

Spring 2012

# DIMENSIONS

Department of Physics & Astronomy

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Photo courtesy of Robert Tilden

# Letter from the Chair



Dear Friends of Physics & Astronomy,

Over the past 12 months the department has seen some exciting developments.

Northwestern welcomed Professor Nathaniel Stern to the faculty last Fall. Nate works at the frontier of optical and condensed matter physics studying quantum interactions of photons with atoms, nano-scale structures, and magnetic materials. He is setting up a new lab on the ground floor of Tech and has already taught a very successful photonics laboratory for undergraduates.

This Spring we admitted 14 new graduate students, one of whom is arriving with an NSF fellowship. They come to us from prestigious centers of learning all over the world: University of Notre Dame, Cambridge University, National Cheng Kung University, College of the Holy Cross, University of Illinois, Southern Illinois University, Aristotle University of Thessalonikis, Coe College, Denison University, The University of Florida, Illinois Institute of Technology, The University of Delaware, and Northwestern Univeristy.

Our current graduate students continue to excel in their work. Andrew Kobach was selected to attend the prestigious Lindau Meeting this year and Vivien Raymond accepted an offer for the Caltech Millikan Prize Postdoctoral Fellowship in Experimental Physics. Roberto Vega-Morales won a 2012-2013 Fermilab Fellowship in Theoretical Physics, allowing him to work at Fermilab while finishing his thesis. In addition, Tsing Wai Wong won a CIC-Smithsonian Institution Predoctoral Fellowship. Several research staff and students have been authors to articles recently published; details about their work are listed on pages 4 and 5.

Our undergraduate majors number 61. Among those, graduating senior Kyle Kremer won a fellowship from the Churchill foundation to study astrophysics at Cambridge. Kremer is one of only 14 students nationwide to receive this award. Two of our sophomores, Jonathan Kernes and Nicholas Boffi, won summer research grants from Northwestern. Finally, Paul Geringer, Kyle Kremmer, Dan Stevens, Mitchell Drew, Jesse Choe, Marc Bourgeois, and Sascha Herrmann are graduating with honors. We congratulate them all!

The fourth floor overbuild is almost complete and is already occupied, mainly by theoretical physicists. Work on the atrium next door is still proceeding and many offices on the 2nd and 3rd floors are closed for construction. We look forward to getting all of our space back sometime early in 2013. The good news is that new space comes with new furniture, fresh paint and better carpet. The bad news is that, by the end of the project almost everyone in the department will have had to move at least once.

Several of our alumni are featured in this issue of Dimensions. If we've missed you, please send us an update for our next edition. We are proud of our alumni and want to know how you're doing.

With best wishes,

Heidi Schellman, Professor and Chair  
Department of Physics & Astronomy

## Faculty News

**Professor Anupam Garg's** new graduate-level textbook, *Classical Electromagnetism in a Nutshell*, has been published by Princeton University Press. Reviewers call it "a treasure trove of thoughtful and incisive nuggets," and "the best treatment of electromagnetism in material media that I know." The book offers an alternative to John David Jackson's *Classical Electrodynamics*, a text in use since 1962. <http://press.princeton.edu/titles/9771.html>

**Professor Chris Jacobsen** is now a Fellow of the American Physical Society. His citation reads "For seminal contributions to x-ray microscopy". [http://www.aps.anl.gov/News/APS\\_News/Content/APS\\_NEWS\\_20111129.php](http://www.aps.anl.gov/News/APS_News/Content/APS_NEWS_20111129.php)

**Professors Vicky Kalogera and Ian Low** have received Simons Fellowships to support sabbatical leaves in 2013.

**Assistant Professor Jens Koch** won a visitor's grant from the National Institute for Theoretical Physics in South Africa.

