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202 NICHOLSON HALL
Louisiana State University
Baton Rouge, Louisiana 70803-4001

WEEKLY CALENDAR

February 20-24, 2012

DEPARTMENTAL COLLOQUIUM

"Plasmonics: From Quantum Effects to Fano Interference and Light Harvesting"

3:40 PM, February 23, 2012
109 Nicholson Hall

Peter Nordlander
Rice University

Host: Ward Plummer

• Refreshments served at 3:15 PM in 232 (Library) Nicholson Hall •

This "plasmon hybridization"concept,[1] shows that the plasmon resonances in complex metallic nanostructures interact and hybridize in an analogous manner as atomic wavefunctions in molecules. This insight gained from this concept provides an important conceptual foundation for the development of new plasmonic structures that can serve as substrates for surface enhanced spectroscopies, chemical and biosensing, and subwavelength plasmonic waveguiding and other applications. The talk is comprised of general overview material interspersed with a few more specialized "hot topics" such as plasmonic interference effects,[2] quantum plasmonics and plexcitonics,[3] and active plasmonic nanoantennas for enhanced light harvesting,[4] and plasmon induced chemical reactions.[5]

[1] N.J. Halas *et al.*, Chem. Rev. 111(2011)3913.

[2] B. Lukyanchuk *et al.*, Nature Mat. 9(2010)707 ; J. Fan *et al.*, Science 328(2010)1135; S.P. Zhang *et al.*, Nano Lett. 11(2011)1657.

[3] J. Zuloaga *et al.*, Nano Lett. 9(2009)887; ACS Nano 4(2010)5269 ; P. Song et al., J. Chem. Phys. 114(2011)074701; A. Manjavacas *et al.*, Nano Lett. 11(2011)2318.

[4] M. W. Knight *et al.*, Science 332(2011)702.

[5] R. Huschka *et al.*, J. Am. Chem. Soc. 133(2011)12247.

ANNOUNCEMENT:

The University will be closed on Tuesday, February 21, 2012 due to the Mardi Gras Holiday.

Office of Research & Economic Development

proudly presents

Dr. Naomi Halas

Rice University

Stanley C Moore Professor in Electrical & Computer Engineering

Thursday, February 23, 2012

10:40 AM

Hill Memorial Library

(Seating is Limited)

Nanoscale Manipulation of Light: New Physical Insights and Technological Opportunities

Metallic nanoparticles, used since antiquity to impart intense and vibrant color into materials, have more recently become a central tool in the nanoscale manipulation of light. This interest has led to a virtual explosion of new types of metal-based nanoparticles and nanostructures of various shapes and compositions, and has given rise to new strategies to harvest, control, and manipulate light based on these structures and their properties. Light coupled to metallic nanoparticles induces collective oscillations in the conduction electrons of the structure, known as surface plasmons. As one begins to assemble metallic nanoparticles into useful building blocks, the striking parallel between the plasmons of these structures and wave functions of simple quantum systems is universally observed. Clusters of metallic nanoparticles behave like coupled oscillators or antennas of various types, introducing effects characteristic of systems as diverse as radio frequency transmitters and coupled pendulums into light-driven nanoscale structures. These paradigms give rise to new ways to manipulate light, and from these new capabilities, new applications emerge that can benefit society, in applications ranging from biomedicine to solar energy.

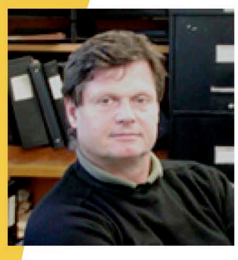
LSU

LSU DEPARTMENT OF MECHANICAL ENGINEERING

The Sidney E. Fuchs Seminar Series

3:30-4:30pm, Friday, February 24, 2012

Frank H. Walk Design Presentation Room



Plasmonic Nanostructures: Artificial Molecules

by **Peter Nordlander***

Professor of Physics & Astronomy, and Electrical & Computer Engineering, Rice University
Director, Rice Quantum Institute

The recent observation that metallic nanoparticles possess plasmon resonances that depend sensitively on the shape of the nanostructure has led us to a fundamentally new understanding of the plasmon resonances supported by metals of various geometries. This picture- "plasmon hybridization", reveals that the collective electronic resonances in metallic nanostructures are mesoscopic analogs of the wave functions of simple atoms and molecules, interacting in a manner that is analogous to hybridization in molecular orbital theory. The new theoretical insight gained through this approach provides an important conceptual foundation for the development of new plasmonic structures that can serve as chemical and biosensors, substrates for surface enhanced spectroscopies and subwavelength plasmonic waveguides and devices such as routers, multiplexers, modulators, and logic gates.

* Obtained his PhD degree in Theoretical Physics at Chalmers Univ. of Technology in Gothenburg in Sweden in 1985. After postdoctoral positions at IBM Thomas J. Watson Research Center (USA), AT&T Bell Laboratories (USA), and Rutgers Univ., he joined Rice University where he is Professor of Physics & Astronomy and Professor of Electrical & Computer Engineering. He has been Visiting Professor at Univ. of Paris and at the Institute of Physics at the Chinese Academy of Sciences. His research background is in theoretical condensed matter physics and nanophysics. His current research is focused on theoretical and computational modeling of Plasmonics and Nanophotonics phenomena. He is an associate editor of ACS Nano, fellow of APS, AAAS, and SPIE and the recipient of the Charles Duncan Award. He has published more than 200 refereed articles, given more than 250 invited presentations worldwide, and has been cited more than 10000 times with an h-index higher than 50.

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Seminar Series