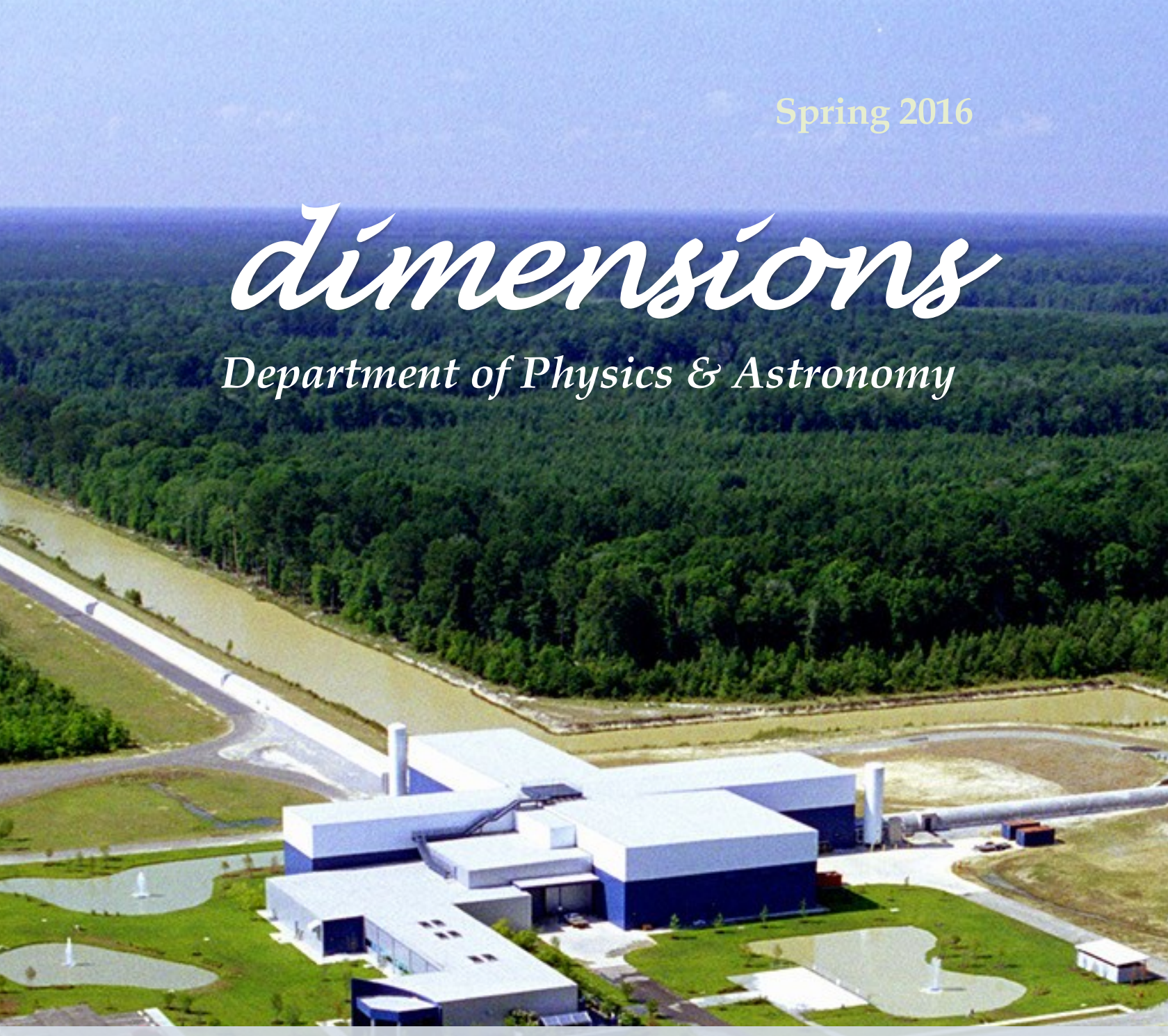
Spring 2016

dimensions

Department of Physics & Astronomy



In this issue:

LIGO Receives Special Breakthrough Prize in Fundamental Physics

Heilborn Lectures 2016, featuring Professor David Wineland (NIST)

Northwestern University

The Figueroa-Feliciano Group Lab at 1801 Maple

Faculty News

Claude-André Faucher-Giguère, Aaron Geller from CIERA, and astronomers from the Kavli Institute for Astronomy and Astrophysics, have for the first time, found young populations of stars within globular clusters that have apparently developed courtesy of star-forming gas flowing in from outside of the clusters themselves. The study was published in the January 28 issue of Nature and featured at the Northwestern News Center. http://www.northwestern.edu/newscenter/stories/2016/01/globular-clusters.html

Enectali Figueroa-Feliciano and his research group's new lab at 1801 Maple Avenue is officially open for business. The group's research centers on the use of cryogenic detectors to search for dark matter, but also applies the technology to neutrino physics. The new lab has around 1500 sq. ft. of space, and is equipped with a local helium plant with 350 liters of helium to cool down two different Adiabatic Demagnetization Refrigerators that can cool detectors down to 50 mK. The lab also has a clean room, a crane, a fume hood, and other assorted "lab -ish accoutrements." The lab recently began preparing for their first detector cool down, so look for new results coming from the group in the near future.