**Adilson Motter** has been promoted to Full Professor!

**Giles Novak** has received the Weinberg College Award for Excellence in Mentoring Undergraduate Research.

The American Astronomical Society (AAS) has named **Professor Frederic Rasio** as the next editor of *The Astrophysical Journal Letters*. Rasio will succeed Christopher Sneden (University of Texas, Austin). <http://www.northwestern.edu/newscenter/stories/2011/12/rasio-editor-journal.html>

**Jim Sauls** has been awarded the 2012 John Bardeen Prize recognizing his contributions to the theory of unconventional superconductivity, most importantly manifest in the heavy fermion superconductor UPt<sub>3</sub>, high-temperature cuprate superconductors, and superfluid <sup>3</sup>He.

The prize will be formally presented to him and two others, Chandra Varma and Steve Kivelson, at the M2S superconductivity meeting this August.

**Professor Heidi Schellman** has been appointed as United States Representative on the H Commission of Particles and Fields (C11) of IUPAP, the International Union of Pure and Applied Physics. The mandate of C11 is "To promote the exchange of information and views among the members of the international scientific community in the general field of Particles and Fields".

**Michael Smutko** has accepted a full-time Distinguished Senior Lecturer position in the Department starting this Spring. He will be teaching both physics and astronomy courses. For the past eight years, Smutko has held a joint appointment with the Adler Planetarium.

## Selected Publications

### Pulak Dutta

*Reverse Self-Assembly: (111)-Oriented Gold Crystallization at Alkylthiol Monolayer Templates* by Ahmet Uysal, Benjamin Stripe, Binhua Lin, Mati Meron, Pulak Dutta. **Phys. Rev. Lett.** **107**, 115503 (2011).

It is known that organic molecules with a thiol terminal group will 'self-assemble' onto a gold surface, covering it with a robust monolayer coating whose lateral structure matches that of the gold surface. Graduate student Ahmet Uysal demonstrated the reverse process: a thiol monolayer will nucleate gold nanocrystals from solution, such that only a specific matching crystal face grows against the monolayer. This process is analogous to the way biominerals (such as bones and shells, but also biogenic gold) are grown in a controlled way by living organisms, and the discovery may lead to more efficient ways to control gold crystal growth and produce oriented nanoparticle assemblies.

<http://prl.aps.org/abstract/PRL/v107/i11/e115503>

### **Jens Koch**

*Synthetic gauge fields and homodyne transmission in Jaynes-Cummings lattices* by Jens Koch. **New J. Phys.** **13**, 095008 (2011).

This paper is part of a special issue of New Journal of Physics titled "Focus on Quantum Simulation". It explores the theory and modeling lattices made of on-chip microwave resonators and superconducting qubits, for which the first experiments are now underway.

<http://scienceinsociety.northwestern.edu/content/articles/2011/why-quantum-physics-weird-and-stunningly-useful>

### **Prem Kumar**

*All-optical switching of photonic entanglement* by Matthew Hall, Joseph Altepeter, Prem Kumar. **New Journal of Physics (NJP)**, **2011**, **13**, 1050049.

This paper has been selected by editors of NJP for inclusion in our exclusive "Highlights of 2011" collection. Professor Kumar describes a new in-fiber switching device capable of routing entangled single photons with minimal noise, loss, and decoherence. Quantum communications hold the promise of classically impossible communication tasks, such as the physically secure transmission of secret cryptographic keys (i.e., quantum key distribution) or transfer of the complete quantum state of an object to a distant location without moving the object through the intervening space (i.e., quantum teleportation). A key requirement for most quantum communication protocols is the successful distribution of entangled photons. To date, most demonstrations of quantum communications have established point-to-point links between two locations. To enable many-to-many-i.e., networked-quantum communications, a new type of switch capable of routing entangled single photons is needed. In the work selected by the editors of NJP as a 2011 highlight, the authors reported on developing an ultrafast entangled photon switch which can enable a number of intriguing applications for quantum information processing and quantum communications, taking us one step closer to, for example, a fiber-optic 'quantum internet'.

