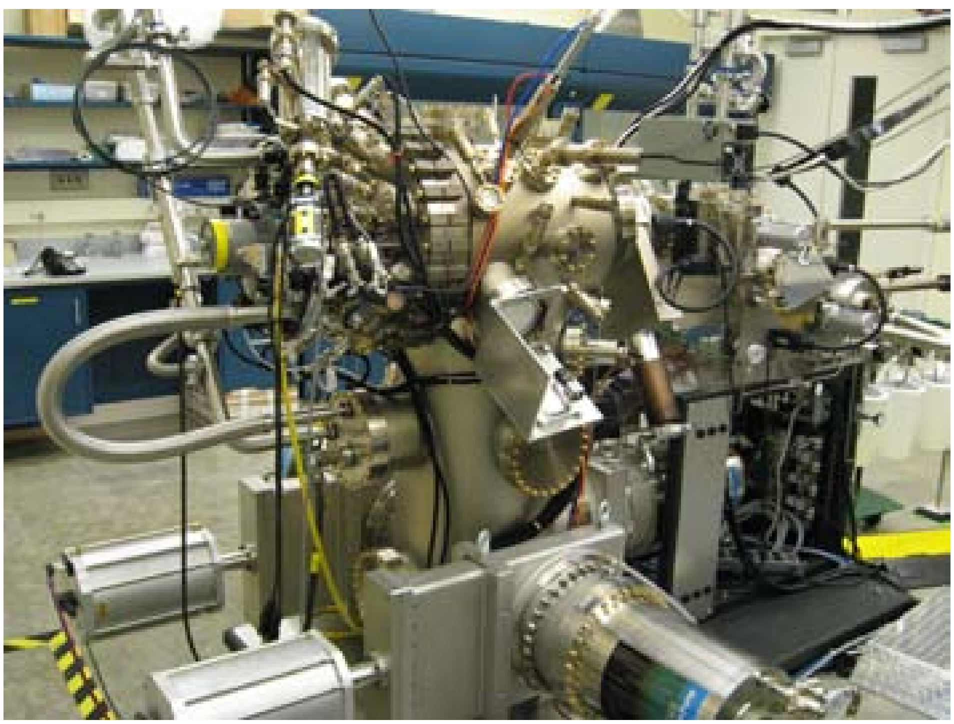
PURDUE
UNIVERSITY

Physics
INTERACTIONS

A NEWSLETTER HIGHLIGHTING THE DEPARTMENT OF PHYSICS AT PURDUE UNIVERSITY

2011

Purdue physicists playing a leading role in semiconductor research



Molecular Beam Epitaxy system installed in the Birck Nanotechnology Center that is used to grow high quality GaAs crystals for Professor Michael Manfra and Professor Gabor Csathy.

(page 8)

Inside

From the Head

It is my great pleasure to welcome you to this edition of *Interactions*, the annual newsletter from the Department of Physics. As Department Head, I take great satisfaction in observing and supporting the truly inspiring work of my colleagues. In January our Undergraduate Women in Physics group hosted the 4th Annual Midwest Conference for Undergraduate Women in Physics (page 10). More than one hundred young women attended and had a chance to interact with a number of female physicists who have had tremendous impacts in science and society. Our graduate students continue to garner national and international recognition, as Katherine Davis was awarded a prestigious National Foundation Graduate Fellowship. This is the third consecutive year that one of our graduate students has been so honored. The Large Hadron Collider (LHC) at the CERN laboratory in Geneva, Switzerland is beginning to produce scientific results, and our graduate students are making important contributions to that work. On page 6, graduate student Zhen Hu describes some very recent studies by Professor Ian Shipsey's group at the LHC on the quark gluon plasma in dense nuclear matter.

Our faculty continue to be recognized for their outstanding work. Michael Manfra and Gabor Csathy and their students have attracted much attention for their observations of new states of electron matter created in two dimensional semiconductor systems, as described in page 8. The work of Yong Chen's group on graphene was the subject of a cover story in June 2011 issue of the journal Nature Materials. We are also very pleased to welcome Rafael Lang as the newest member of our faculty. Rafael joined us in August; his main research interest is in searches for dark matter. We are especially excited about the new research area that Rafael brings to the Department.