Bennett Goldberg has been appointed Director of the Searle Center and Associate Provost for Learning and Teaching. He is a Fellow of the American Physical Society and formerly a Professor of Physics at Boston University. He will have a courtesy appointment as a professor in the Department of Physics & Astronomy. http://www.northwestern.edu/newscenter/stories/2016/04/searle-center-for-advancing-learning-and-teaching-names-new-director.html

Kristian Hahn was awarded $750,000 for his dark matter research currently underway at the CERN Large Hadron Collider (LHC) in Geneva, Switzerland. He is one of 49 young scientists from across the country to receive the 2016 DOE Early Career Research Award. Professor Hahn aims to elicit vital information about the substance scientists say makes up roughly 85 percent of the physical universe.

Vicky Kalogera, Shane Larson and Selim Shariar are members of the Laser Inferometer Gravitational-Wave Observatory (LIGO) Scientific Collaboration. In February, the collaboration announced the first detection of ripples in spacetime known as gravitational waves 100 years after Einstein predicted them. http://www.northwestern.edu/newscenter/stories/2016/02/gravitational-waves-detected.html?utm_campaign=&utm_medium=email&utm_source=enews

In March of 2016, **Professor Kalogera** was named a "Top Ten Northwestern Professor" by College Magazine. http://www.collegemagazine.com/10-northwestern-professors-need-next-quarter/

Jens Koch has reached a milestone in his career, and has been granted tenure. The entire department congratulates Jens on his promotion. In addition, Jens was awarded the ***WCAS Distinguished Teaching Award***. Each year, Weinberg College recognizes three faculty for excellence in undergraduate teaching.

Adilson Motter and Takashi Nishikawa received a $3.2M award to study the North American Power Grid Network Optimized Distributed Energy Systems (NODES) grant from the U.S. Department of Energy's Advanced Research Projects Agency ARPA-E) to study power grid architecture related to utilization of renewables. Professors Motter and Nishikawa are members of the Institute for Sustainability and Energy at Northwestern (ISEN). http://isen.northwestern.edu/northwestern-team-awarded-32-million-arpa-e-grant

Adilson Motter was invested as the Charles and Emma H. Morrison Professor on April 26, 2016.

In Memoriam

Professor Art Freeman

(February 06, 1930-June 7, 2016)

Sadly I must share with you the news that Professor Art Freeman passed away on Tuesday, June 7, 2016.

Art was a distinguished member of the Department of Physics and Astronomy for many years until he retired in 2014. He was much respected and admired by his peers in the physics community, in materials science, and in chemistry. His career was impressive, including awards and honors such as the Guggenheim, Fulbright, and Humbolt Fellowships; he was a Fellow of the American Association for the Advancement of Science and a winner of the First Medal of the Materials Research Society.

Art was also admired by his group members, both students and research associates, of whom many are pursuing successful careers of their own. It is striking how devoted and loyal his group members are, and I believe this comes from his kindness and gentle manner as much as from his formidable scientific talent.

Perhaps this is a good moment to reflect on the fact that, quite apart from our individual scientific aspirations, we are all members of a community, and those of us who lead should be kind and supportive of those who depend on us, as Art once was.

Regards,

Michael Schmitt
Chair

Faculty News (continued)

In addition, **Prof. Motter** has been selected Outstanding Referee of the APS. The Outstanding Referee program recognizes scientists who have been exceptionally helpful in assessing manuscripts for publication in the APS journals. The program annually recognizes about 150 of the roughly 60,000 currently active referees. Motter is the first member of the department to receive this recognition. https://journals.aps.org/edannounce/aps-announces-outstanding-referees-for-2016

Tamar Seideman, who holds a joint appointment with Chemistry and is the Dow Company Professor in that department, was named a Wetson Professor at the Weizmann Institute of Sciences. Among other research interests, Professor Seideman performs research in novel approaches to solar energy conversion.

Nate Stern was awarded the prestigious ONR Young Investigator Award for his proposal "Multi-Dimensional Control in Laterally Confined Atomically Thin Nanostructures." Professor Stern received funding through the Office of Naval Research. Only 47 investigators received this prestigious early career award nationwide. In addition, his work on the quantum properties of materials was featured in the 2015 Annual Report from the Office for Research.
http://www.research.northwestern.edu/pubs/annualreport/AR2015.pdf

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Selected Publications

"Observation of Ordered Structures in Counterion Layers Near Wet Charged Surfaces---a Potential Mechanism for Charge Inversion", Mitchell Miller, Miaoqi Chu, Binhua Lin, Mati Meron and Pulak Dutta, *Langmuir* **32**, 73 (2016) http://pubs.acs.org/doi/10.1021/acs.langmuir.5b04058

Li, Chengyuan; de Grijs, Richard; Deng, Licai; Geller, Aaron M.; Xin, Yu; Hu, Yi; Faucher-Giguère, Claude-André "Formation of new stellar populations from gas accreted by massive young star clusters", *Nature*, Vol. 529, Issue 7587, pp. 502-504 (2016) http://adsabs.harvard.edu/abs/2016Natur.529..502L

