WEEKLY CALENDAR

September 19, 2011

Departmental Colloquium

Thursday, 3:40 PM, September 22, 2011
109 Nicholson Hall

"Disorder, Interactions and Zero-bias Anomalies"

Rachel Wortis
Trent University – Ontario, CANADA

Host: **Juana Moreno**

• *Refreshments served at 3:15 PM in 232 (Library) Nicholson Hall* •

Many of the most interesting electronic behaviors arise in materials with strong electron-electron correlations. Many of these same materials are disordered either intrinsically or due to doping. The study of how electrons behave in the presence of both disorder and interactions has a long history, yet the regime of strong disorder and strong interactions remains poorly understood. The density of states is one measure of the electrons which is readily accessible to both theorists and experimentalists. The combination of disorder and interactions is known in a number of contexts to generate a feature in the density of states at the Fermi level, a zero-bias anomaly. Experiments on strongly correlated materials and recent numerical results on the Anderson-Hubbard model, however, show behavior which is inconsistent with existing theoretical descriptions. This talk will suggest that insight into the physical origin of the zero-bias anomaly in strongly correlated systems may be gained by examining an ensemble of two-site systems.

Special Nuclear Physics Seminar
Tuesday, 3:10 pm, September 20, 2011 435 Nicholson Hall
"Applications of calculable R–matrix theory"
Dr. Janina Grineviciute
Western Michigan University
Host: Jerry Draayer/Kristina Launey

Nonrelativistic calculations using a recoil corrected continuum shell model have been performed for 14N(p,g)15O reaction using an interaction from a fit to Cohen and Kurath p-shell matrix elements and Reid soft core g-matrix elements. The results showed that the extremely low capture rate was due to a fortuitous cancellation between contributing configurations. The relativistic R-matrix formalism that allows one to solve coupled channels equations, in which binary break up channels satisfy the relative Dirac equation, has been developed and applied to the relativistic impulse approximation (RIA) and to phenomenological quantum hadrodynamics (QHD). RIA calculations demonstrated that the local density approximation is not appropriate for relativistic calculations and that pseudoscalar and pseudovector coupling gave similar agreement to experiment. Scattering calculations demonstrate that coupling constants derived in QHD are inappropriate in calculations where classical fields are exchanged with one meson exchange potentials.

Publications:

1. "Boosting jet power in black hole spacetimes", David Neilsen, Luis Lehner, **Carlos Palenzuela**, Eric W. Hirschmann, Steven L. Liebling, Patrick M. Motl, and **Travis Garrett**, Proceedings of the National Academy of Sciences 108, 12641 (2011).

2. "Parity detection achieves the Heisenberg limit in interferometry with coherent mixed with squeezed vacuum light," **Anisimov, Petr M., Lee, Hwang**, **Dowling, Jonathan P**, **Seshadreesan, Kaushik P**., New Journal of Physics, Volume 13, Number 8, August 2011 , pp. 83026-83038(13).