This has been another very lively and productive year for Physics at Purdue. Please don't hesitate to contact me to learn more about the exciting things you read about in this newsletter, or any other aspects of the Department.

Nicholas J. Giordano ('73)
Hubert James Distinguished Professor of Physics and Department Head.

Credits

This newsletter is published annually by the Department of Physics at Purdue University. Please address any questions to our department at the phone number below.

Department Head
Nicholas Giordano

Editor
Bill Fornes - Assistant to the Head
wfornes@purdue.edu

Contact Information:
Department of Physics
525 Northwestern Avenue
West Lafayette, IN
47907-2036

www.physics.purdue.edu
Telephone: (765) 494-3000
Fax: (765) 494-0706

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Faculty Honors

Professor Martin Kruczenski was promoted to Associate Professor.

Professor David Miller received the Ruth and Joel Spira Award for Outstanding Undergraduate Teaching.

Professor Maxim Lyutikov was promoted to Associate Professor.

Professor Denes Molnar was promoted to Associate Professor and received the Ruth and Joel Spira Award for Outstanding Graduate Teaching.

Professor Jay Melosh was elected to membership in the American Academy of Arts and Sciences.

Professor Fuqiang Wang was named a Fellow of the American Physical Society.

New Faculty

Rafael Lang, Assistant Professor of Physics, is interested in the nature of dark matter. In particular, he builds and operates experiments that aim at the direct detection of dark matter interactions using liquid noble gases as targets. He comes to Purdue from Columbia University, where he was analysis co-coordinator of the XENON100 experiment, an international collaboration to search for dark matter using a liquid xenon time projection chamder. After studying physics in Ulm, Melbourne, and Berlin, his dissertation work was at the Max Planck Institute of Physics within the CRESST experiment, also on the search for dark matter.

Staff Honors

Carol Buuck received a 2011 Mortar Board Rose Award.

Keith McDermott received the College of Science Customer Service Award.

Pat Osiecki received a 2011 Mortar Board Rose Award.

Tami Snyder-Armstrong received the College of Science Customer Service Award.

Janice Thomaz received the College of Science Professional Achievement Award.

Retired Faculty

Prof. Tzee-Ke Kuo
Years of Service: 1965 – 2010

Prof. Earl W. Prohofsky
Years of Service: 1966 – 2011

In Memorium

Prof. Robert L. McIlwain
April 16, 1929 – August 26, 2011
Years of Service: 1962 – 1994

Prof. Albert W. Overhauser
August 17, 1925 – December 28 2010
Years of Service: 1973 – 2004

Prof. Masao Sugawara
May 28, 1925 – November 28 2010
Years of Service: 1958 – 1990

Physics INTERACTIONS

Student Awards

Graduate Awards

Karl Lark-Horovitz Award – Outstanding Research
- Miguel Araya-Arguedas

H.Y. Fan Award – Outstanding Research in Condensed Matter
- Nodar Samkharadze

Akeley-Mandler Award for Teaching Excellence
- Christos Deligkaris

George W. Tautfest Award – Outstanding Research in High Energy Physics
- Quan Wang

Lijuan Wang Award – Women in Physics
- Kari Frank

Dr. Warner L. Black Award
- Ozhan Koybasi

Purdue University Outstanding Graduate Student Teacher
- Adrien Chauvet
- Ajith Rajapaksha

AAPT Outstanding Teaching Assistant
- Brendan Sullivan

Department Head Nick Giordano with Lark-Horovitz Award winner Miguel Araya-Arguedas.

Graduate Fellowships

Bilsland Dissertation Fellowship
- Eric Clausen-Brown
- Yu Zheng

Gary L. Wright Memorial Fellowship
- Cristina Moody

NSF Graduate Research Fellowship
- Katherine Davis

Undergraduate Awards

Richard W. King Award
Outstanding Physics Junior and Senior
- Kristen Ziegler (Sr.)
- Brent Woodhouse (Jr.)