"Stellar and Quasar Feedback in Concert: Effects on AGN Accretion, Obscuration, and Outflows", Authors: Hopkins, P. F.; Torrey, Paul; Faucher-Giguère, C.-A.; Quataert, E.; Murray, N. Ref: MNRAS, 458, 816 (2016) http://mnras.oxfordjournals.org/content/458/1/816

Rodriguez, Carl; Chatterjee, Sourav; Rasio, Frederic, "Binary black hole mergers from globular clusters: Masses, merger rates, and the impact of stellar evolution," *Physical Review D*, Volume 93, Issue 8, id. 084029 http://adsabs.harvard.edu/abs/2016PhRvD..93h4029R

Shi, S., Thomas, A., Corzo, N. V., Kumar, P., Huang, Y. & Lee, K. F., "Broadband photon pair generation in green fluorescent proteins through spontaneous four-wave mixing." *Sci. Rep.* 6, 24344; doi: 10.1038/srep24344 (2016)

Christoph Bostedt, Sébastien Boutet, David M. Fritz, Zhirong Huang, Hae Ja Lee, Henrik T. Lemke, Aymeric Robert, William F. Schlotter, Joshua J. Turner, and Garth J. Williams, "Linac Coherent Light Source: The first five years," *Rev. Mod. Phys.* **88**, 015007 – Published 9 March 2016 http://journals.aps.org/rmp/abstract/10.1103/RevModPhys.88.015007

Zhenwei Yao and Monica Olvera de la Cruz, "**Electrostatics-Driven Hierarchical Buckling of Charged Flexible Ribbons**" *Physical Review Letters*, 116, 148101 (2016); DOI: 10.1103/PhysRevLett.116.148101.

Sumit Kewalramani, Guillermo I. Guerrero-García, Liane M. Moreau, Jos W. Zwanikken, Chad A. Mirkin, Monica Olvera de la Cruz, and Michael J. Bedzyk, "Electrolyte-Mediated Assembly of Charged Nanoparticles" *ACS Central Science* 2, 219−224 (2016); DOI: 10.1021/acscentsci.6b00023

"Observation of Gravitational Waves from a Binary Black Hole Merger" by Abbott et al. (LIGO Scientific Collaboration and Virgo Collaboration) Phys. Rev. Lett., Vol. 116, 061102 http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.116.061102

C. Amole et al. "Improved dark matter search results from PICO-2L Run 2." Phys. Rev. D 93, 061101(R) (2016) http://dx.doi.org/10.1103/PhysRevD.93.061101

Antonini, Fabio; Chatterjee, Sourav; Rodriguez, Carl L.; Morscher, Meagan; Pattabiraman, Bharath; Kalogera, Vicky; Rasio, Frederic A., "Black Hole Mergers and Blue Stragglers from Hierarchical Triples Formed in Globular Clusters", 2016, ApJ, 816, **65** http://adsabs.harvard.edu/abs/2016ApJ...816...65A

Y. Yang, G. Fedorov, S. E. Shafranjuk, T. M. Klapwijk, B. K. Cooper, R. M. Lewis, C. J. Lobb, and P. Barbara, "Electronic Transport and Possible Superconductivity at Van Hove Singularities in Carbon Nanotubes," *Nano Lett.*, DOI: 10.1021/acs.nanolett.5b02564 (2015)

Christopher M. Seck, Mark G. Kokish, Matthew R. Dietrich, and Brian C. Odom, "Raman sideband cooling of a Ba+138 ion using a Zeeman interval", Phys. Rev. A **93**, 053415 – Published 17 May 2016 http://dx.doi.org/10.1103/PhysRevA.93.053415

Archer, A.; Benbow, W.; et. al., Yusef-Zadeh, F., TeV "Gamma-Ray Observations of the Galactic Center Ridge by VERITAS", The Astrophysical Journal, Volume 821, Issue 2, article id. **129**, (2016) http://adsabs.harvard.edu/abs/2016ApJ...821..129A

Strong-Coupling and the Stripe Phase of 3He, Joshua J. Wiman , J. A. Sauls, Journal of Low Temperature Physics, Vol. 184, pp. 1-17, 2016
DOI: 10.1007/s10909-016-1632-7

Research Staff Achievements

CIERA Postdoctoral Fellow **Laura Fissel** will be leaving Chicago for Virginia next year, as one of the National **Radio Astronomy Observatory's (NRAO's) Jansky** fellows. Jansky fellows are awarded to a handful of promising young researchers whose interests are aligned with that of the NRAO. As a Jansky fellow, Laura will continue her work with the BLAST (the Balloon-borne Large Aperture Submillimeter Telescope) project, a telescope that measures electromagnetic radiation in star-forming clouds of dust and gas.

Sean Dobbs (Seth Group) was promoted to Research Assistant Faculty. Professor Dobbs' research focuses on experimental, nuclear and elementary particle physics.

Sourav Chatterjee (CIERA) was promoted to Research Assistant Faculty. Professor Chatterjee's research interests include formation and evolution of star clusters, dynamical formation of stellar exotica in clustered environments, formation and evolution of planetary systems, and signatures of past evolutionary history of planets on their current orbital and structural architectures.