<http://iopscience.iop.org/1367-2630/13/10/105004>

**Winter 2012**

### **John F. Marko**

*Single-molecule analysis reveals the molecular bearing mechanism of DNA strand exchange by a serine recombinase* by Bai H, Sun M, Ghosh P, Hatfull GF, Grindley ND, Marko JF. **Pro Natl Acad Sci U S A.** **2011 May 3;108(18):7419-24. Epub 2011 Apr 18.**

We used single-DNA micromanipulation to directly observe the mechanics of exchange of DNA strands by an enzyme that cuts and pastes DNA segments as part of the life cycle of a virus that infects bacteria. There had previously been some controversy concerning the mechanism of this type of DNA-recombining enzyme, but now our work has established that at least the type we studied operates like a "molecular bearing", allowing free rotation of the cut DNA segments past one another.

<http://www.ncbi.nlm.nih.gov/pubmed/21502527>

### **Brian Odom**

*Optical pulse-shaping for internal cooling of molecules* by Brian Odom, Chien-Yu Lien, Scott R. Williams. **Phys. Chem. Chem. Phys.**, **2011**, **13**, 18825-18829  
**DOI: 10. 1039/C1CP21201J.**

In this article, we propose a method to freeze the vibration and rotation of molecules-preparing them in their ground internal state.

<http://pubs.rsc.org/en/content/articlelanding/2011/cp/c1cp21201j>

### **Michael F. Smutko**

*Near-Infrared and Millimeter-Wavelength Observations of Mol 160: A Massive Young Protostellar Core* by G Wolf-Chase, M. Smutko, R. Sherman, D. A. Harper, M. Medford. **Astrophysical Journal**, **745**, 116 (2012).

Combining near-infrared molecular-hydrogen line imaging data from APO with millimeter wavelength observations from CARMA, we make the argument that Mol-160 is massive star in the early stages of formation. I am pleased to say that Michael Medford, a Physics major and 2011 graduate of Northwestern, was a co-author on the paper. Medford's work with me was funded by NASA's Space Grant program and a Northwestern Residential College FARA grant.

# New Research Staff

**Jason (Nate) Bode** joined the Kalogera group in September of 2011.

**Sean Dobbs** started in September of 2011 in the Seth group. He studies the strong nuclear interaction through the measurement of the properties of bound states composed of charm and bottom quarks. He received his Ph.D. from Northwestern in Fall 2011, for the confirmation of the bottomonium ground state,  $\eta_b(1S)$ , and the observation of its radial excitation,  $\eta_b(2S)$ , as a member of the CLEO experiment located at Cornell University. Sean is continuing the study of these data with Professor Seth, and has also become a member of the PANDA experiment at the GSI Laboratory in Germany.

**David Ferguson** joined the Sauls group in August of 2011. He currently works equally with the Koch group.

**Aaron M. Geller** of the Rasio group and has a recent publication:

*A mass transfer origin for blue stragglers in NGC 188 as revealed by half solar-mass companions* by Robert Mathieu, Aaron M. Geller. **Nature 478, 356-359 (20 October 2011) doi: 10.1038/nature10512**

Geller and Mathieu show that the majority of the blue straggler stars in the old open cluster NGC 188 are in binaries with half-solar mass companions. This points directly to an origin through mass transfer, where the blue stragglers are created when a normal main-sequence star consumes mass from a giant star, leaving behind only the half solar-mass white-dwarf core of the giant as a companion.

<http://www.nature.com/nature/journal/v478/n7369/full/nature10512.html>

**Longhua Li** started in November of 2011 in the Freeman group. He received his Ph.D. from and was a research assistant at the Fujian Institute of Research on the Structure of Matter at the Chinese Academy of Sciences. His research includes electronic, optical, magnetic and transport properties of solid state

compounds, and inorganic and organic nanostructured systems.

