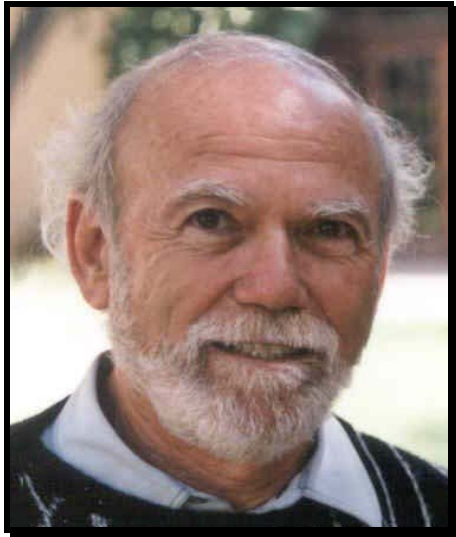


DIMENSIONS

NORTHWESTERN UNIVERSITY DEPARTMENT OF PHYSICS AND ASTRONOMY

Spring 2005



Professor Barry Barish to Visit Department as Heilborn Lecturer

The department is pleased to welcome this year's Heilborn Distinguished Lecturer, Professor Barry Barish of the California Institute of Technology. He will be a guest of the department April 18th through 22nd and will present the following three lectures:

April 18: *"Probing Einstein's Universe"*
(reception following lecture)

April 19: *"The Next Great Particle Accelerator: The International Linear Collider"*

April 21: *"Detecting Gravitational Waves with LIGO"*

Barry C. Barish is the Director of the Laser Interferometer Gravitational Wave Observatory (LIGO) and a professor of high-energy physics at the California Institute of Technology, where he has taught and conducted research since 1963. In October 2002, Dr. Barish was nominated to the National Science Board, which oversees the National Science Foundation (NSF) and advises the President and the Congress on policy issues related to science, engineering and education.

Dr. Barish earned his Bachelor of Arts in physics in 1957 and a Ph.D. in experimental high-energy physics in 1963 from the University of California, Berkeley. At Caltech, Dr. Barish helped develop a new high-energy physics program that utilized the frontier particle accelerators. Among his noteworthy experiments were those at Fermilab, using high-energy neutrinos to reveal the quark substructure of the nucleon. In the 1980's, Dr. Barish initiated an ambitious international effort to build a sophisticated underground detector (MACRO) to search for the magnetic monopole and solve other problems in the emerging area of particle astrophysics.

Dr. Barish was named the Maxine and Ronald Linde Professor of Physics in 1991. He became the Principal Investigator of the LIGO project in 1994 and was appointed Director of the LIGO Laboratory in 1997. Dr. Barish served as co-chair of the sub-panel of the High Energy Physics Advisory Panel (HEPAP) that developed a long-range plan for U.S. high-energy physics. He has served as chair of the Commission of Particles and Fields of the International Union of Pure and Applied Physics (IUPAP) and is currently chair of the U.S. Liaison committee to IUPAP. In 2002, he received the Klopsteg Award of the American Association of Physics Teachers and was elected to the National Academy of Sciences. He is presently serving as a member of the special panel for NASA that is considering the future of the Hubble Space Telescope and the transition to the James Webb Space Telescope.



Congratulations

The department extends its congratulations to the following graduating students. While the road to a degree may be long and difficult, it is with patience and dedication that this next chapter in our education slowly unfolds. The quest for knowledge knows no ending; attainment of a degree is but one important milestone along its pathway.

2005 Graduates

Bachelor's Degree

Brian Allen
Nathan Brown
Elizabeth Hay
Christopher Morse
Arjun Sharma

Laura Blecha
Holly Childers
Catherine Ihm
Ryan O'Leary
Jason Stein

Joseph Breen
Lisa Ferrara
Verene Lystad
Rachel Scheidegger
Christopher Straub

Master's Degree

Andrew Busch
Meghan Gagliardi
Megan Krejny
Johannes Pollanen

Sourav Chatterjee
James Jenkins
Mary Messall
Jeremy Sepinksy
Shaoxuan Yang

Sean Dobbs
JianJian Jin
Luis Mier Y Teran
Norman Tubman

Ph.D.