Graduate Achievements

Graduate Student **Dan Baxter** has received an Office of Science Graduate Student Research program award. Supported by this award, Dan will be working at Fermilab for the next year with Hugh Lippincott to study electron recoil backgrounds in a LZ-style Xenon Time Projection Chamber. Dan is in the research group of Eric Dahl.

Graduate Student **Daniel Case** has been awarded a Presidential Fellowship, the most prestigious fellowship awarded to graduate students at Northwestern. It is funded by the President of the University and awarded by The Graduate School. Awardees are nominated by their academic programs as individuals who combine outstanding intellectual or creative ability with the capacity to play an active part in the life of the Society of Fellows. Daniel also received the 2016 Student Chapter Certificate of Recognition from the Society for Industrial and Applied Mathematics. Daniel is the current president of the Northwestern Chapter. Daniel works in the research group of Prof. Adilson Motter.

Kevin Kelly, a graduate student working with Professor André de Gouvêa, was selected to receive the Outstanding Graduate Student Teaching Award. He was nominated by many students in his sections, and also strongly supported by faculty in the department. This is an important honor for him and for the undergraduate program.

Kyle Kremer created a Solar System Symphony, combining his love of music and physics. "Evening of Brass: Solar System Symphony" is an audio and visual fusion of science and music on stage, and took place at Pick-Staiger Concert Hall on May 24, 2016.

Carl Rodriguez was chosen to present a TEDx talk, "Listening to Einstein's Final Symphony" as part of this year's TEDx NorthwesternU event. Carl's talk described how binary black holes are forged in the cores of star clusters, and how we can "hear" them collide with a new type of telescope designed to listen to tiny vibrations in the fabric of spacetime itself.

Yang (Angela) Yang received the Student Speaker Award in Statistical and Nonlinear Physics at the APS March Meeting 2016, held in Baltimore, MD. She was selected from the 5 finalists invited to present at the meeting. The award includes a certificate, travel support, and a cash prize. Yang is a PhD Candidate in Prof. Adilson Motter's group. Her talk at the meeting was titled "Hamiltonian-Based Model to Describe the Nonlinear Physics of Cascading Failures in Power-Grid Networks".

Undergraduate Achievements

Physics major **Rebecca Diesing** (2017) was accepted to the University of Michigan's REU program at CERN. Diesing was nominated by Prof. Mayda Velasco.

Bohan Xu was awarded a Weinberg College Summer Research Grant. He will study fundamental questions related to quantum measurement under the guidance of Professor Adilson E. Motter.

Staff News

The Department of Physics & Astronomy has witnessed tremendous growth over the past few years, and in August of 2015, the college agreed that a program review was in order. To ensure quality support of our faculty, research staff and students, recommendations were made regarding staffing, and these changes were implemented in December of 2015.

In April, we hired a new Graduate Program Assistant and Financial Assistant, and we will hire an Undergraduate Program Assistant, along with a second Faculty Assistant, in the coming months.

In addition, the following staff members have taken on new or expanded roles:

Gretchen Burnett
Academic Program Coordinator

Gretchen will facilitate the transition of duties from the Business Office to the Academic Office. In addition, she is responsible for the day to day management of the Academic Office and staff.

Vicki Eckstein
Accounting Specialist

In recognition of her expanding procurement and encumbrance responsibilities, expense reimbursements were shifted the Academic Office. This allows Vicki to focus on procurement and encumbrance issues more thoroughly.

Agnes Engstrom
Research Administrator

Agnes received her CRA credentials earlier this year. As the department grows, her concentration is more narrowed to research administration, both pre-award and post-award.

Pam Villalovoz
Faculty Assistant

As a Faculty Assistant, Pam will provide faculty and their respective research groups with focused administrative support. Pam will assist with reimbursements, maintain faculty bio-sketches, make edits to research group websites, and assist with iBuyNU orders.

New Staff Members

Andrew Robinson
Graduate Program Assistant

Andrew joined the department on May 9, 2016. Though Andrew is his given name, his nickname is Bud.

Bud grew up in Glenview, and went to many Wildcat football games. He attended the University of Pittsburgh where he majored in German Literature and Language. He taught English in Taiwan, where he also met his wife. Bud is back in the area, and he is extremely excited to work at such a wonderful university.

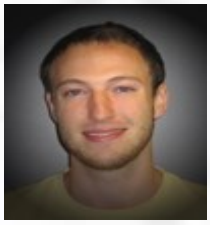
Amy Bassett
Financial Assistant

Amy comes from the Office of the Provost where she supported the Associate Provost for Budget, Facilities and Analysis and the Assistant Provost for Faculty Information and Business Operations. She mainly supported the day to day operations of the Provost's Office while also assisting the Manager for Faculty Information with supporting faculty processes. Amy is originally from Northern California and has a degree from Sacramento State in the Humanities and a post-baccalaureate degree from Loyola Chicago.

