrobial peptides.
Poloxamers as membrane sealants.
Lipid organizations and membrane structure.

Technologies

Fluorescence microscopy, Brewster angle microscopy, atomic force microscopy, x-ray and neutron reflectivity, x-ray diffraction.

Potential Points of Collaboration

Peptide chemistry, theoretical modeling, numerical experiments.

Program Synergies

Jason MacLean

Research Interests

Neocortex, Microcircuits, Dynamics, Information Theory, Learning and Memory

Specific Questions

Neurons do not work in isolation but rather operate together, within local interconnected circuits. Our lab is interested in how information is encoded and stored, at the level of the functional neuronal circuit, in the neocortex? Experiments at the circuit level are essential to answering these questions because studies in which single or even a few cells are monitored fundamentally miss the emergent properties of these circuits.

Technologies

2-photon imaging, patch clamp recording, advanced quantitative approaches to multidimensional data, quantitative anatomy

Potential Points of Collaboration

Optics, fluorescence, ion channels, light activated proteins, image analysis

Keith Moffat

Research Interests

Time-resolved X-ray crystallography
Signal transduction by photoreceptors.

Specific Questions

Mechanisms of signal transduction by photoreceptors sensitive to blue or red light
Conferral of light sensitivity on light-inert systems by biologically-inspired protein design.

Technologies

Static and time-resolved, synchrotron-based X-ray crystallography: hardware, experimental design, software.

Potential Points of Collaboration

Protein design, protein folding, computational studies of protein dynamics, ultrafast optical spectroscopies.

Milan Mrksich

Research Interests

Biochip Arrays; Mimics of the Extracellular Matrix; Self-Assembling Protein Nanoscale Networks; Biochemistry at the Nanoscale.

Specific Questions

How can we rapidly measure thousands of diverse biochemical activities?
How can we understand the roles that discreet matrix ligands play in cell adhesion and signaling?
How can we program protein monomers to create functional extended structures and cytoskeletons?
How do enzyme activities depend on inhomogeneous distributions of substrates in the cell?

Technologies

Surface Chemistry, Mass Spectrometry, Protein Design/Production, High Throughput Drug Screening, Arrays (peptides, carbohydrates, proteins, etc).

Potential Points of Collaboration

Any biological problem that can benefit from our tools.

Program Synergies

Piers Nash

Research Interests

Cellular signal transduction, protein-protein interactions, molecular basis for ultrasensitivity in biological systems, all-or-none cellular switches, evolution of complexity and robustness in signaling networks.

Specific Questions

Does a local high concentration of low affinity interaction sites on an intrinsically unstructured polypeptide allow repeated transient interactions (sampling) enforcing proximity and creating the basis for ultrasensitive protein-protein interactions?

Technologies

High-density peptide arrays, protein arrays, peptide synthesis, molecular biology, tissue culture, protein purification, fluorescence polarization, computational modeling, bioinformatics, systems level examination of signaling domains.

Potential Points of Collaboration

Development of technologies to assess protein interactions, development of computational approaches to predict and model protein interactions, modeling of ultrasensitive interactions, proteomic examination of signaling complexes, spatial and temporal organization of signaling.

Tao Pan

Research Interests

Functional genomics of RNA.
RNA folding.

Specific Questions

tRNA in immunology and cancer. RNA epigenetics and regulation of translation. RNA structural genomics.

Technologies

High throughput methods using microarray platforms. Nucleic acid biochemistry.

Potential Points of Collaboration

Theoretical modeling of biological networks. Prediction and simulation of RNA structure and dynamics.

Eduardo Perozo

Research Interests

Structure, function, and dynamics of ion channels and transporters.

Specific Questions

Energy transduction and conformational changes in voltage gated, ligand gated, and mechanosensitive channels.

Technologies

Membrane protein biochemistry, single molecule and ensemble electrophysiological techniques, Electron paramagnetic resonance spectroscopy, X-ray crystallography.

Potential Points of Collaboration

Computational approaches to membrane protein gated transitions, Design of chimera ion channels, Bioinformatics, Metagenomics.

