DIMENSIONS

NORTHWESTERN UNIVERSITY DEPARTMENT OF PHYSICS AND ASTRONOMY

Fall 2004


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Yang Zhou

Welcome to our Incoming Graduate Students!

In the news…

A recent paper by **Prof. Sara Solla**, in collaboration with her colleagues Prof. Hermann Riecke (Engineering Sciences and Applied Mathematics) and Alex Roxin, an NSF International Postdoctoral Fellow at the Laboratory of Neurophysics and Physiology of the Universite Rene Descartes in Paris, has received quite a bit of attention in the news. The paper, titled: *"Self-Sustained Activity in a Small-World Network of Excitable Neurons"*, appeared in Phys. Rev. Lett. 92, 198101 (2004) and was selected for the May 15, 2004 issue of the Virtual Journal of Biological Physics Research (www.vjbio.org). The work was also reviewed in New Scientist on May 26, 2004. (www.newscientist.com/news/news.jsp?id=ns99995012), and in the Chicago Sun Times (www.suntimes.com/output/zinescene/cst-fin-ecol21.html). The work's findings have also recently prompted an interview with Professors Riecke and Solla by ABC Radio National in Australia.

Also making news, **Prof. Farhad Yusef-Zadeh** presents new findings in a National Radio Astronomy Observatory article titled: *"Origin of Enigmatic Galactic-Center Filaments Revealed"* (www.physics.northwestern.edu/research/zadeh/Center.htm). The work details the research by Prof. Yusef-Zadeh, **John Hewitt** and William Cotton (NRAO). A related component of the findings is the mentioned GBT survey, which was conducted by Northwestern's **Casey Law** and **Douglas Roberts**; as well as Ron Maddalena (NRAO). Prof. Zadeh and graduate student Casey Law are also credited for a new Chandra image on SPACEFLIGHTNOW.com (www.spaceflightnow.com/news/n0408/07chandraquint/).

Lastly, Prof. Zadeh is now also featured on the Hubble Heritage Project website, for both images and data he has submitted to the effort. These can be seen at: http://heritage.stsci.edu/2004/17/index.html.

Prof. Michael Schmitt will be holding a mini-workshop on Z-primes, broadly defined, at Northwestern on Nov 16th. The goal is to promote collaborative efforts and an exchange of views among theorists and experimenters from the colliders at Fermilab and CERN.

Lastly, **Profs. André de Gouvêa** and **Robert Oakes** will be hosting high-energy theorists from around the area on November 1st, for the Greater Chicagoland Theoretical Seminar. The guest speakers are Shamit Kachru from Stanford and John Terning from UC-Davis.

Comings and Goings…

This edition of the newsletter greets the arrival of incoming students, as well as the addition of some new research associates to the department. First off, **John Fregeau** has joined Northwestern, coming from the Massachusetts Institute of Technology. Next, **Craig Heinke** comes to our department, having left Harvard University. Also, **David Knauth** arrived in June from Johns Hopkins University. Earlier, **Richard O'Shaughnessy** had come from the California Institute of Technology. From overseas, we welcome **Bart Willems,** who hailed from the Catholic University of Leuven, Belgium.

On the outgoing side, we a bid a fond farewell to postdocs **Joshua Faber** and **Krzysztof Belczynski**. Josh recently departed Northwestern for the University of Illinois at Urbana-Champaign. Heading further west, Krzysztof will begin a new career in Las Cruces, at New Mexico State University.

September saw the **2004 NASA Summer Research Program for Undergraduates and High School Students** draw to a close. After receiving applications from all over the country, ten students were chosen to participate in the program. Each was given the opportunity to gain experience in the field of astrophysics while working with Northwestern professors for more than two months. The program will continue again next summer, with the deadline for submission of application papers falling on Friday, February 4th, 2005. (www.astro.northwestern.edu/Education/edu_summer_programs.html)

Congratulations!

On Saturday, October 9th 2004, **John Fregeau** married Grace Uy. Our best wishes go out to the newlyweds!

Undergraduate student **Rebecca Miller** has won a prestigious Barry M. Goldwater Scholarship (http://www.act.org/goldwater). These scholarships support students in mathematics, the natural sciences, and engineering. The award is for $7500. The Goldwater Program awards about 300 scholarships per year in the U.S. and its territories.