2015—2016 PhD Graduates

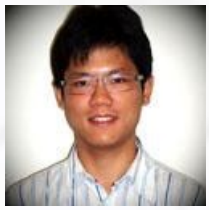
Charles Collett (William Halperin)
Thesis: *Transverse Acoustic Measurements of Pure Superfluid 3He at Fixed and Variable Path Lengths*

Andrey Pozdnyakov (Mayda Velasco)
Thesis: *Search for the Higgs Boson Decays to a Photon and Two Leptons with Low Dilepton Invariant Mass*



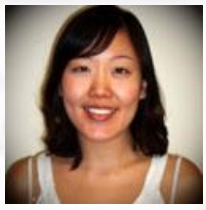
Christfried Focke (Frank Petriello)
Thesis: *N-jettiness Subtraction for Collider Phenomenology*

Carl Rodriguez (Frederic Rasio)
Thesis: *Globular Clusters as Gravitational-wave Factories*



Ting-Chung Huang (Frank Petriello)
Thesis: *Exclusive Rare Decays of Electroweak Bosons*

Emily Sun (Prem Kumar) Thesis: *Sorting single-photon Schmidt Modes with Mode-selective Quantum Frequency Conversion*



May Kim (Selim Shariar)
Thesis: *Collective States of Atoms for Applications in Quantum Computing and Precision Metrology*

Ting Xiao (Kamal Seth)
Thesis: *Precision Measurement of the Hadronic Contribution to the Muon Anomaly*

Manan Mehta (Venkat Chandrasekhar)
Thesis: *Interplay between Superconductivity and Ferromagnetism at the LaAlO3/ SrTiO3 interface*

Thomas Wytock (Adilson Motter) Thesis: *Inverting Genome-Wide Observations to Control Cell Phenotype*

Cheryl Patrick (Heidi Schellman)
Thesis: *Measurement of the Antineutrino Double-Differential Charged-Current Quasi-Elastic Scattering Cross Section at MINERvA*

Yang Yang (Adilson Motter) Thesis: *Network Observability and Cascading Failures: Applications to Power-Grid Networks*

2015—2016 Undergraduate Awards

The Physics & Astronomy is pleased to announce the undergraduate awards for 2016, selected by the Undergraduate Curriculum Committee:

Best Senior Thesis: Christopher J. Hansen (Title: "Analysis of Magnetic Field Structure in Molecular Clouds through Planck and Ground-Based Polarimetry"; research advisor: Giles Novak)

Outstanding Junior: Rebecca Diesing (research advisor: Farhad Yusef-Zadeh)

Outstanding Sophomore: Nathaniel Speiser (research advisor: Nate Stern)

Please congratulate our winners, who will be recognized with awards of $400.

Northwestern's Society of Physics Students (SPS)

On April 6, 2016, the Northwestern chapter of SPS held elections. The officers for next year are as follows:

Treasurer: Mihir Swaroop
Secretary: Kelly Powderly
Public Relations Chair: Lauren Barmore
Programming Chair: Luis De La Barza
Publicity Chair: Dara Rubin
Social Media Chair: Rachel Inderhees
Historian: Daniel Kinch

Society of Physics Students Officer-Elects for 2016-2017
Left to Right: Lauren Barmore, Dara Rubin, Rachel Inderhees, Luis De La Garza, Kelly Powderly, Daniel Kinch, Joon Park, Mihir Swaroop, and advisor, Art Schmidt

2016 Senior Class Graduates

Raymond Chang

Rui Chen will be attending graduate school at MIT/Woods Oceanographic Institution for applied ocean science and engineering.

Kyle Condron

Austin Dickey will begin his career at Uptake, a data science company in Chicago.

Christopher Hansen

Anya Kogan will attend Columbia University to pursue her Master's in Applied Physics.

Sarah Matthews will begin her career at InterSystems software company in Boston, starting in August.

Remington Millman will be moving to Utah to take a position at Lucid Software, a data visualization start-up.