Teresa Fonseca
Muge Karagoz
Anton Voronstov

Atakan Gurkan
Ersin Kececioglu

David Joffe
Joo-Hyoung Lee
Su Yan

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 Université René 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 Physics Review Letters 92, 198101 (2004) and was selected for the May 15, 2004 issue of the Virtual Journal of Biological Physics Research (<http://www.vjbio.org>). The work was subsequently reviewed by the New Scientist news service (www.newscientist.com/news/news.jsp?id=ns99995012) and the Chicago Sun Times (www.suntimes.com/output/zinescene/cst-fin-ecol21.html).

This research was the subject of an interview with Professors Riecke and Solla by ABC Radio National in Australia.

In January, an article by **Prof. Hui Cao** appeared in Optics and Photons News, titled "*Random Lasers: Development, Features and Applications*". The article discusses the random laser, its history and new applications (www.osa-opn.org/abstract.cfm?URI=OPN-16-1-24).

Also that month, Prof. Cao's work with **Xiaohua Wu** and **Alexey Yamilov** appeared in the January edition of Photonics Spectra magazine. This preceded mention of the group's work that same month in Laser Focus World magazine. To view a write-up of the research titled "*Ultraviolet Photonic Crystal Laser*", please visit: http://xxx.arxiv.org/PS_cache/physics/pdf/0406/0406005.pdf.

Making news, **Prof. Farhad Yusef-Zadeh** presents new findings in a National Radio Astronomy Observatory article titled

"*Origin of Enigmatic Galactic-Center Filaments Revealed*" <http://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 of the NRAO.

Prof. Zadeh and graduate student Casey Law are also credited for a new Chandra image on SPACEFLIGHTNOW.com (<http://www.spaceflightnow.com/news/n0408/07chandraquint/>).

Prof. Yusef-Zadeh was also featured on the Hubble Heritage Project website, for both images and data he has contributed to the effort. These can be seen at: <http://heritage.stsci.edu/2004/17/index.html>

Welcome to our 2005 NASA Summer students!

COLLEGE PARTICIPANTS

Sarah Braden
Joseph Eckart
Steven Ehlert
Daniel Iden
Walter Maksym
Nick Spear
Mark Tibbit
Alexander Vaynman

HIGH SCHOOL PARTICIPANTS

Jennifer Huang
Martha Malin
Steven Wang

Recognition, Appointments and Awards...

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 \$7,500. The Goldwater Program awards about 300 scholarships per year in the U.S. and its territories.

Prof. Vicky Kalogera has been awarded a National Science Foundation Faculty Early Career Development Award in Astronomy. This is one of NSF's most prestigious awards and is given in support of the early career-development activities of those teacher-scholars who are most likely to become the academic leaders of the 21st century.

Laura Blecha has been awarded a Gates-Cambridge Scholarship for the coming academic year to pursue her research on intermediate-mass black holes under the supervision of Sir Martin Rees (<http://trust.gatesscholar.org>). She started work in this area with Prof. Vicky Kalogera, and it forms the subject of her senior thesis. Laura is the first NU student to receive this award in the past six years.

Graduate student **Louis Jisonna** has been selected to attend the 55th Annual Lindau Meeting this summer in Lindau, Germany. He is one of 25 U.S. graduate students selected by the United States Department of Energy and one of 4 representing the nuclear physics community. There will be 60 students from the U.S. and roughly 600 international students attending the meeting with Nobel Laureates from various fields including Physics, Chemistry and Physiology/Medicine.

Where are they now?

Here are some recent news items concerning department graduates who have gone on to prominent careers in the fields of Physics and Astronomy.

Guillaume Gervais (PhD, 2002) has been appointed Assistant Professor at McGill University (Montreal, Canada) and was just awarded an Alfred P. Sloan Research Fellowship for 2005. Gervais is interested in the strongly correlated electronic properties of low-dimensional nanostructured systems. Examples include the fractional quantum Hall effect, anyons, non-abelian quantum statistics, skyrmion crystals, Luttinger liquid behavior and other quantum-coherent phenomena in quantum dots and wires. Gervais' thesis advisor was William Halperin.