Muge Karagoz Unel successfully defended her thesis *"Searches for New Physics Using High Mass Dimuons at CDF II Experiment,"* on September 23, 2004. She has accepted a position at the University of Oxford to work on the ATLAS experiment at CERN beginning in November**.**

WINE & CHEESE PARTY 2004

Research Awards

June – October 2004

Hui Cao
NSF/MRSEC Allocation
National Science Foundation
Materials Research Center
September 2004 – August 2005
$70,517

Pulak Dutta
NSF/MRSEC Allocation
National Science Foundation
Materials Research Center
September 2004 – August 2005
$70,517

Donald E. Ellis
NSF/MRSEC Allocation
National Science Foundation
Materials Research Center
September 2004 – August 2005
$70,517

Donald E. Ellis and John B. Ketterson
"Inter-American Materials Collaboration: Surface Structure and Metal Uptake of Apatite Films and Particles"
National Science Foundation
August 2004 – July 2005
$155,000

Arthur J. Freeman
"Production, Injection, Transport and Manipulation of Spin-Polarized Electrons within III-N Semiconductor Structures"
DARPA
Subcontract: Arizona State
February 2003 – January 2004
$30,726

NSF/MRSEC Allocation
National Science Foundation
Materials Research Center
September 2004 – August 2005
$84,481

Arthur J. Freeman and John B. Ketterson
"U.S.-Italian Collaboration: Theoretical and Experimental Development of New Magneto-Electronic Materials"
National Science Foundation
August 2004 – July 2005
$120,000

Anupam K. Garg
"Studies of Mesoscopic Spin Systems: Magnetic Molecules and Formalism"
National Science Foundation
July 2004 – June 2005
$70,000

William P. Halperin
"Order Parameter Structure in Thin Films and Disordered Superfluid 3He"
National Science Foundation
August 2004 – July 2005
$152,000

NSF/MRSEC Allocation
National Science Foundation
Materials Research Center
September 2004 – August 2005
$70,517

Vassiliki Kalogera
"Genetic Algorithms in Gravitational Wave Astrophysics"
Research Corporation
May 2004 – May 2005
$75,000

"Understanding the X-Ray Binary Populations of Nearby Galaxies Revealed by the Chandra Observatory: Super Star Clusters and Starbursts"
NASA
September 2004 – August 2005
$24,000

Vassiliki Kalogera and Frederic A. Rasio
"Stellar Sources of Low-Frequency Gravitational Waves (ATP)"
NASA
April 2004 – March 2005
$87,388

John B. Ketterson
"Chalcopyrite and Orientation-Patterned Semiconductors of Mid-IR Sources: Modelling, Growth and Characterization (MURI)"
Department of Defense
Subcontract: Stanford University
January 2004 – December 2004
$75,801

"A Qubit Based on SINIS Josephson Tunnel Junctions"
National Science Foundation
September 2004 – August 2005
$152,784

"IMR: Acquisition of a Physical Property Measurement System for Research and Education"
National Science Foundation
September 2004 – August 2005
$155,050

NSF/MRSEC Allocation
National Science Foundation
Materials Research Center
September 2004 – August 2005
$70,517

John B. Ketterson and David M. Kelso
"SENSORS: Collaborative Research: Biochemical Sensors and Data Processing for Security Applications"
National Science Foundation
September 2004 – August 2005
$120,000

David M. Meyer and David C. Knauth
"O VI Distribution in the Sco OB1 Association"
NASA Goddard Space Flight Center
July 2004 – June 2005
$24,200

Giles A. Novak
"Diffraction-limited Polarimetry at the Caltech Submillimeter Observatory"
National Science Foundation
August 2004 – July 2005
$190,360

Frederic A. Rasio
"Binary Stars and Globular Cluster Dynamics"
NASA
April 2004 – April 2005
$93,638

"Dynamics of Extrasolar Planetary Systems"
National Science Foundation
July 2004 – June 2005
$79,368

"Hydrodynamic Calculations of Coalescing Compact Binaries"
National Science Foundation
August 2004 – July 2005
$35,000