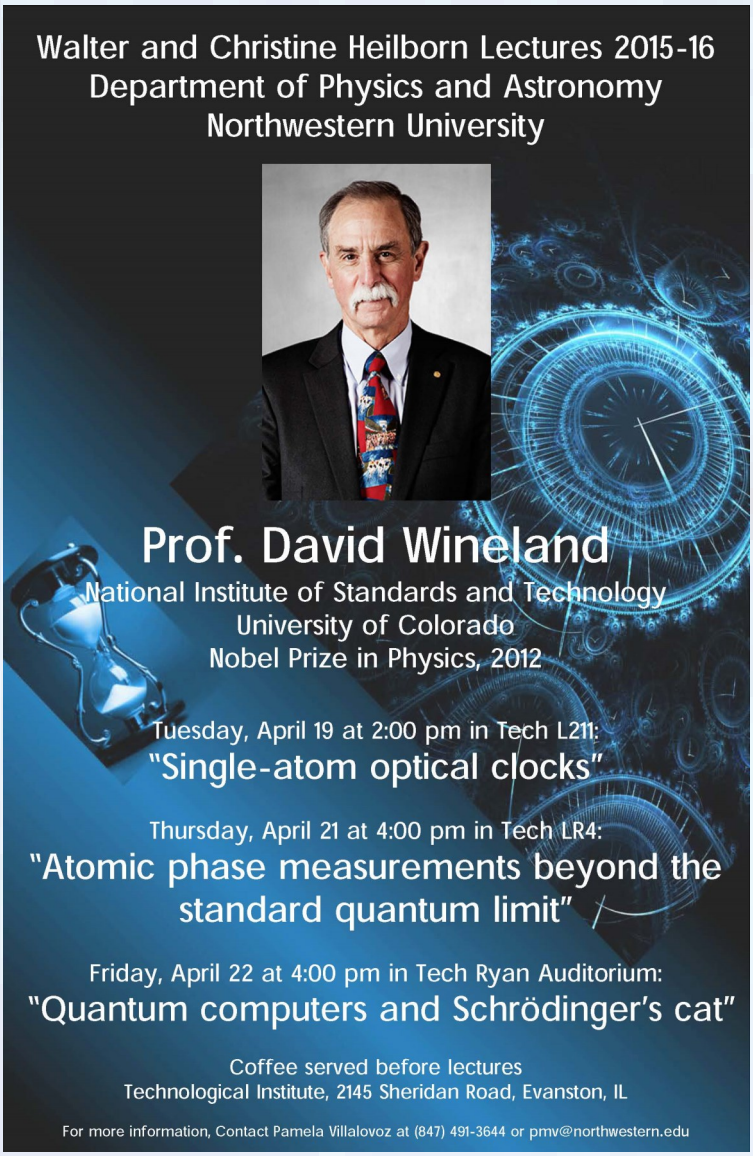
David Rice

Benjamin Sandeen

Zachary Zaruba

Vilmos Zsolnay

Heilborn Lectures 2016



Since 2001, the Department of Physics & Astronomy has invited distinguished scientists to deliver lectures supported by the Walter and Christine Heilborn fund.

In 2016, we welcomed Nobel-laureate physicist David Wineland. He was awarded the 2012 Nobel Prize in Physics, jointly with Serge Haroche, for ground-breaking experimental methods that enable measuring and manipulation of individual quantum systems.

In 1975, he joined the National Bureau of Standards (now called NIST), where he started the ion storage group and is on the physics faculty of the University of Colorado at Boulder. He continues to work at NIST laboratories.

Wineland was the first to laser cool ions in 1978. His NIST groups use trapped ions in many experiments on fundamental physics, and quantum state control. They have demonstrated optical techniques to prepare ground, superposition and entangled states. This work has led to advances in spectroscopy, atomic clocks and quantum information.

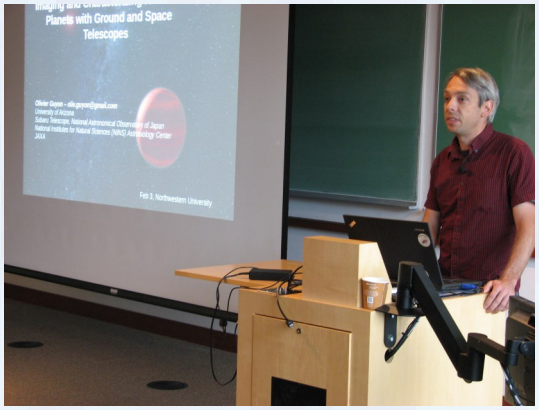
In 1995, he created the first single atom quantum logic gate and was the first to quantum teleport information in massive particles in 2004.Wineland implemented the most precise atomic clock using quantum logic on a single aluminum ion in 2005.

Professor Wineland delivered lectures on Tuesday, April 19th, Thursday, April 21 and Friday, April 22, entitled *"Single-atom optical clocks," "Atomic phase measurements beyond the standard quantum limit"* and "*Quantum computers and Schrödinger's cat".*

Following the April 22 lecture, members of the faculty hosted a dinner in honor of Prof. Wineland. Recordings of his talks may be viewed at the Heilborn website:

heilbornlectures.northwestern.edu/videos/

Department Events



Olivier Guyon Looks to Characterize Habitable Exoplanets: CIERA Winter Interdisciplinary Colloquium

Thanks to significant recent advances in high contrast imaging techniques, the next generation of space and ground telescopes will have the capability to image habitable planets around nearby stars. Space telescopes operating at visible wavelength can deliver the contrast level necessary to image Earth-like planets around nearby Sun-like stars. The next generation of telescopes (25-40m diameter) offer the angular resolution to resolve the habitable zones of nearby M-type stars and image habitable planets around these stars. Both approaches share similar fundamental challenges and technical solutions, yet will provide valuable complementary measurements. Dr. Guyon described current efforts to develop the high contrast imaging technologies, and show how the Subaru Extreme-AO (SCExAO) instrument on the Subaru Telescope 8-m telescope is playing a key role as a prototyping/technology validation platform.

Dr. Guyon, from the University of Arizona's College of Optical Sciences, was hosted by Hooman Mohseni and Mel Ulmer as McCormick's Distinguished Speaker and CIERA's Interdisciplinary Colloquium Speaker. Over 60 people heard the talk on February 3rd.