Camille Ginsburg (PhD, 1995) has accepted an associate (tenure track) position at Fermilab. Ginsburg's thesis advisor was Kamal Seth.

Yoonseok Lee (PhD, 1997) has been awarded an Alfred P. Sloan Research Fellowship for 2004-06. This comes on top of a previous NSF Career Award (2003) and a President's Award from the Association of Korean Physicists in America for Outstanding Young Researcher (2002). Lee is currently an Assistant Professor at the University of Florida, where his research interests center on ultra-low-temperature phenomena in strong magnetic fields. Lee's thesis advisor was William Halperin.

Vesna Mitrovic (PhD, 2001) has been appointed Assistant Professor at Brown University (Providence, Rhode Island). Her research is focused on quantum phenomena arising in strongly correlated electron systems at low temperatures and high magnetic fields. Specifically, she uses NMR spectroscopy to study quantum magnetism and unconventional superconductivity. Her thesis advisor was William Halperin.

Paolo Rumerio (PhD, 2003) has recently left Brookhaven National Laboratory and has gone on to become a CERN Fellow. His thesis advisor was Jerome Rosen.

Thomas Toellner (PhD, 1996) has received a 2004 Distinguished Performance Award from the University of Chicago. The University of Chicago operates Argonne National Laboratory, where Toellner is a Staff Physicist. Toellner and his co-worker, Wolfgang Sturhahn, are the first scientists to discover and extract the phonon density of states from nuclear resonant scattering data. Their ideas and technical innovations were crucial to the development of nuclear resonant techniques at the Advanced Photon Source and other third-generation synchrotron radiation sources. Toellner's thesis advisor was John Ketterson.

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. Her thesis advisor was Michael Schmitt.

For more information on past graduates, please visit the department web site at: <http://www.physics.northwestern.edu/news/news.html>.

Comings and Goings...



Grant Darktower recently joined the academic office as the new Program Assistant. Grant previously worked for Sire Digital Co. Upon her graduation, **Teresa Fonseca** will be working for the Universitat Autònoma de Barcelona, Spain, in a post-doctoral position to conduct research at Fermilab.



EDUCATION & ANNOUNCEMENTS



Kaon 2005 International Workshop

Northwestern University, Technological Institute, Room L211
June 13th–17th

The purpose of this workshop will be to bring together the latest experimental and theoretical developments on flavor physics with particular emphasis in the kaon system. The high-energy particle physics community has finished a series of important measurements and there is a need to develop a new generation of experiments that will have the precision to challenge our understanding of the standard model. In order to realize this potential, a close collaboration of physicists working in various subfields of high-energy physics—experiment, chiral perturbation theory, lattice QCD, CP-violation, lepton number violation and other sources of physics beyond the standard model—is necessary. The format is plenary talks only, with a moderate number of talks each day to have time for lively discussions. <http://diablo.phys.northwestern.edu/~mvelasco/conference.html>

World Year of Physics 2005

Northwestern University, Technological Institute and Dearborn Observatory
May 15th

As part of Northwestern's contribution to the World Year of Physics 2005, the department is having an Open Day on Sunday, May 15th from 1:00 pm – 6:00 pm. It will be held on the 1st floor of the Tech Institute and in the Dearborn Observatory. The day is aimed primarily at high school students, though it's hoped to provide something of interest for all ages. There will be a series of short talks, demonstrations, posters, quizzes, lab tours and (security arrangements permitting) live demonstrations of a trebuchet (a gravity-powered catapult). The keynote speaker will be Tony Leggett of UIUC, winner of the 2003 Nobel Prize in Physics.

Please invite your family and friends. It will be a great opportunity to visit the department and learn while having fun.

For questions, volunteering, comments, and to open your lab for the day, visit the function's web site at <http://www.physicsyear.northwestern.edu/> for details.