"Collaborative Research: Stellar Collisions in Dense Star Clusters"
National Science Foundation
September 2004 – August 2005
$17,498

Douglas A. Roberts
"7mm GBT Recombination Line Observations of Sgr A West"
National Radio Astronomy Observatory
July 2004 – June 2005
$6,000

Jerome L. Rosen
"Research in High Energy Physics: Task A"
Department of Energy
December 2003-November 2004
$25,000

Ronald E. Taam
"Studies in Common Envelope Evolution"
National Science Foundation
August 2004 – July 2005
$106,185

Melville P. Ulmer
"Development of High Performance Laminated Electroformed Shape Memory Composite Materials for Lightweight and Deployable Optics"
NASA
Subcontract: Ball Aerospace
July 2003 – January 2005
$124,923

"Plasma Sprayed Metal/Ceramic Composite for Light Weight X-Ray Mirrors (STTR)"
NASA
Subcontract: Powdermet
July 2004 – August 2005
$125,611

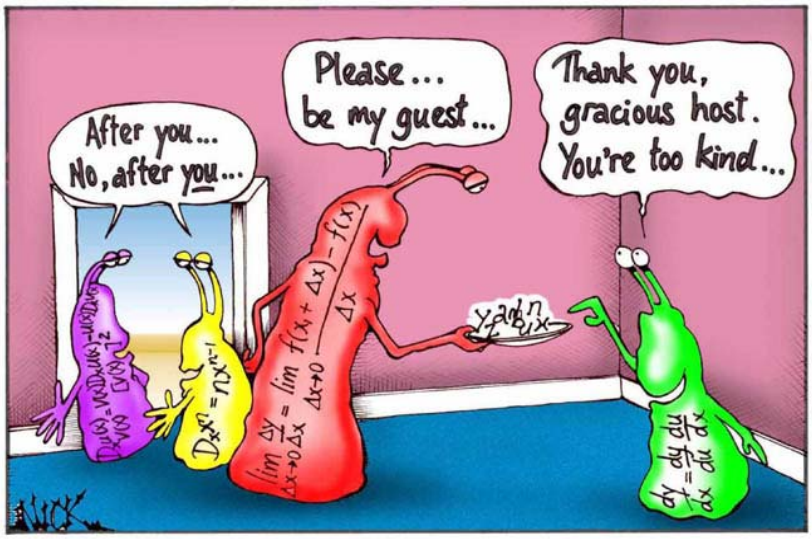
Mayda M. Velasco
"Illinois Consortium for Accelerator Research (ICAR)"
State of Illinois Board of Higher Education
Subcontract: Illinois Institute of Technology
August 2003 – August 2004
$437,000

Farhad Yusef-Zadeh
"The Distribution of Stars around the Massive Black Hole at the Galactic Center"
NASA
Subcontract: Space Telescope Science Institute
August 2004 – April 2005
$35,000

"Supernova Remnants Interacting with Molecular Clouds"
National Science Foundation
June 2004 – May 2005
$64,225

"A Multi-Wavelength Study of the Inner 50-pc Region at the Galactic Center (LTS99)"
NASA Goddard Space Flight Center
March 2004 – March 2005
$36,895

"A Coordinated NICMOS and XMM Experiment to Observe the Variability of Sgr A*"
NASA
Subcontract: Space Telescope Science Institute
September 2004 – August 2005
$73,522



Deferential equations.

Calendar of Events

October

15 Interdisciplinary Seminar in Nonlinear Science – *"Collective Motion and Mobile Sensor Networks"*
Naomi Leonard
Princeton University
2:00pm in Tech Room M416

15 Colloquium – *"Hanbury Brown and Twiss Intensity Interferometry: From Stars to Nuclear Collisions to Atoms"*
Gordon Baym
University of Illinois - Urbana
4:00pm in Tech Room L211

18 High Energy Physics Seminar – *"K-> pi nu mu: Results and Prospects"*
David Jaffe
Brookhaven National Laboratory
4:30pm in Tech Room F235

19 Astrophysics Seminar – *"Revealing the Youngest Circumstellar Disks: Hiding in the Dust"*
Leslie Looney
University of Illinois
4:00pm in Dearborn Room 23