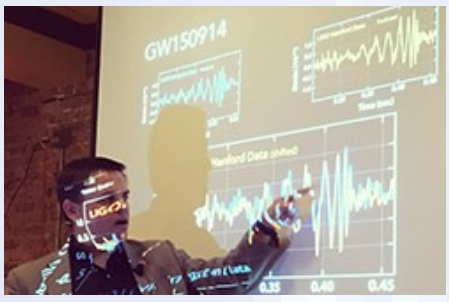
Roger Malina Discusses Hybrid Art-Sciences Practices at CIERA Spring Interdisciplinary Colloquium

Roger F. Malina shared the story of his career, including the strong influence of his father, who became a full-time artist following a successful scientific career, at CIERA's Spring Interdisciplinary Colloquium on April 7th. Dr. Malina is a Distinguished Professor of Arts and Technology and Professor of Physics from the University of Texas at Dallas.

Dr. Malina is the founder of ArtSciLab, a transdisciplinary research lab at UT Dallas. He shared a wide array of examples of collaborations between physicists and engineers, art historians and musicians, designers and doctors. He talked about the many challenges to these collaborations, but emphasized the innovations that they can produce.

As Executive Editor of Leonardo, the leading international peer-reviewed journal on the use of contemporary science and technology in the arts and music, Dr. Malina also discussed his publishing initiatives and his work to create permanent records of research being done today.

Learn more about the ArtSciLab at UT Dallas and the Leonardo Journal from the MIT Press.



CIERA's Shane Larson Leads Gravitational Waves Discussion at Science Café

More than 80 people from the Northwestern and Evanston area communities came to the Firehouse Grill March 23 to talk about the dawn of gravitational wave astronomy. Research Assoc. Professor Shane Larson shared the modern description of gravity, explained what gravitational waves are, how we hope to measure them, and what we hope to learn from their detection.

Northwestern's Science Café is an informal forum for the local community of science enthusiasts to gather and learn about interesting topics. Science Café is sponsored by Northwestern's Vice President of Information Technology, Northwestern's Vice President for Research, and NU Chapter 22 of Sigma Xi.

Prizes and Awards

Major Prizes for LIGO Founders and 1,012 Contributors to Gravitational-Wave Discovery

Yuri Milner, a Russian entrepreneur, venture capitalist, and physicist, is giving $3 million as a Special Breakthrough Prize in Fundamental Physics to honor the scientists and engineers involved in the gravitational-wave discovery announced earlier this year. $1 million will be shared equally by the three LIGO founders, Ronald Drever, Kip Thorne, and Rainer Weiss, and the remaining $2 million will be shared equally by the 1,012 contributors.

This special award can be conferred by the organization's selection committee at any time (outside of and in addition to the ordinary annual nomination process) to recognize an extraordinary scientific achievement. Mr. Milner, one of the founders of the Breakthrough Prizes organization, said, "The creative powers of a unique genius, many great scientists, and the universe itself, have come together to make a perfect science story."

A second prestigious honor, the Gruber Foundation's $500,000 Cosmology Prize, will be conferred to the founders and the entire LIGO team for "pursuing a vision to observe the universe in gravitational waves, leading to a first detection that emanated from the collision of two black holes." The prize citation continues, "This remarkable event provided the first glimpse into the strong-gravity regime of Einstein's theory of general relativity that governs the dynamics of black holes, giving direct evidence for their existence, and demonstrating that their nature is consistent with the predictions of general relativity."

CIERA's director, Vicky Kalogera, led the astrophysical interpretation of the discovery for the LIGO collaboration. Over the years her group pioneered ways of making detection source rate predictions and the development of methods for extracting information from gravitational-wave signals from binaries of spinning compact objects.

The following Northwestern members are co-authors on the discovery paper and hence awardees:

Faculty:
Vicky Kalogera (Weinberg, Physics and Astronomy)
Selim Shahriar (McCormick, Electrical Engineering and Computer Science)

Postdoctoral Fellows:
Chris Pankow (CIERA)
Laura Sampson (CIERA)

Graduate Students:
Joshua Yablon (McCormick, Electrical Engineering and Computer Science)
Mike Zevin (Weinberg, Physics and Astronomy)
Minchuan Zhou (Weinberg, Physics and Astronomy)
Zifan Zhou (McCormick, Electrical Engineering and Computer Science)

Undergraduate Students:
Ben Sandeen (current, majoring in Physics with minors in Classical Studies and Computer Science)
Scotty Coughlin (pre-doctoral research assistant in CIERA, and past Northwestern undergraduate, majored in Mathematics, Economics, and Classics)

Investiture Ceremony

On April 26, 2016, Professor **Adilson Motter** was invested as the *Charles E. and Emma H. Morrison Professor* in WCAS. Congratulations to Professor Motter!