WINE & CHEESE PARTY 2004





Research Awards

October 2004 – March 2005



David A. Buchholz and Heidi M. Schellman

High Energy Experimental
Physics Program: Task C
Department of Energy
December 2004 – November
2005
\$473,000

Venkat Chandrasekhar

“NIRT: Atomic Layer
Controlled Epitaxial
Ferromagnetic Oxide
Nanostructures”
National Science Foundation
Subcontract: University of
Wisconsin
October 2004 – September 2005
\$55,000

Pulak Dutta

“In Situ X-Ray Studies of
Adsorption, Nucleation and
Self-Assembly at Soft-Hard
Interfaces”
Department of Energy
January 2005 - October 2005
\$159,951

Arthur J. Freeman

“Predicting Real Optimized
Materials: Quantum
Engineering of Materials
and Devices”
Defense Advanced Research
Projects Agency
Subcontract: Lawrence
Livermore Nat'l Laboratory
December 2004 – June 2006
\$132,117

“Fundamental Electronic
Structure Characteristics and
the Mechanical Behavior of
Materials for Aerospace
Applications”
Air Force Office of Scientific
Research
October 2004 – September 2005
\$125,000

Bruno Gobbi

High Energy Experimental
Physics Program: Task H
Department of Energy
December 2004 – November
2005
\$210,000

“US CMS Forward Pixels
Subsystems”
Department of Energy
Subcontract: Fermilab
October 2004 – September 2005
\$71,182

Vassiliki Kalogera

“Discrete X-Ray Source
Populations and Star
Formation History in Nearby
Galaxies”
NASA
Subcontract: Smithsonian
Astrophysical Observatory
March 2004 – August 2005
\$16,620

David & Lucile Packard
Fellowship in Science and
Engineering
David & Lucile Packard
Foundation
October 2004 – September 2005
\$125,000

“Binary Compact Objects as
Gravitational Wave Sources:
Modeling and Data Analysis”
National Science Foundation
November 2004 – October 2005
\$87,039

“X-Ray Binary Formation in
Elliptical Galaxies: The Role
of Dynamical Processes”
NASA
Subcontract: Smithsonian
Astrophysical Observatory
January 2005 – December 2005
\$76,235

“CAREER: Theoretical Studies
of Compact Objects in Binary
Systems”
National Science Foundation
November 2005 – October 2006
\$103,183

John B. Ketterson

“Chalcopyrite and Orientation-
Patterned Semiconductors of
Mid-IR Sources: Modeling,
Growth and Characterization
(MURI)”
Department of Defense
Subcontract: Stanford
University
January 2005 – December 2005
\$117,363

James T. Lauroesch and David M. Meyer

“The Physical Character of the
Smallest-Scale Interstellar
Structures”
NASA
Subcontract: Space Telescope
Science Institute
November 2004 – February
2006
\$30,407

David M. Meyer and David C. Knauth

“Where has the N₂ Gone?”
NASA Goddard Space Flight
Center
October 2004 – October 2005
\$38,900

Robert J. Oakes and André de Gouvêa

High Energy Experimental
Physics Program: Task F
Department of Energy
December 2004 – November
2005
\$68,000

Jerome L. Rosen
High Energy Experimental
Physics Program: Task A
Department of Energy
December 2004 – November
2005
\$20,000

Michael H. Schmitt
High Energy Experimental
Physics Program: Task B
Department of Energy
December 2004 – November
2005
\$179,000

Ralph E. Segel
“Research into the Measurement
of the Proton Form Factor:
Fellowship for Issam Qattan”
Department of Energy
Subcontract: Argonne National
Laboratory
September 2004 – August 2005
\$27,444

“Physics with Rare Isotope
Beams”
Department of Energy
January 2005 – December 2005
\$60,000

Kamal K. Seth
“Strong Interaction Studies with
Medium Energy Probes”
Department of Energy
December 2004 – November
2005
\$326,000

Melville P. Ulmer
National Space Grant College
and Fellowship Program
NASA
Subcontract: University of
Illinois at Urbana-Champaign
February 2004 – January 2005
\$102,026