Lijuan Wang Award – Women in Physics
- Rachael Fulper
- Rachelle Klinger

College of Science Outstanding Student Award
- Stephanie Wicke (Fr.)
- Chenglian Zhu (So.)
- Brent Woodhouse (Jr.)
- Kristen Ziegler (Sr.)

David G. Seiler Physics Scholarship
- Lora Beard

Kenneth S. and Paula D. Krane Physics Scholarship
- Yuedong Fang
- Matthew Polek
- Chengliang Zhu

Shalim and Paul Sargis Memorial Physics Scholarship
- Chris Majors

Bottorff Physics Scholarship
- Stephanie Wicke
- Jacob Rimmell Beard

Particles of Information - Graduate Research

Indications of Suppression of Excited Υ States in Pb-Pb Collisions at $\sqrt{S_{NN}} = 2.76$ TeV

Zhen Hu

Quantum chromodynamics (QCD) predicts that strongly interacting matter undergoes a phase transition to a deconfined state, often referred to as the quark-gluon plasma (QGP), in which quarks and gluons are no longer bound within hadrons. If the QGP is formed in heavy-ion collisions, it is expected to screen the confining potential of heavy quark-antiquark pairs [1], leading to the melting of charmonia and bottomonia status. The melting temperature depends on the binding energy of the quarkonium state. The ground states J/Ψ and Υ(1S) are expected to dissolve at significantly higher temperatures than the more loosely bound excited states. This sequential metling pattern is generally considered a "smoking gun" signature of the QCD deconfinement transition [2].

Our analysis present the first measurements of the Υ(2S+3S)/Υ(1S) ratio with data recorded by the Compact Muon Solenoid (CMS) experiment during the first Pb-Pb run of the Large Hadron Collider (LHC) in late 2010 and during the proton-proton (pp) run of March 2011, both at $\sqrt{S_{NN}} = 2.76$ TeV, where S is the center-of-mass energy. The integrated luminosity used in this analysis corresponds to 7.28 μb^{-1} for Pb-Pb and 225 nb^{-1} for pp collisions.

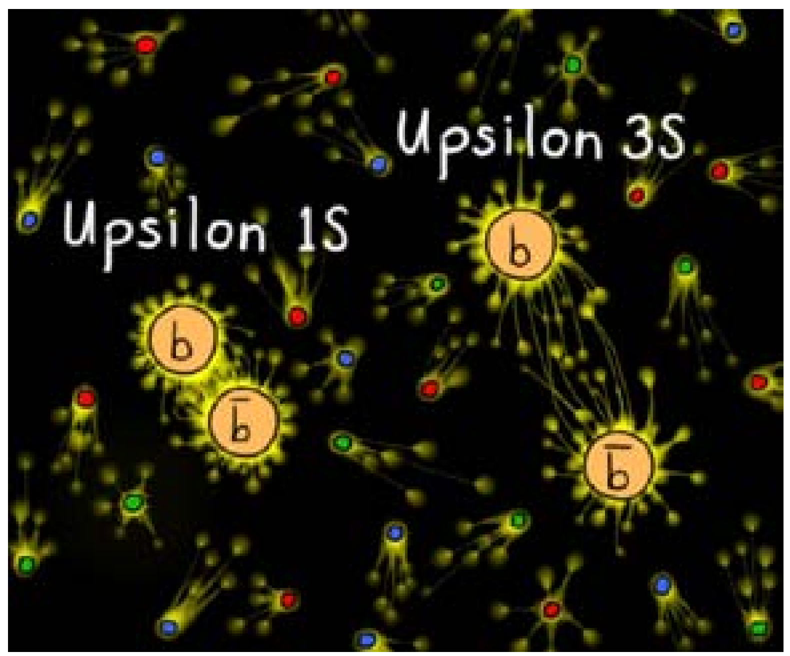


Figure 1: Since the bottom quarks (b and b) in Υ(1S) are held together more tightly than in Υ(3S), the Υ(1S) is less likely to fall apart when clobbered by quarks and gluons in a hot plasma. Picture drawn by Jim Pivarski.