21 Condensed Matter Seminar – *"Thermal fluctuations in an underdamped Josephson tunnel junction"*
Frank Hekking
CNRS-CRTBT, Grenoble
4:00pm in Tech Room F235

22 Colloquium – *"Gravitational-Wave Observatories -- Giant Detectors, Precision Measurement, and the Search for the Elusive Waves"*
Nergis Mavalvala
Massachusetts Institute of Technology
4:00pm in Tech Room L211

25 High Energy Physics Seminar – *"Neutralino Dark Matter"*
Csaba Balazs
Argonne National Laboratory
4:30pm in Tech Room F235

29 Colloquium – *"Neutrino Astronomy at the South Pole: From AMANDA to IceCube"*
Francis Halzen
University of Wisconsin - Madison
4:00pm in Tech Room L211

November

1 High Energy Physics Seminar – "Greater Chicagoland Theoretical Seminar"
Shamit Kachru & John Terning
Stanford & LANL/Davis
4:30pm in Tech Room F235

2 Astrophysics Seminar – *"Ultracompact HII Regions and the Origin of Broad Line Sources"*
Chris DePree
Agnes Scott College
4:00pm in Dearborn Room 23

3 **Special Colloquium** – *"Quantum Spin Noise"*
Alexander Balatsky
Los Alamos National Laboratory
4:00pm in Tech Room F235

5 Interdisciplinary Seminar in Nonlinear Science – *"Motion Coordination for Multi-Agent Networks: Algorithmic Design and Theoretical Framework"*
Francesco Bullo
University of California at Santa Barbara
2:00pm in Tech Room M416

5 Colloquium – *"Ultrafast Coherent X-Ray Generation and Applications"*
Margaret Murnane
University of Colorado - Boulder
4:00pm in Tech Room L211

8 High Energy Physics Seminar – *"Bottom Quark and J/Psi Production at CDF"*
Tom LeCompte
Argonne National Laboratory
4:30pm in Tech Room F235

9 Astrophysics Seminar – *"Dust and Metals in the Early Universe"*
Sara Ellison
University of Victoria
4:00pm in Dearborn Room 23

11 Condensed Matter Seminar – TBA
Hideaki Takayanagi
NTT Research Labs
4:00pm in Tech Room F235

12 Colloquium – *"A Stirring Tale of Bacterial Swimming and Chemotaxis"*
Raymond Goldstein
University of Arizona
4:00pm in Tech Room L211

15 **Special Colloquium** – "Relic Neutrinos"
Paul Langacker
University of Pennsylvania
4:00pm in Tech Room F235

16 Astrophysics Seminar – *"Observing Relativistic Binary Pulsars"*
Ingrid Stairs
University of British Columbia
4:00pm in Dearborn Room 23

18 Condensed Matter Seminar – TBA
Andrey Chabanov
Northwestern University
4:00pm in Tech Room F235

19 Colloquium – TBA
Charles Marcus
Harvard University
4:00pm in Tech Room L211

22 High Energy Physics Seminar – TBA
Irina Mocioiu
Argonne National Laboratory
4:30pm in Tech Room F235

23 Astrophysics Seminar – *"Relativity for the Impatient: The Nature of Microquasars"*
Michael Rupen
National Radio Astronomy Observatory
4:00pm in Dearborn Room 23

30 Astrophysics Seminar – *"Outflows from Accretion Disks"*
Daniel Proga
University of Colorado
4:00pm in Dearborn Room 23

December

2 Condensed Matter Seminar – TBA
Alexey Yamilov
Northwestern University
4:00pm in Tech Room F235

3 Interdisciplinary Seminar in Nonlinear Science – *"Self-Organizing Robotic Systems"*
Eric Klavins
University of Washington
2:00pm in Tech Room M416

6 High Energy Physics Seminar – *"Performance of the CsI-RICH for High Momentum Identification in the ALICE Experiment at the CERN-LHC"*
Abraham Gallas
CERN
4:30pm in Tech Room F235

4 Last day of classes for Fall quarter.

6 Fall quarter examinations begin.

10 Fall quarter examinations end.

10 Department Christmas party