Program Synergies

Joseph Piccirilli

Research Interests

-The Chemistry of RNA Splicing and RNA-Protein Interactions
-Development of new methods and model systems for studying RNA molecules.
-Chemistry and biochemistry of nucleic acids with particular emphasis on RNA and RNA catalysis.

Specific Questions

-How biologically important RNA molecules work, including the energetic features that allow them to adopt three-dimensional architectures and to interact with proteins.
-How manipulation of the structure of RNA molecules at precise locations in answer very specific questions about biological function.

Technologies

RNA/Protein crystallography, protein expression, proteomics, modified RNA/DNA synthesis, organic chemistry, molecular biology, site directed mutagenesis, bioconjugation PCR, phage display, mass spectrometry, RNA transcription.

Potential Points of Collaboration

Tao Pan, Norbert Scherer, Tobin Sosnick, Shohei Koide

Phoebe Rice

Research Interests

Mechanisms of DNA recombination, mobile DNA elements, protein-DNA interactions.

Specific Questions

How do site-specific and homologous recombinases orchestrate DNA strand exchange?
How are these reactions controlled by DNA topology and accessory factors?
How do site-specific recombinases catalyze the chemical reactions of strand breakage and rejoining?
Molecular mechanisms for the mobility of antibiotic resistance elements.
The interplay between DNA bending and indirect sequence recognition.

Technologies

x-ray crystallography; in vitro biochemistry; whatever it takes.

Potential Points of Collaboration

The interface of DNA recombination and repair; structural biology; better tools for structure determination.

Ron Rock

Research Interests

Molecular motors and the cytoskeleton.

Specific Questions

How mechanics and kinetics are coupled in motors, how motor domains are coordinated over large distances, how motors identify and are targeted to tracks, how motors behave on in vivo tracks, how actin networks form from crosslinkers.

Technologies

Optical trapping, single-molecule fluorescence, confocal, EM.

Potential Points of Collaboration

rheology and physical properties of actin networks in migrating cells.

Program Synergies

Marsha Rosner

Research Interests

Signal transduction by protein kinase cascades.

Specific Questions

Regulation of kinase activity, structure-function relationships governing kinase inhibitors, interaction of microRNAs, proteins, and mRNAs in signaling cascades, Modeling of signaling networks.

Technologies

cell, molecular and biochemical tools (eg cloning, cell culture, immunoblotting,etc), arrays (DNA, microRNA, protein), computer simulations, animal models.

Potential Points of Collaboration

Protein structure and dynamics, development of computational tools, imaging, kinetic modeling.

Benoit Roux

Research Interests

Understanding the function of biological macromolecular systems at the atomic level using computational methods.

Specific Questions

Molecular basis for ion selectivity and voltage-gating in ion channels.

Technologies

Molecular dynamics simulations. Free energy perturbation. Statistical mechanics. X-ray crystallography.

Potential Points of Collaboration

Program Synergies

Norbert Scherer

Research Interests

Single molecule and single cell biophysics; Nano-scale resolution optical microscopy;
Non-equilibrium statistical mechanics; Transport in crowded energetic environments;
Developing new experimental methods (and theoretical descriptions) to elucidate reaction networks.
Using biological examples to obtain new insights into fundamental statistical mechanics

Specific Questions

- How do complex systems or processes respond to perturbation (e.g., vesicle/granule transport in stimulated insulin cells)?
- Can one deduce the structure and dynamics of (oscillatory) cell networks by a "chemical perturbation spectroscopy"?
- Can such perturbation approaches be used to control cell function?
- Can one understanding biological function as changes between non-equilibrium steady-states?

Technologies

We develop new methods and design & build most of our instruments for these experiments, including:
Single molecule fluorescence spectroscopies and microscopies; Interferometric microscopy;
AFM and Optical tweezer force-extension measurements;
Drive and probe non-equilibrium granular materials as model systems;
Chemical perturbation spectroscopy (my group's development);
We also conduct Molecular Dynamics, Langevin and Master equation simulations.