**Xiaohui Liu** joined the Petriello group in September of 2011.

**Gautam (Sonny) Mantry** joined the Petriello group in September of 2011.

**Laura E. Trouille** of the Kalogera group has a recent publication:

*The OPTX Project. V. Identifying Distant Active Galactic Nuclei* by Laura E. Trouille, A. J. Barger, C. Tremanti. **Astrophysical Journal, 742-46 (2011).**

We developed a new high-redshift ( $z < 1.4$ ) emission line ratio diagnostic to distinguish star-formation dominated sources versus those with active galactic nuclei. This TBT diagnostic reliably classifies BPT selected AGN and BPT selected star forming galaxies. Finally, we address the inclusion of the majority of the BPT-comp (sources lying between the BPT-SF and BPT-AGN regimes) in our TBT-AGN regime. We find that the stacked BPT-comp source is X-ray hard and has a high X-ray luminosity to total infrared luminosity ratio. This suggests that, on average, the X-ray signal in BPT-comp is dominated by obscured or low accretion rate AGN activity rather than by star formation, supporting their inclusion in the TBT-AGN regime.

Also, Dr. Trouille has the NSF Computing Education for the 21st Century Grant for 3 years at \$1 million dollars. In collaboration with Northwestern University science education, learning sciences, and computer science faculty and grad students, we are developing, testing, and refining computational thinking focused lesson plans for the high-school STEM curriculum. We are also conducting teacher training professional development workshops to support teachers in implementing these lesson plans in their classrooms.

## Graduate Achievements



**Andrew Kobach** has been selected to attend the Lindau Meeting this year. The Nobel Laureate Meeting in Lindau 2012 is dedicated to physics, expecting around 25 Nobel Laureates and about 500 young researchers

from over 60 countries to attend. The meeting will take place July 2012 in Lindau, Germany, and is uniquely designed to allow as many opportunities for personal interaction as possible with Nobel Laureates in physics.

Also, Andrew has a recent publication: *Zgamma production and limits on anomalous ZZgamma and Zgammagamma couplings in ppbar collisions at sqrt(s)=1.96TeV. Phys.Rev. D. 85, 052001 (2012).* Using data from the DZero experiment, Kobach and his collaborators investigated whether a Z boson and a photon can directly interact, a process which is prohibited in the standard model but is allowed under some new physics scenarios. No evidence of anomalous Z-photon couplings was found, resulting in stringent limits on new physics of this type.

<http://prd.aps.org/abstract/PRD/v85/i5/e052001>



**Tsing Wai Wong** won a CIC-Smithsonian Institution Predoctoral Fellowship! Tsing Wai is 1 of 6 students to be awarded this fellowship.

He will receive a stipend of \$30,000 for one year, and conduct research for one year at the Smithsonian Astrophysical Observatory (SAO), beginning in August 2012. He will work with Dr. Jeffrey E. McClintock and Dr. Ramesh Narayan on modeling the observed X-ray binaries in our Galaxy, which all host a black hole. The goal is to find out the progenitor mass of the black hole and the possible momentum kick imparted to the black hole during its formation through a core collapse event. He will also work on hydrodynamics simulation of core collapse supernova to check whether the current core collapse theory can match the results he found in modeling the observed X-ray binaries. He will also collaborate with Dr. Chris Fryer of the Los Alamos National Laboratory for the hydrodynamics simulations of core collapse.



**Vivien Raymond** accepted an offer for the Caltech Millikan Prize Postdoctoral Fellowship in Experimental Physics; he will be moving to Caltech following his Ph.D. graduation in Summer 2012.

He works in Kalogera's research group on physical parameter estimation of gravitational waves from binary coalescence with spinning compact objects within the LIGO Scientific Collaboration.

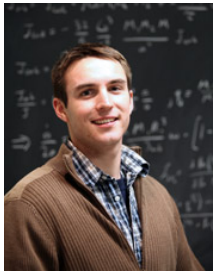
## Flashback to the past...



In 1931, Researchers at the Dearborn Observatory photographed the asteroid Eros, which contributed to improved accuracy of distances in the solar system.



