LSU College of Science
Department of Physics & Astronomy

WEEKLY CALENDAR

TEL: 225-578-2261
FAX: 225-578-5855
http://www.phys.lsu.edu

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

WEEKLY CALENDAR

February 24 - 28, 2014

DEPARTMENTAL COLLOQUIUM

"New Horizons in Ab Initio Theory of Atomic Nuclei"

3:30 PM February 27, 2014
109 Nicholson Hall

Tomas Dytrych
LSU, Physics & Astronomy

Host: Jerry Draayer

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

Atomic nuclei are intriguing finite many-body quantum systems governed by the very complex residual strong force. Ab initio nuclear theory seeks to provide accurate predictions of nuclear properties and reaction processes starting from quarks/gluon considerations. I will discuss an innovative method that improves the predictive power of the ab initio framework and extends its reach towards currently inaccessible medium-mass nuclei.

LA-SiGMA
Louisiana Alliance for Simulation-Guided Materials Applications

Fall Seminar

Michael Mascagni
Florida State University

"Monte Carlo Methods and Partial Differential Equations: Algorithms and Implications for High-Performance Computing"

3:30pm - 4:30pm, Wednesday, February 26, 2014

1008B, Digital Media Center, Louisiana State University

LA-SiGMA

Louisiana Alliance for Simulation-Guided Materials Applications

Fall Seminar
3:30pm - 4:30pm, Wednesday, February 26, 2014
1008B, Digital Media Center, Louisiana State University

Monte Carlo Methods and Partial Differential Equations: Algorithms and Implications for High-Performance Computing

By

Michael Mascagni
Florida State University

We give a brief overview of the history of the Monte Carlo method for the numerical solution of partial differential equations (PDEs) focusing on the Feynman-Kac formula for the probabilistic representation of the solution of the PDEs. We then take the example of solving the linearized Poisson-Boltzmann equation to compare and contrast standard deterministic numerical approaches with the Monte Carlo method. Monte Carlo methods have always been popular due to the ease of finding computational work that can be done in parallel. We look at how to extract parallelism from Monte Carlo methods, and some newer ideas based on Monte Carlo domain decomposition that extract even more parallelism. In light of this, we look at the implications of using Monte Carlo to on high-performance architectures and algorithmic resilience.

Michael Mascagni studied Neurobiology at the Rockefeller University, and he also took graduate classes uptown, at Columbia University, and downtown, at the Courant Institute of Mathematical Sciences of New York University. Eventually, he obtained his M.S. and Ph.D. in Mathematics from Courant.

Upon graduation, he obtained a post-doctoral research position in the Mathematical Research Branch of an institute of the National Institutes of Health, in Bethesda, MD and they moved to Washington, DC. It was during this period his research moved away from modeling the nervous system to studying the high-performance computing implications of the algorithms he developed and used. He was one of the first to use random number-based algorithms on the massively parallel Connection Machine at the Naval Research Lab in D.C. In fact, after two years at NIH he moved to the Institute for Defense Analyses' Supercomputing Research Center in Bowie, MD. This organization works for the National Security Agency, and it was there that his interests in parallel computing, random number generation, number theory, and discrete mathematics were nurtured

Eventually, he join a Computer Science department and he moved to Florida State University as an Associate Professor of Computer Science, he has since been promoted to Full Professor. While at FSU he also has appointments as Professor of Mathematics, Professor of Scientific Computing, and a faculty member of the Graduate Program in Molecular Biophysics.

His areas of research are parallel and distributed computing, Grid computing, Cloud computing, random number generation, Monte Carlo methods, computational number theory and discrete algorithms, and applications to materials science, biochemistry, electrostatics, and finance.

***UNO** - Liberal Arts Building 234 ~ **LATech** - PML 1015, Center for Instructional Technology, at the Wyly Tower*