A detailed description of the CMS detector can be found at www.physics.purdue.edu/particle [3]. The trigger conditions, offline event selection and muon reconstruction criteria are discussed in [2]. In order to reduce the background in the Υ mass region, only muons with a transverse momentum (p_T) higher than 4 GeV/c are considered. An extended unbinned maximum likelihood fit is performed to extract the signal yields, following the method described in [4]. The measured mass lineshape of each Υ state is parameterized by a crystal ball function, i.e. a Gaussian resolution function with the low-side tail replaced by a power law describing the final state radiation (FSR). A second order polynomial is chosen to describe the background in the 14 GeV/c² mass-fit range.

The ratios of the observed (uncorrected) yields of the Υ(2S) and Υ(3S) excited states to the Υ(1S) ground state in the pp and Pb-Pb data are:

$$\Upsilon(2S+3S)/\Upsilon(1S)\big|_{pp} = 0.78^{+0.16}_{-0.14} \pm 0.02 \qquad \Upsilon(2S+3S)/\Upsilon(1S)\big|_{PbPb} = 0.24^{+0.13}_{-0.12} \pm 0.02$$

The dominant systematic uncertainty arises from imperfect knowledg of the lineshapt [2], which results in a relative uncertainty on the ratio of 3% for the pp data and 10% for the Pb-Pb data.

The ratio of Υ(2S+3S)/Υ(1S) ratios in Pb-Pb and pp benefits from an almost complete cancellation of the possible acceptance and efficiency difference among the reconstructed resonances. A simultaneous fit to the pp and Pb-Pb mass spectra gives the double ratio:

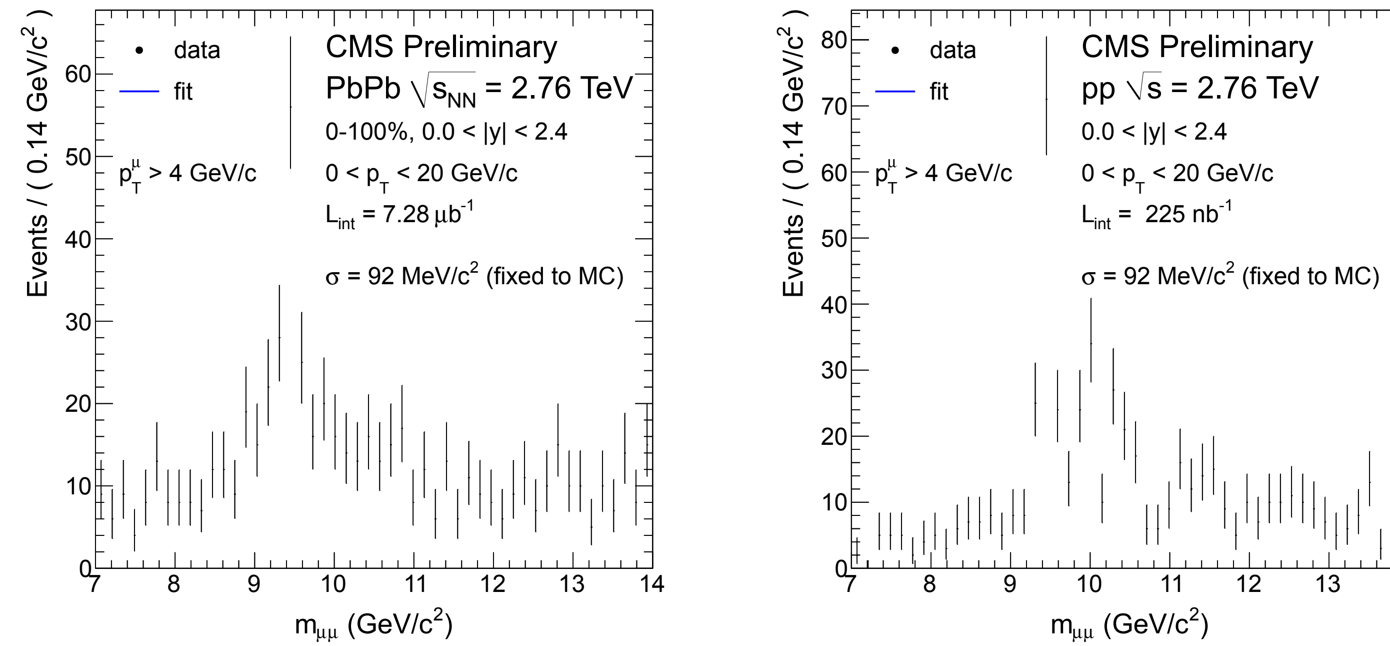


Figure 2. Dimuon invarient-mass distributions (solid black circles from the PbPb (left) and pp (right) data in minimum bias collisions, for muons above 4 GeV/c.