## Undergraduate Achievements



Kyle Kremer, a senior double-majoring in Physics and Trumpet Performance (trumpet and flugelhorn), and a Goldwater Scholar and a Robert C. Byrd Scholar, has won the Churchill Scholarship! Kyle conducts

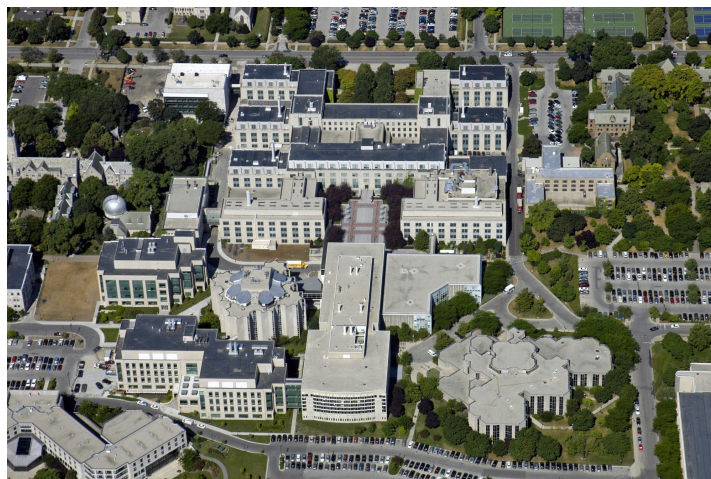
research on compact objects in binary systems in Professor Kalogera's group. With the Churchill Scholarship, Kyle will be pursuing a Masters of Advanced Study degree in theoretical astrophysics at the University of Cambridge. Kyle is 1 of 14 students across the United States who won this prestigious award. The Churchill Scholarship will pay all his University and College fees (approximately \$25,000), a living allowance of 13,000 pounds for the 12 month program, up to \$1,000 for one round trip airfare from the United States to the United Kingdom, the cost of his student visa for the United Kingdom, and an additional travel stipend of \$500.00. He is also eligible for a Special Research Grant of up to \$2,000. Kyle will do a Master of Advanced Study in Astronomy, a new program where he will combine courses in Astrophysics and Mathematics with research in astrophysical fluid dynamics and accretion discs. After Cambridge, Kyle plans to do a doctorate in Theoretical Astrophysics in the United States.

## Northwestern's Society of Physics Students (SPS)

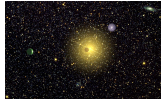
With the move to a new, more spacious office in Dearborn room B6, The Society of Physics Students (SPS) took the opportunity to reorganize itself in Winter quarter, 2012. The move kept SPS pretty busy, but the group still held a general meeting, at which Dr. Art Schmidt showcased some physics demonstrations. During the meeting, SPS's executive board recruited new members and discussed potential upcoming events. A couple weeks later, Dr. Nathaniel Stern gave a fascinating talk to SPS students about cavity quantum electrodynamics. Throughout the quarter, SPS has worked on improving advertisement for its events in a bid to improve. The group has also begun planning events for the coming quarter, including another undergraduate majors' dinner to be held early in the Spring.



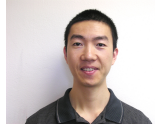
Left to right: David Caratelli, Jesse Choe, Ben Godek, Dan Stevens, Paul Geringer



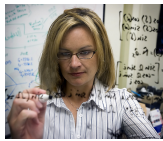
# Alumni News



**Dr. Anne Dabrowski** formerly worked with Mayda Velasco's group, and is now a lecturer on Accelerator Physics and Instrumentation at Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland.



**Dr. Botao Xiao** (P&A Ph.D. Summer 2011), formerly worked with John Marko's group, and is now a postdoc at Harvard Medical School.



**Dr. Jill Prince** formerly worked with Giles Novak's group in the South Pole as a research assistant. She won the 2010 Women in Aerospace Achievement Award and now works at NASA on planetary exploration.



NU graduate **Sahal Yacoob** has accepted a position as a Lecturer at the University of KwaZulu-Natal (UKZN) in his home town of Durban, South Africa. Sahal will join the growing South African consortium on the ATLAS experiment at CERN while building a new research group at UKZN. Sahal received his Ph.D. in 2010 and was an active member of the NU competitive and performance ballroom dance teams (BLAST) during his time at NU.