“The Development and Testing
of GaN Based EBCCDs for
Visible-Blind UV Imaging”
NASA
January 2005 – December 2005
\$98,000

Mayda M. Velasco
High Energy Experimental
Physics Program: Task K
Department of Energy
December 2004 – November
2005
\$122,000

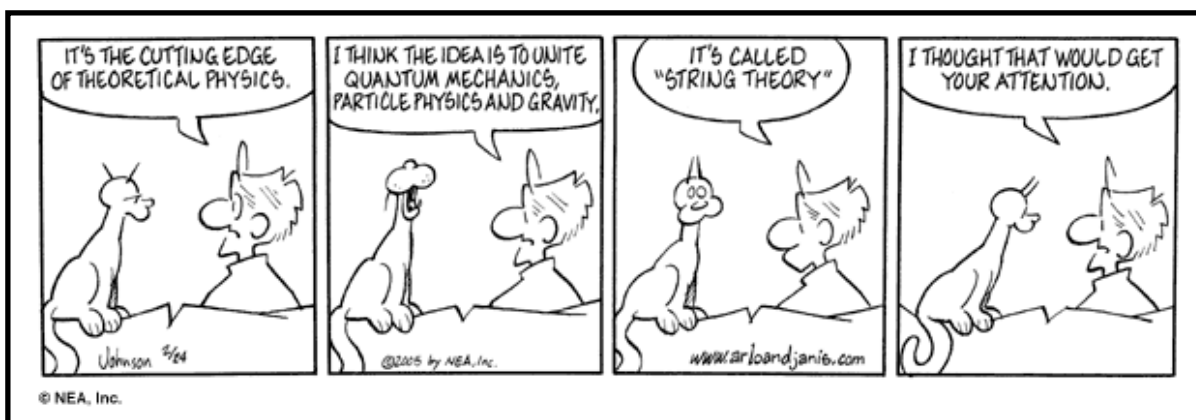
Farhad Yusef-Zadeh
“High Resolution Imaging of the
Galactic Center with
Spitzer/IRAC”
NASA
Subcontract: Jet Propulsion
Laboratory, California
Institute of Technology
August 2004 – July 2007
\$2,700

GBT Student Support Program:
A Study of the Galactic
Center Lobe (support for
Casey Law)
NASA
Subcontract: National Radio
Astronomy Observatory
September 2004 – September
2005
\$35,000

“An Archival Analysis of Stellar
Life-Cycles at the Galactic
Center”
NASA
Subcontract: Smithsonian
Astrophysical Observatory
January 2005 – December 2005
\$7,688

“The Distribution of Stars
around the Massive Black
Hole at the Galactic Center”
NASA
Subcontract: Space Telescope
Science Institute
May 2005 – July 2006
\$35,000

“A Coordinated NICMOS and
XMM Experiment to Observe
the Variability of Sgr A*”
NASA
Subcontract: Space Telescope
Science Institute
May 2005 – August 2006
\$73,522





Calendar of Events



April

- 1 Interdisciplinary Seminar in Nonlinear Science – TBA
Andre Levchenko
Johns Hopkins University
2:00 pm in Tech Room M416
- 1 Colloquium – *"A Different Universe: Remaking Physics from the Bottom Down"*
Robert Laughlin
KAIST and Stanford University
4:00 pm in Tech Room L211
- 4 High Energy Physics Seminar – *"COUPP, a CF3I Bubble Chamber Dedicated to WIMP Searches"*
Juan Collar
University of Chicago
4:30 pm in Tech Room F235
- 7 Astrophysics Seminar – *"Neutrinos as Astrophysical Probes"*
Carlos Pena-Garay
Institute for Advanced Study
4:00 pm in Dearborn Room 23
- 7 Condensed Matter Seminar – TBA
Patrick Sebbah
University of Nice, France
4:00 pm in Tech Room F235
- 8 Colloquium – *"Digital Geometry Processing"*
Peter Schroeder
California Institute of Technology
4:00 pm in Tech Room L211
- 12 Astrophysics Seminar – *"Cataclysmic Variables"*
Joe Patterson
Columbia University
4:00 pm in Dearborn Room 23
- 15 Colloquium – *"Reinventing the Accelerator for the High Energy Frontier"*
James Rosenzweig
University of California – Los Angeles
4:00 pm in Tech Room L211
- 18 Heilborn Lecture – *"Probing Einstein's Universe"*
Barry Barish
California Institute of Technology
4:00 pm in Tech Room L211
- 19 Heilborn Lecture – *"The Next Great Particle Accelerator: The International Linear Collider"*
Barry Barish
California Institute of Technology
4:00 pm in Tech Room L211
- 21 Heilborn Lecture – *"Detecting Gravitational Waves with LIGO"*
Barry Barish
California Institute of Technology
4:00 pm in Tech Room L211

