



College of
Science
Department of Physics
& Astronomy

WEEKLY CALENDAR

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

WEEKLY CALENDAR

May 5 - 9, 2014

DEPARTMENTAL COLLOQUIUM

"Building with Crystals of Light and Quantum Matter: From Clocks to Computers"

3:30 PM May 8, 2014
109 Nicholson Hall

Ana Maria Rey
JILA, University of Colorado

Host: Daniel Sheehy

• *Refreshments served at 3:10 PM in 232 (Library) Nicholson Hall* •

Understanding the behavior of interacting electrons in solids or liquids is at the heart of modern quantum science and necessary for technological advances. However, the complexity of their interactions generally prevents us from coming up with an exact mathematical description of their behavior. Precisely engineered ultracold gases are emerging as a powerful tool for unraveling these challenging physical problems. Atoms cooled down to ultra-low temperatures and trapped in artificial crystals of light behave like electrons in a solid crystal. In contrast to electrons in solids, however, atomic systems have the advantage that they are free of defects or disorder and fully tunable. In this talk, I will present our recent developments at JILA on using atoms in crystals of light for the investigation of complex many-body phenomena and magnetism. I will also explain how atoms inside crystals of light can be used to create the best atomic clocks in the world. Finally I will discuss a new research direction of using atomic clocks not only as precise time keepers but also as unique quantum laboratories for the investigation of new forms of matter with no known counterpart in Nature.


LA-SIGMA
Louisiana Alliance for Simulation-Guided Materials Applications

Spring Seminar

C. David Sherrill
Georgia Institute of Technology

"Modeling and Visualizing Non-Covalent Interactions"

3:30pm - 4:30pm, Wednesday, May 7, 2014

234 The Liberal Arts Building – University of New Orleans

PUBLICATIONS:

1. "Schwarzschild scalar wigs: Spectral analysis and late time behavior" Juan Barranco, Argelia Bernal, Juan Carlos Degollado, Alberto Diez-Tejedor, **Miguel Megevand**, Miguel Alcubierre, Darío Núñez, and Olivier Sarbach, Phys. Rev. D 89, 083006.
2. "Three principles for canonical quantum gravity" Rodolfo Gambini, and **Jorge Pullin**, Studies in History and Philosophy of Modern Physics 46 (2014) 164-169.



Louisiana Alliance for Simulation-Guided Materials Applications

Spring Seminar
3:30pm - 4:30pm, Wednesday, May 7, 2014
234, Liberal Arts Building, University of New Orleans

Modeling and Visualizing Non-Covalent Interactions

By

C. David Sherrill
Georgia Institute of Technology

Non-covalent interactions govern the properties of liquids, crystal packing forces, protein structure, and drug-ligand binding. However, they are still not well understood at a fundamental level. Our group has been developing and using tools from quantum chemistry to better understand the fundamental nature of non-covalent interactions, especially involving organic molecules. This talk will highlight the state-of-the-art in computations of non-covalent interactions: their strength, directional dependence, substituent effects, and fundamental makeup in terms of the basic intermolecular forces. We have developed the world's fastest computer code to perform energy component analysis using symmetry-adapted perturbation theory, and recently we have extended our approach to both quantify and visualize which intermolecular contacts are the most important for a given system. Case studies including cation- π interactions and base stacking in DNA will illustrate the approach.



Dr. C. David Sherrill is a Professor of Chemistry and Biochemistry and a Professor of Computational Science and Engineering at the Georgia Institute of Technology. He is co-director of the Center for Computational Molecular Science and Technology, and he has published over 140 peer-reviewed articles on the development and application of new theoretical methods and new algorithms in computational quantum chemistry. He is a Fellow of the American Chemical Society and the American Physical Society, and he has been Associate Editor of the Journal of Chemical Physics since 2009. Dr. Sherrill has received a Camille and Henry Dreyfus New Faculty Award (1999), the International Journal of Quantum Chemistry Young Investigator Award (2001), an NSF CAREER Award (2001), and Georgia Tech's W. Howard Ector Outstanding Teacher Award (2006).

LATech – 122, Nethken Hall ~ **LSU** – 1034, Digital Media Center
SUBR – 211 J.B. Moore Hall ~ **Xavier** – 226 Qatar Pavillion

Note, this seminar will Only be available through HD Videoconferencing.

