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

September 1 - 5, 2014

DEPARTMENTAL COLLOQUIUM

"Results from the T2K Experiment"

3:30 PM September 4, 2014
109 Nicholson Hall

Thomas Kutter
LSU, Department of Physics & Astronomy

Host: Juhan Frank

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

After a brief introduction to neutrino physics and the scientific questions the field aims to answer I will describe the Tokai to Kamioka (T2K) long-baseline neutrino experiment.

T2K has conclusively demonstrated the appearance of electron neutrinos in a nearly pure beam of muon neutrinos. The T2K experiment also performed the most precise measurements of muon neutrinos oscillating away. I will present results from both of these analysis as well as those from a combined V_e-appearance and V_μ-disappearance analysis. The results provide a first hint on the value of the δ_{CP} phase CP which describes the asymmetry between matter and anti-matter in the neutrino sector.

LA-SiGMA
Louisiana Alliance for Simulation-Guided Materials Applications

Fall Seminar

Helmut G. Katzgraber
Department of Physics & Astronomy, Texas A&M University

"Quantum computers: Are we there yet?"

3:30pm - 4:30pm, Wednesday, September 3, 2014
1008B Digital Media Center, Louisiana State University

LA-SiGMA

Louisiana Alliance for Simulation-Guided Materials Applications

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

Quantum computers: Are we there yet?

By

Helmut G. Katzgraber

Department of Physics & Astronomy, Texas A&M University

Can quantum computers indeed meet the promise of doing complex calculations faster than classical computers based on transistor technologies? While the holy grail of a programmable universal quantum computer will probably still take decades to reach, one can already begin to answer this question by testing programmable quantum annealing machines that are currently being built. These machines, such as D-Wave 2, use a non-mainstream method known as adiabatic quantum annealing to perform optimization tasks. Very recently, tests performed by different research teams on the D-Wave 2 machine using spin glasses as a benchmark have shown that, although the machine indeed appears to tap into quantum effects, it shows no speedup over traditional computing architectures. Here, I present reasons why this might be the case: The benchmarks used to test the D-Wave machine are encoded in the restrictive Chimera topology dictated by fabrication constraints of the device. Our finding is that, for the standard benchmark Ising spin glass on the Chimera lattice, its energy landscape is actually rather simple. This means that searching for a ground state of an Ising spin glass on the Chimera lattice is an easier exercise in optimization for both quantum, as well as vanilla classical optimization methods, i.e., not a measure of sufficient rigor to detect quantum speedup. Our results thus show that a careful design of the hardware architecture and benchmark problems is key when building quantum annealing machines and we present alternative benchmark strategies in the quest for detecting quantum speedup.

Work done in collaboration with R. Andrist, F. Hamze, A. Ochoa and Z. Zhu.

Dr. Helmut Katzgraber was born in Lima, Peru and is Austrian citizen. After growing up in Lima and completing military duties in the Austrian army, he studied physics at ETH Zurich where he graduated with a Diploma with distinction under the supervision of Prof. Gianni Blatter. He received his PhD in Physics in 2001 under the supervision of Prof. A. Peter Young at the University of California Santa Cruz for numerical studies of spin-glass systems. After a one-year postdoctoral position with Profs. Gergely Zimanyi and Richard Scalettar at the University of California Davis where he worked on numerical studies of magnetic recording media, he returned to ETH Zurich in 2002 as a postdoctoral fellow in the group of Prof. Gianni Blatter at the Institute for Theoretical Physics. In 2007 he was awarded a Swiss National Science Foundation professorship and in 2009 he joined Texas A&M as a tenure-track assistant professor. In 2011 he received an NSF CAREER award and since 2012 he is an associate professor in the Physics and Astronomy Department at Texas A&M University. His main research fields in computational physics are the investigation of disordered and complex systems, as well as the study of topologically-protected quantum computing. Since 2013 he is member of the Texas A&M Materials Science and Engineering program and since 2014 he is external faculty member at the Santa Fe Institute in New Mexico.

UNO – 234, Liberal Arts Building ~ **LATech** – 122, Nethken Hall
SUBR – 211 J.B. Moore Hall ~ **Xavier** – 226 Qatar Pavillion

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