- 22 Interdisciplinary Seminar in Nonlinear Science – TBA
John Maddocks
Ecole Polytechnique Federale de Lausanne, Switzerland
2:00 pm in Tech Room M416
- 22 Colloquium – *"Fundamental Physics Measurements Using Ultracold Neutrons"*
James Huffman
North Carolina State University
4:00 pm in Tech Room L211
- 26 Astrophysics Seminar – *"Signatures of Planets in Debris Disks"*
Amaya Moro-Martin
Princeton University
4:00 pm in Dearborn Room 23
- 29 Interdisciplinary Seminar in Nonlinear Science – TBA
Roman Rafikov
Institute for Advanced Study
2:00 pm in Tech Room M416
- 29 Colloquium – TBA
Michael Turner
University of Chicago
4:00 pm in Tech Room L211

May

- 3 Astrophysics Seminar – *"Interstellar Shocks"*
David Neufeld
Johns Hopkins University
4:00 pm in Dearborn Room 23
- 6 Colloquium – TBA
Daniel Ralph
Cornell University
4:00 pm in Tech Room L211
- 10 Astrophysics Seminar – *"Hittin' the Pulsar Jackpot in Cluster Terzan 5 with the Green Bank Telescope"*
Scott Ransom
National Radio Astronomy Observatory
4:00 pm in Dearborn Room 23
- 13 Interdisciplinary Seminar in Nonlinear Science – TBA
Robert Buchler
University of Illinois
2:00 pm in Tech Room M416
- 13 Colloquium – TBA
Elizabeth Simmons
Michigan State University
4:00 pm in Tech Room L211
- 16 High Energy Physics Seminar – TBA
Wesley Smith
University of Wisconsin, Madison
4:30 pm in Tech Room F235

- 17 Astrophysics Seminar – *"Interstellar Chemistry"*
Ben McCall
University of Illinois at Urbana – Champaign
4:00 pm in Dearborn Room 23
- 20 Interdisciplinary Seminar in Nonlinear Science – TBA
Tim Elston
University of North Carolina
2:00 pm in Tech Room M416
- 20 Colloquium – *"Debris Around Young Suns"*
Lynne Hillenbrand
California Institute of Technology
4:00 pm in Tech Room L211
- 23 High Energy Physics Seminar – TBA
Wesley Smith
University of Wisconsin, Madison
4:30 pm in Tech Room F235
- 24 Astrophysics Seminar – *"Sgr A*'s Weakness is our Strength: Exploring Inflow/Outflow Around Starved Black Holes"*
Sera Markoff
Massachusetts Institute of Technology
4:00 pm in Dearborn Room 23
- 27 Colloquium – TBA
Daniel Schwartz
University of Colorado
4:00 pm in Tech Room L211
- 30 High Energy Physics Seminar – *"Dark Matter and a Baryon Asymmetry from Supersymmetry"*
David Morrissey
University of Chicago
4:30 pm in Tech Room F235
- 31 Astrophysics Seminar – *"Dark Energy"*
Rocky Kolb
University of Chicago
4:00 pm in Dearborn Room 23

June

- 3 Interdisciplinary Seminar in Nonlinear Science – TBA
John White
Boston University
2:00 pm in Tech Room M416
- 4 Last day of classes for Spring quarter.
- 6 Spring quarter examinations begin.
- 10 Spring quarter examinations end.

