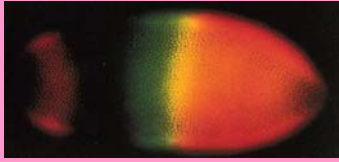




Institute for Pure and Applied Mathematics
University of California, Los Angeles presents a program in

Cells and Materials Workshop I: Membrane Protein Science and Engineering



March 27 – 31, 2006

Members of the Organizing Committee include **Tom Chou**, Chair (UCLA, Biomathematics), **Francisco Bezanilla** (UCLA, Neuroscience and Physiology), **Ka Yee Lee** (University of Chicago, Chemistry and Biophysical Dynamics), **Jacob Schmidt** (UCLA, Bioengineering)

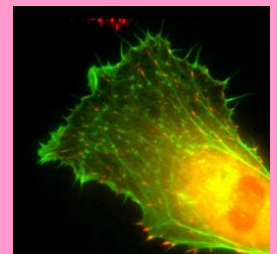
Scientific Overview:

Membrane proteins are a huge and widely diverse family: with functions including valves, pumps, sorters, sensors, energy transducers, and more, it is not surprising that a large fraction of the human genome has been found to comprise membrane proteins. However, due to the difficulty in crystallizing these proteins, structures are only known for a fraction of them. This is the current rate-limiting step in the overall understanding of this protein family, since the structure/function relationship is responsible for the unique performance of each protein. Far from being a purely biological problem, there is a growing realization within the community that the transport properties of some proteins can be described from a device perspective, using mean field theories, the development of which may allow the determination of the positions of specific key atoms and charges through an inverse problem formalism by measurement of "device" transport characteristics of these proteins. Aside from structural determination, further work concerns the behavior of a subset of membrane proteins whose structures and transport properties can change with electrostatic potential. These so-called "voltage gated" proteins function through an as yet unknown mechanism, although they are fundamental to the function of the heart and brain. Due to the importance, ubiquity, and functions of membrane proteins, they are targets of high pharmaceutical interest, and their ability to govern transmembrane transport addressable electrically opens new engineering vistas as well. In this program, we will bring together experimental and theoretical experts in membrane protein structure and function highlighting the state-of-the-art in the science and integrate these perspectives with those of applied science and future applications.

Mathematical approaches: Stochastic processes, Monte-Carlo and Molecular Dynamics simulations, membrane elasticity theory, and Inverse problems.

Scientific Program:

- [Workshop I: Membrane Protein Science and Engineering](#). March 27 - 31, 2006.
- [Workshop II: Microfluidic Flow in Nature and Microfluidic Technologies](#). April 18 - 22, 2006.
- [Workshop III: Angiogenesis, NeoVascularization and Morphogenesis](#). May 8 - 12, 2006.
- [Workshop IV: Systems Biology and Molecular Modeling](#). May 22 - 26, 2006.
- Culminating Workshop at Lake Arrowhead (by invitation only). June 11 - 16, 2006.



Participation:

We have funding to support the attendance of recent PhD's, graduate students and researchers in the early stages of their career. Mathematicians and scientists at all levels who would like to learn more about this area are encouraged to apply for funding. Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM's mission and we welcome their applications.

<http://www.ipam.ucla.edu/programs/cmws1/>

Or email questions to cmws1@ipam.ucla.edu

IPAM is an NSF funded Institute