**Sam Zeller** formally worked with Heidi Schellman as an undergraduate student, and now has won a DOE Early Career Award.

# Staff News



**Monica Brown** joined the Dearborn Observatory as Program Assistant in December 2011. She lives in Chicago, and likes cycling around the city, traveling, painting, classic/foreign/indie films, but mostly enjoys spending time with her family and friends.



**Agnes Engstrom** has been promoted to Associate Research Administrator. In addition to her other financial responsibilities in the business offices, Agnes will now work on proposal preparation and submission.

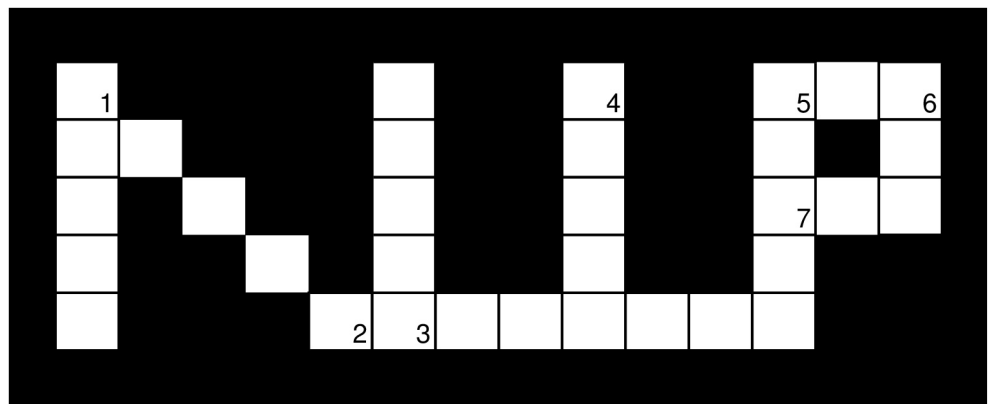


**Leah Handel** joined the Physics & Astronomy Department as Undergraduate Secretary in December 2011. She lives in Chicago with her fiancé, Nathan, and her two cats, Rocky and Sasha. She loves gardening, cooking, eating, and watching British television. This summer she got a Masters in History from the University of Chicago, and before that lived in Philadelphia.

# Physics Crossword Puzzle

by Vaishnavi Rajagopal

- 1 (down): Qubit states lie on surface of this unit sphere
- 1 (diagonal): a Disney princess working on CP violation
- 2 (across): use me to model decay in a random process
- 3 (down to up): a blue-blooded member of the periodic table
- 4 (down): propagator in Feynman diagrams
- 5 (across): unit for electrostatic charge in CGS system



- 5 (down): to become a white dwarf, the red giant has to
- 6 (down): to help the farmer, the physicist solved for a spherical cow in
- 7 (across): the magnitude of what an electron feels in a magnetic field



## Department Events

### Network Frontier Workshop 2011

Adilson Motter's group closed the year by hosting the Network Frontier Workshop, sponsored by the Northwestern Institute on Complex Systems and the Weinberg College of Arts and Sciences. The meeting took place on December 1-2, 2011, and was organized by Jie Sun (Scientific Organizer) and Luciana Zanella (Administrative Organizer).

The two-day event highlighted leading-edge research on the dynamics of complex networks and attracted over 60 participants. Researchers working on innovative aspects of complex systems communicated recent results relevant to fields as diverse as biophysics, energy, and materials research. Sessions included theory and applications of nonlinear dynamics and statistical physics in the context of synchronization, cascades, percolation, control, and failure recovery in interconnected dynamical systems.

The scientific program featured 30 oral presentations. Keynote speakers included Daniel ben-Avraham (Clarkson), Ian Dobson (Iowa State), Marty Golubitsky (Ohio State), Peter Grassberger (Calgary), Kevin M. Lynch (Northwestern), and Edward Ott (Maryland). The closing talk of the Workshop was delivered by Reka Albert (PennState) and was jointly held with the Physics & Astronomy Colloquium.