Potential Points of Collaboration

Many, with theorists and experimentalists
Current collaborators: Aaron Dinner, Louis Philipson, Chuan He, Sean Crosson, Karl Freed

Ridgway Scott

Research Interests

Research Interests: Protein-ligand interactions.

Specific Questions

What types of bonds are formed in antibody-antigen binding?
As an antibody `matures' how does the bond structure change?

Technologies

Theoretical and computational analysis, often guided by PDB
structures and other databases.

Potential Points of Collaboration

Drug design.

Program Synergies

Steven Sibener

Research Interests

Surface/Materials Chemistry & Physics; Nanoscience; Bio-Interfaces; Single Molecule Studies; Interfacial Kinetic Processes; Chemical Physics; Reaction Dynamics; STM/AFM Studies of Surface Phenomena; Trace Detection; Molecular Beam Scattering; Surface Metallurgy; Dynamics and Structure of Thin Polymer Films.

Specific Questions

Self-organization and mechanisms of molecular assembly,
Precision imaging of viruses, protein-DNA interactions, single-molecule dynamics
Trace detection.

Technologies

Scanning tunneling and atomic force microscopy in vacuum, ambient conditions, and electrochemical environments. Electron microscopy (TEM, SEM). Surface spectroscopy. Molecular beam scattering.

Potential Points of Collaboration

Precision bio-imaging at interfaces. Studies of mechanistic kinetics and dynamics.

Tobin Sosnick

Research Interests

Protein and Ribozyme folding and design.

Specific Questions

Protein and RNA structure prediction; light-triggered, multi-function protein design; RNA structural genomics including non-coding RNAs.

Technologies

Protein chemistry, Computer simulations, NMR, CD, Fl. Spectroscopy, Stopped-flow methods, Small-angle scattering, CryoEM.

Potential Points of Collaboration

In vivo applications of light-triggered proteins.

Wei-Jen Tang

Research Interests

Structural basis of cell signal transduction and its application to human health.

Specific Questions

Structural basis for the regulation of human insulin degrading enzyme and other amyloid-beta degrading enzyme, the action of bacterial toxins.

Technologies

X-ray crystallography, molecular biology, protein chemistry, enzyme assay, tissue culture, spectroscopy.

Potential Points of Collaboration

Structure biology, Cellular signal transduction, Enzyme engineering, Biological significances of protein aggregation.

Program Synergies

Tom Witten

Research Interests

Stress condensation, such as in crumpling or collapse of an elastic membrane. Abrupt folding of liquid monolayers.

Specific Questions

How far are the sharp structures and concentrations of energy and stress seen in crumpling and monolayer folding explainable from general properties of elastic sheets?
How can one use microrheology to measure dynamic and nonlinear surface moduli of dense lipid monolayers?
How can chiral sedimentation be used to identify and separate polyatomic complexes?

Technologies

Differential Geometry, numerical calculation, simulation. Hydrodynamic theory.

Potential Points of Collaboration

Cell membrane morphology and pathology. Separation and classification of cell fragments.

Jun Yin

Research Interests

Bioorganic chemistry and natural product biosynthesis.

Specific Questions

Directed evolution of natural product biosynthetic enzymes.
High throughput profiling of protein posttranslational modification enzymes.
Enzyme catalyzed protein labeling.

Technologies

Phage display, Enzyme directed evolution, Cell imaging and labeling

Potential Points of Collaboration

Protein engineering, Enzyme evolution, High throughput screen or selection, Biosynthesis.

Yingming Zhao

Research Interests

Developing proteomics-based technologies and applying them, in conjunction with biochemistry, molecular biology, and cell biology, to dissecting post-translational modification networks that are not amenable to conventional approaches.

Specific Questions

New technologies for discovery of novel protein post-translational modification pathways, post-translational modification cross-talks, and systems biology of post-translational modification pathways

Technologies

Proteomics, mass spectrometry, bioinformatics, biochemistry, organic synthesis, affinity reagents, systems analysis of protein post-translational modification networks

Potential Points of Collaboration

Cellular network regulations, systems biology, bioinformatics, epigenetics, peptide/protein chemistry, signal transduction