LSU
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PHYSICS & ASTRONOMY
WEEKLY CALENDAR

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

WEEKLY CALENDAR

February 18, 2008

Departmental Colloquium

"Neutrino and Neutrinoless Experiments"

3:40 PM – Tuesday, February 19, 2008

109 Nicholson Hall

Huaizhang Deng

University of Pennsylvania

Host – William Metcalf

•Refreshments served at 3:15 PM in 201 Nicholson Hall•

In our universe, the neutrinos have more mass than all stars combined. Those tiny particles play a crucial role in the burning of the sun, explosion of the supernovae, and construction of the galaxies, and probably the existence of our universe. Only ten years ago, we knew so little about them that we had a crisis to explain why the sun shines. In the talk, I will present the results from the Sudbury Neutrino Observatory (SNO), which solve the solar neutrino problem. I will also present the effort of SNO+ to determine whether neutrinos are Majorana particles, which means they are their own antiparticles. Though the results from SNO and other experiments revealed many properties of neutrinos, there are still a lot of important questions about them. The neutrinos physics is at a very exciting stage because we may be able to answer all those questions within the next ten to twenty years.

Material Science and Engineering Seminar

"Evidence For Luttinger Liquid Physics in Dimension Higher Than One from ARPES of Li0.9M06O17"

3:40 pm – Wednesday, February 20, 2008
109 Nicholson Hall

James W. Allen
Joaquin M. Luttinger Professor – University of Michigan
Host: Ilya Vekhter

Li0.9Mo6O17 is a quasi-one dimensional (1D) superconducting metal whose single particle spectrum as measured by angle resolved photoemission spectroscopy (ARPES) has features generic to the T-dependent spectral function of the one-band Tomonaga-Luttinger model. The ARPES spectrum of the dispersing excitation defining its quasi-1D Fermi surface shows a holon (charge mode) peak and a spinon edge dispersing with different velocities, and the k-integrated spectrum approaches the Fermi energy EF as a power law with anomalous exponent a. A strong T-dependence of a [1] and the particulars of quantum critical scaling observed in the ARPES spectrum [2] can be traced to interacting gapped charge neutral critical modes that emerge naturally for Li0.9Mo6O17 because two nearly degenerate bands cross EF. New band structure calculations and additional ARPES results conspire to imply the presence of a mechanism for suppression of perpendicular hopping that would otherwise destabilize the observed Luttinger liquid (LL) behavior. Such a mechanism would constitute a scenario for a new quantum state of matter in which LL physics is maintained in dimension greater than one.

[1] Feng Wang et al., "New Luttinger-Liquid Physics from Photoemission on Li0.9Mo6O17," Phys. Rev. Lett. 96, 196403 (2006).
[2] J. V. Alvarez et al, "Gap-protected Quantum Critical Scaling in ARPES of Li0.9Mo6O17," submitted to Phys. Rev. Lett.

* Collaborators: J. V. Alvarez (Univ. Autonoma Madrid), Feng Wang (Univ. of Michigan), S.-K. Mo (Stanford Univ.), G.-H. Gweon (Univ. of California, Santa Cruz), J. He (Clemson Univ.) , D. Mandrus (Univ. of Tennessee and Oak Ridge National Lab), R. Jin (ORNL), and H. Höchst (SRC, Univ. of Wisconsin)..

Reminder:

There will be a faculty meeting, **Thursday, February 21, 2008** at 3:40 in Room 109.

Publications:

"Loss of entanglement in quantum mechanics due to the use of realistic measuring rods," Rodolfo Gambini Rafael A. Porto, and **Jorge Pullin**, Physics Letters A 372 (2008) 1213-1218.