Professor Rebecca Elizabeth Zorach, Professor Adilson Motter, Professor Jennifer Lackey, Dean Adrian Randolph and Provost Dan Linzer

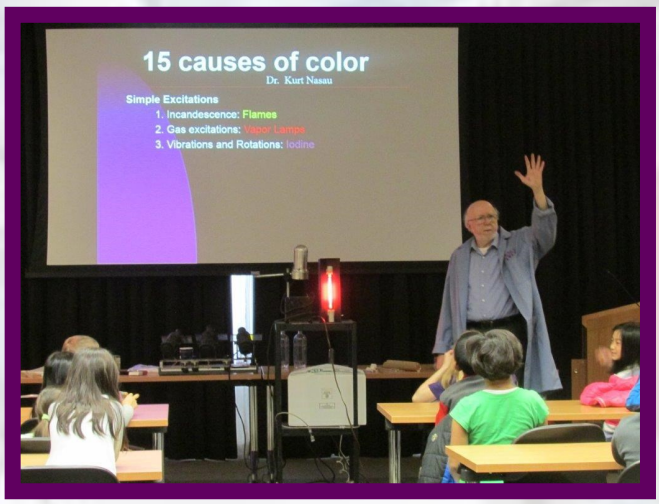
Professors Michael Schmitt and Adilson Motter with Dean Adrian Randolph

Dean Adrian Randolph and Professor Adilson Motter

Professors Zorach, Motter and Lackey

Physics in the Community

Art Schmidt has been giving outreach presentations to grade school kids once a month at the Skokie Library. Here Art talks about color and shows a white light seen through a blue filter. In another scene he works with kids to construct a mobile using the concept of center of mass.



Dearborn Observatory Visiting Schedule

Spring/Summer Hours (April—September)

9-10 pm: One hour session by reservation only. Your group will be able to use the telescope for the full hour.

10-11 pm: Walk-ins are welcome, but space in the dome is limited.

There is no charge for these Friday night tours; however, we do require a refundable deposit for groups of 10 or more. Additionally, the Observatory is available for private viewing events on other evenings. To place a reservation, or for more information, contact Gretchen Burnett at (847) 467-3798 or gretchen-burnett@northwestern.edu.

Alumni Focus

Stephen Allan Becker, *(WCAS '72, Astronomy)* is Laboratory Fellow and Scientist (Level 5) at the Los Alamos National Laboratory where he is involved in classified research and analysis for the national defense.He is president of the Pajarito Astronomers, the local astronomy club. He has been to 10 total solar eclipses (all successfully) with his first in 1970, a Northwestern University Expedition to Mexico under Dr. Hyneck.

Gary Lazich *(WCAS '75, Astronomy)* suspended a 33-year career in planetariums in 2008. He began as Assistant at Triton College's Cernan Earth and Space Theater and, after positions in northern Minnesota, South Carolina, and south Florida, managed the Russell C. Davis Planetarium in Jackson, Mississippi, one of the largest in the U. S. Gary and his wife Cindy have four biological children and have provided formal or informal foster care to nearly two dozen others. They are preparing for relocation from Elk Grove Village to Asheville, North Carolina in April 2016 to live near their second-oldest son and his wife and to continue "semi-retirement," part-time retail work, and volunteer work.

Jay Jones *(WCAS '48, Physics)* The American Physical Society awarded it's first Medal for Exceptional Achievement in Research to Ed Witten on January 28, 2016. This medal was established through the generosity of Jay and Mary Jayne Jones. Jay graduated with an undergraduate degree in physics in 1948. He is an entrepreneur and founder of the Olympic Medal Corporation.

Gabriel Juarez *(WCAS '09 Physics)* will be joining the Mechanical Science and Engineering Department at University of Illinois as an Assistant Professor. After receiving his PhD from Northwestern University, Professor Juarez held postdoctoral fellow positions at the University of Pennsylvania, and later at MIT.

Yonatan (Yoni) Kahn *(WCAS, '09 Physics)* received the 2016 J.J. and Noriko Sakurai Dissertation Award in Theoretical Physics from the American Physical Society. Yoni's undergraduate research at Northwestern was under the direction of Prof. Michael Schmitt. Kahn's dissertation was with Jesse Thaler at the Massachussetts Institute of Technology, and the APS award cites the work "For proposing a novel method to detect dark photons, for developing halo-independent techniques of direct dark matter detection, and for finding a new viable supersymmetric extension of the standard model."

Koichiro Nishikawa *(WCAS, '80, Physics)* has received a Fundamental Physics Breakthrough Award for "fundamental discovery and exploration of neutrino oscillations, revealing a new frontier beyond...the standard model of particle physics." Dr. Nishikawa received his Ph.D. in 1980, working with Prof. David Buchholz.

Johannes Pollanen (*WCAS '12 Physics)* will be joining the faculty of the Michigan State University Department of Physics and Astronomy in January 2016 as an Assistant Professor, holding a Cowen Chair in Experimental Condensed Matter Physics. Johannes earned his Ph.D. in 2012 from Northwestern University where he worked with Prof. BilHalperin in the Low Temperature Physics Group to understand the properties of complex many-particle quantum systems and engineer novel quantum mechanical forms of matter. During this time, Johannes discovered a new chiral state of superfluid ^{3}He, which he stabilized by introducing anisotropic disorder to the superfluid in the form of high porosity silica aerogel.

Alumni News

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Degree: _____

Graduation Year: _____

e-mail Address: _____

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News: _____

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The department newsletter is a means of reaching out to the alumni to keep them abreast of current research and developments in the Department of Physics and Astronomy. It is also a forum for alumni to keep the department informed of their accomplishments; the department welcomes submissions from alumni of newsworthy items for publication in the newsletter. Please feel free to send in items using this form (just fold and staple the page), or to email your news to Gretchen Burnett gretchen-burnett@northwestern.edu