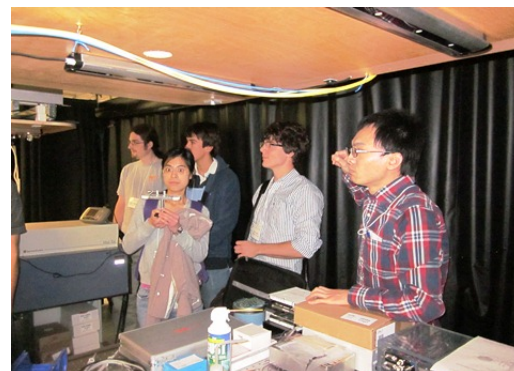
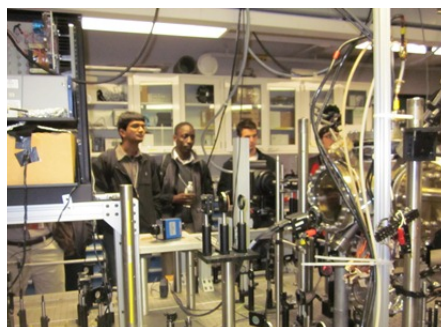


Participants of the Workshop at lunch in the Allen Center.

### Midwest Cold Atoms Workshop 2011



This year's Midwest Cold Atoms Workshop was hosted by Brian Odom's group at Northwestern University. Nearly 100 participants, representing six states in the region, came to Northwestern for this two-day workshop on November 4-5. Topics discussed included cutting-edge research in Bose-Einstein condensations and Fermi-degenerate gases, precision spectroscopy, and quantum manipulation of trapped atoms and ions. Participants included 20 Northwestern students, and tours of the cold atoms labs of Professors Ketterton, Odom, and Shahriar were included as part of the workshop.



# The Future of Astronomy: Fellows at the Frontiers of Science

An Inaugural Conference for Northwestern's Center for Interdisciplinary Exploration and Research in Astrophysics (CIERA)

CIERA introduced itself to the interdisciplinary astrophysics community last fall by hosting an innovative inaugural conference. "The Future of Astronomy: Fellows at the Frontiers of Science" took place August 31 through September 3, 2011 on Northwestern's Evanston campus. The meeting featured science talks by prize post-doctoral fellows from across the nation. CIERA supports a wide range of research, theoretical and observational, and its members decided that a focus on the next generation of leaders was the best reflection CIERA's mission\*. "The point was this: the areas where prize postdoctoral fellows do research represent the future of astronomy," CIERA's Co-Director Vicky Kalogera says, "Because it's these young people who will become the faculty in the next decade." The American Astronomical Society's President-Elect, David Helfand (Columbia U/Qwest U), joined the meeting to lead a discussion on "Astronomy's Future Leaders", soliciting concerns from the postdoctoral community and input on how the AAS can better serve it's early-career member.

More information about the meeting and it's list of speakers is available here:

<http://ciera.northwestern.edu/frontiers/>

A report highlighting the meeting and the research of several CIERA fellows can be found here:

<http://ciera.northwestern.edu/news/JPG/CIERApostdocs.pdf>

\* CIERA's mission is to promote research and education through the support of postdoctoral fellows developing independent research programs, advanced graduate and undergraduate research, seminar series, a long-term visitor's program, and to pursue new astrophysics research directions. Special emphasis is given to interdisciplinary connections with planetary science, computer science, applied math, chemistry, biology, electrical engineering, and materials science.



Left to Right: Laura Trouille, CIERA Conference Participants, Aaron Geller



Left to Right: CIERA Conference Participants, Daryl Haggard, Ben Farr

## Crossword Puzzle Solution

1 (down): Bloch  
1 (diagonal): Belle  
2 (across): Exponent

3 (down to up): Xenon  
4 (down): Green  
5 (across): esu

5 (down): eject  
6 (down): UHV  
7 (across): eBv

## PhD Graduates



**Gideon Alon** (Prem Kumar; McCormick School of Engineering, Department of Electrical Engineering and Computer Science (EECS)). Thesis title:

Generation and Phase Sensitive Manipulations of Pulsed Squeezed Light with Traveling Wave Optical Parametric Amplifiers.



