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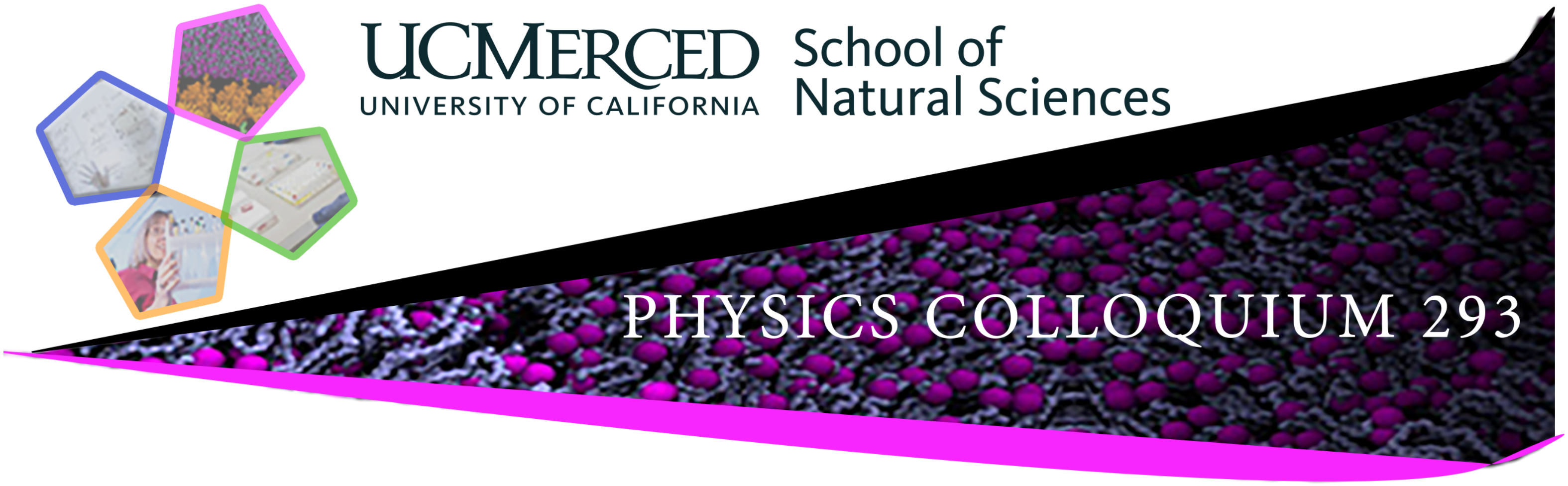

PHYSICS COLLOQUIUM 293

Molecular Transport and Nanoscale Confinement in Carbon Nanotube Porins

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Department of Physics
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Date: **2/9/18**
Time: **10:00 AM**
Location: **SSB 120**

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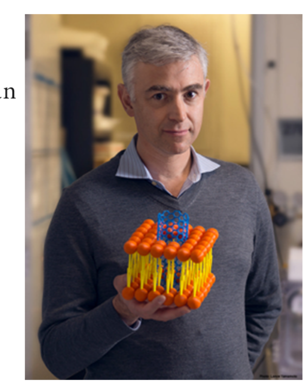
ABSTRACT

Controlling ion and water transport on a molecular scale is important for applications ranging from industrial water treatment, to membrane separations, to bioelectronic interface design. Living systems move ions and small molecules across biological membranes using protein pores that rely on nanoscale confinement effects to achieve efficient and exquisitely-selective transport. I will show that carbon nanotube porins—pore channels formed by ultra-short carbon nanotubes assembled in a lipid membrane—can exploit similar physical principles to transport water, protons, and small ions with efficiency that rivals and sometimes exceeds that of biological channels. I will discuss the role of molecular confinement in these pores, and show how it can enhance water and proton transport efficiency, and influence the mechanisms of ion selectivity in these pores. Overall, carbon nanotube porins represent simple and versatile biomimetic membrane pores that are ideal for studying nanoscale transport phenomena, and building the next generation of separation technologies and biointerfaces.

BIO:

Ph.D., chemistry, Harvard University (1997)
M.A., chemistry, Harvard University (1995)
B.A., chemistry/physics, Moscow State University, Moscow, Russia (1992)

Present positions: Senior Research Scientist at BBTD division at LLNL.
2005-pres. Adjunct Associate Professor, University of California Merced.



Alex Noy is a Senior Research Scientist at LLNL, which he joined as the Lab's first E.O. Lawrence Fellow after getting his Ph.D. in Physical Chemistry from Harvard University in 1998. Prior to that he received his Bachelor's degree in Chemistry from Moscow University in his native Russia. Since 2005 Noy also serves as an Adjunct Associate Professor at the University of California Merced. His research group works at the intersection of biophysics and nanoscience and specializes in using one-dimensional nanomaterials to build biomimetic and bioengineered structures to control transport and communication at molecular scale. The current research portfolio in the Noy group centers on carbon nanotube nanofluidics, where they develop carbon nanotube porins and membranes to study transport in highly-confined environment and develop new separation technologies. Other projects in the group develop novel biolectronic devices that incorporate functional biological and biomimetic components to create seamless bidirectional neural interfaces and use high speed atomic force microscopy where they aim to image biological processes in-situ in real time.