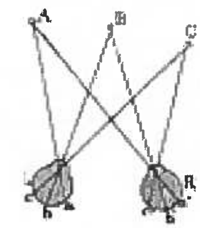

WEEKLY CALENDAR

March 26, 2007

Department of Physics and Astronomy
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Louisiana State University and A&M College
Baton Rouge,, Louisiana 70803-4001

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General Seminar

"Efficient Quantum Algorithm for Simulating Hamiltonian Evolution"

3:40PM / Thursday, 29 March 2007 / Room 109

[Refreshments served at 3:15 PM in Room 229 Nicholson]

Host: Dr. Jonathan Dowling

Barry Sanders, Ph.D.
Director, Institute for Quantum Information Sciences

There are three main applications of quantum computer algorithms: the hidden subgroup problem (with Shor's factorization algorithm one important example), search problems (e.g. Grover's algorithm), and our interest here: simulation (Feynman's original motivation for the quantum computer as a tool for efficient simulation of quantum evolution as opposed to classical computation, which may be exponentially expensive). We develop an efficient quantum algorithm for simulating quantum evolution for any (unknown) Hamiltonian over any time t. Specifically, when the Hamiltonian acts on n qubits, has at most a constant number of nonzero entries in each row and column, and its norm is bounded by a constant, the cost of the simulation is O(log*n t^{1+1/2k}) for k any integer. In other words the cost of the simulation is nearly constant in n and arbitrarily close to linear in the time of evolution; moreover we prove that an algorithm for simulating general evolution of quantum states cannot be sublinear in t. Our results provide a firm algorithmic foundation for studying a quantum computer, especially with respect to assessing and optimizing the cost of the simulation. In addition our methods may lead to improved simulations for quantum control on classical computers.

Special Seminar

"Probing the Limits of Nuclear Existence through Decay Spectroscopy"

3:40PM / Monday, 26 March 2007 / Room 109

[Refreshments served at 3:15 PM in Room 229 Nicholson]

Host: Dr. Jerry Draayer

Sean Liddick, Ph.D.
University of Tennessee

The limits of nuclear stability is a fundamental question in nuclear physics. The location of the driplines (defined as when an additional nucleon is no longer bound to the nucleus) is theoretically difficult predict and requires significant experimental input. Predicting the limits is complicated by the fact that nuclear structure is a dynamic characteristic and can change as one moves away from the valley of stability. Both the limits of nuclear existence and the dynamic nature of nuclear structure also affect the astrophysical processes responsible for the creation of the elements. Decay spectroscopy has become a valuable tool for measuring nuclear properties at low counts rates in an effort to learn about the nuclear structure and the limits of stability. Recent results on particle (alpha and proton) decaying nuclei will be given along with the implications for nuclear structure and astrophysics. These results will include the discovery of two new isotopes (109Xe and 105Te),a sensitive measurement of alpha decay in 109I and its affect on the astrophysical rp-process, and the first digital pictures of a nuclear decay (2 proton decay in this case) from 45Fe.

(continued)

Material Science and Engineering Seminar

"TBA"

3:40PM / Tuesday, 27 March 2007 / Room 109

Host: Dr. John DiTusa (Physics)/Paul Russo (Chemistry)

Judit Puskas, Ph.D.
University of Akron

Special Seminar

"Probing Fundamental Properties of the Weak Interaction: Some Recent Experimental Progress"

2:40PM / Wednesday, 28 March 2007 / Room 435

[Refreshments served at 2:15 PM in Room 229 Nicholson]

Host: Dr. Jerry Draayer

Dan Melconian, Ph.D.
Center for Experimental Nuclear Physics and Astrophysics (CENPA), University of Washington

The culmination of our scientific endeavours to understand the basic constituents of matter and the interactions between them has been formally embodied in the Standard Model of particle physics. This is, by far, the most thoroughly tested theory ever conceived; the recent discovery that neutrinos have a nite mass is the only observation that requires a revision of the model as originally developed in the late 1970's. Even though the Standard Model provides us with a comprehensive and elegant understanding of the basic laws of physics, there are many unanswered questions, such as why is the weak force the only one which violates parity-symmetry?

Nuclear β decay has played a crucial role throughout the development of our understanding of the fundamental symmetries of electroweak interactions. This tradition continues by using ever more precise measurements of β decay observables to test Standard Model predictions. An observed discrepancy would signify an important discovery that would help guide theorists toward a more complete model.

In this talk, I will describe some experimental work which probes the weak interaction: I will show how β-delayed proton emitters and ultra-cold neutrons can both be used to help test whether the quark mass-mixing matrix is unitary or not, and how a polarized sample of laser-cooled atoms investigates the chiral structure of the weak interaction.

Material Science and Engineering Seminar

"Better Lighting through Chemistry"

3:40PM / Wednesday, 28 March 2007 / Room 109

Host: Dr. John DiTusa (Physics)/Theda Daniels-Race (Electrical Engineering)

Laurie McNeil, Ph.D.
University of North Carolina-Chapel Hill

Semiconducting crystals based on organic molecules hold great promise for new optoelectronic devices such as LEDs, solar cells, and transistors. However, it is only recently that we have begun to understand their intrinsic properties and how those relate to future device performance. I will discuss our studies of the optical properties of thiophenes and polyacenes and their potential applications.

Publications:

"Optical Multicolor Photometry of Spectrophotometric Standard Stars," **A. U. Landolt** and A. K. Uomoto, 2007, Astronomical Journal, vol. 133, page 768.

"Fundamental Spatio-Temporal Decoherence: A Key to Solving the Conceptual Problems of Black Holes, Cosmology and Quantum Mechanics," Rodolfo Gambini, Rafael A. Porto, and **Jorge Pullin**, International Journal of Modern Physics D, Vol. 15, No. 12 (2006) 2181-2185.