**Carol Braun** (Anupam Garg). Thesis title: Tools for a Semiclassical Theory of Multispin System.



**Sean Dobbs** (Kamal Seth). Thesis title: Observation of etab (1S) and etab (2S) in Exclusive Radiative Decays of Upsilon (1S) and Upsilon (2S).



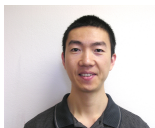
**Martin Melhus** (John Ketterson). Thesis title: Effects of Noise and Vibration on the Solid to Liquid Fluidization Transition in Small Dense Granular Systems Under Shear.



**Johannes Pollanen** (Bill Halperin). Thesis title: PULSED NMR of Superfluid  $^3\text{He}$  in Aerogel: Unconventional Superfluidity in the Presence of Quenched Disorder.



**Norman Tubman** (Bill Halperin). Thesis title: A Quantum Monte Carlo Investigation of Weak Interactions and Sign Problems. He was co-advised during his thesis by Berni Alder, Jonathan Dubois and Randolph Hood at Lawrence Livermore National Lab. Norman is currently a post doc at University of Illinois at Urbana-Champaign.



**Botao Xiao** (John Marko). Thesis title: Single Molecule Study of DNA Organization and Recombination. He is currently a postdoc at Harvard Medical School.

## 2012 Senior Class Plans

**Marc Bourgeois** will pursue a Ph.D. in Atomic, Molecular, and Optical Physics at the University of Arizona.

**David Caratelli** will pursue a Ph.D. in Physics at Columbia University.

**Rongrong Checharoen** will pursue a Ph.D. in Materials Science at Stanford University.

**Jesse Choe** is taking a year off then applying to Engineering or Applied Physics Ph.D..

**Juraj Culak** is looking forward to life after college.

**Mitchell Drew** is looking forward to life after college.

**Paul Geringer** is planning on looking for a job in the field of engineering, and possibly pursue grad school in a couple of years.

**Ryan Jasinski** is looking forward to life after college.

**Kyle Kremer** will pursue a Master's Degree in Astrophysics at the University of Cambridge as a Churchill Scholar.

**Pavan Patel** will teach Physics for Teach for America in the California Bay area.

**Daniel Stevens** will pursue a Ph.D. in Astronomy at the Ohio State University.

**Kevin Tam** is graduating with a concentration in computational physics and is pursuing a job in the industry.

**Mariah Veis** is looking forward to life after college.

**Susan Yu** is looking forward to life after college.

## Tech F-Wing Construction Update

Major renovation and construction began in the department in early 2010. Since then, a 4th floor has been added to F-wing of the Technological Institute, creating 16 new offices for Physics & Astronomy. In addition, rooms F129 and F127 (the former sound lab and graduate student lounge) have been remodeled. This completes Phase I of renovation and provides fresh space for the research groups of Kamal Seth, Michael Schmitt, and Mayda Velasco. In addition, nine offices adjacent the F-G Infill are currently being remodeled.



F-wing 4th floor, October 2010



F-wing 4th floor, January 2012

Phase II of renovation, to begin shortly, will provide new department office and conference room space.

Photos courtesy of Robert Tilden

Space between F and G wings, known as the "FG Infill" is expected to be completed in Fall 2012. This space will provide new clean room facilities to the Department.



FG Infill, October 2010



FG Infill, January 2012

The final construction phase will create new space for CIERA. The F-G infill nears completion. It will contain a clean room for Physics & Astronomy as well as a new home for the Department of Earth and Planetary Sciences.

Please visit the Physics and Astronomy website for a complete list of upcoming events:  
[www.physics.northwestern.edu/events](http://www.physics.northwestern.edu/events)

Be sure to check out our Facebook Fan page and our LinkedIn Group Page.  
Type in "Department of Physics and Astronomy, Northwestern University".



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Evanston, IL 60208-3112



Please fold here.