$$\frac{\Upsilon(2S+3S)/\Upsilon(1S)\big|_{PbPb}}{\Upsilon(2S+3S)/\Upsilon(1S)\big|_{pp}} = 0.31^{+0.19}_{-0.15} \pm 0.03$$

where the systematic uncertainty (9%) arises from varying the lineshape in the simultaneous fit, thus taking into account partial cancellations of systematic effects. Using an ensemble of 1 million pseudo-experiments, generated with the signal lineshape obtained from the pp data, the background lineshapes from each data set, and a double ratio equal to unity within uncertainties, the probablity of finding the measured value of 0.31 or below is estimated to be 0.9%, which corresponds to 2.4σ in a one-tailed integral of a Gaussian distribution. Production yields of quarkonium states can also be modified from pp to PbPb collisions in the absence of QGP formation by cold nuclear matter effects [5].

References

[1] T. Matsui and H. Satz, Phys. Lett. B **178**, 416 (1986).
[2] S. Chatrchyan *et al.* (CMS Collaboration), Phys. Rev. Lett. **107**, 052302 (2011).
[3] S. Chatrchyan *et al.* (CMS Collaboration), JINST **3**, S08004 (2008).
[4] V. Khachatryan *et al.* (CMS Collaboration), Phys. Rev. D **83**, 112004 (2011).
[5] R. Vogt, Phys. Rev. C **81**, 044903 (2010).

Zhen Hu is advised by Professor Ian Shipsey. His work is supported by the Department of Energy.

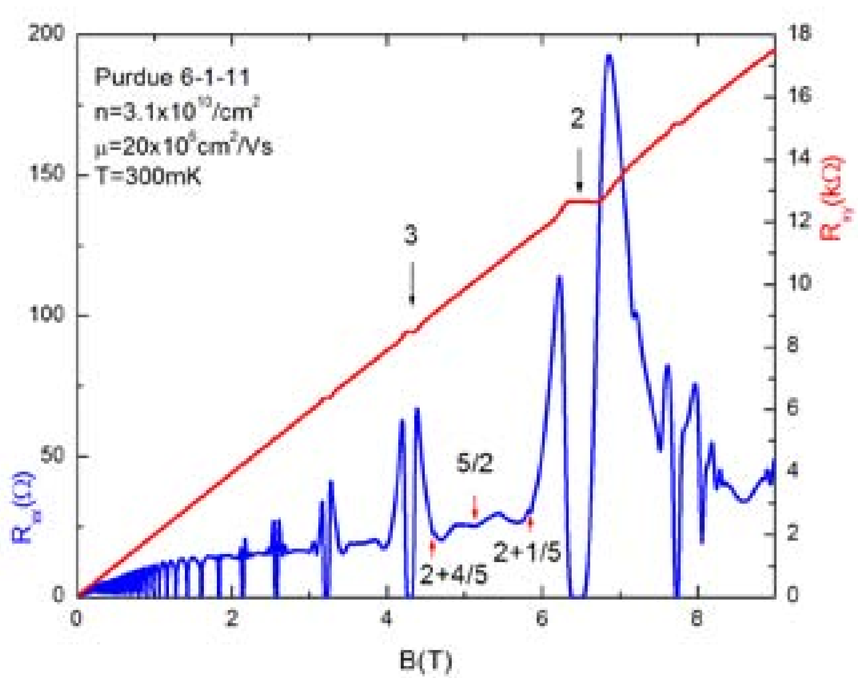
The Fractional Quantum Hall Effect in GaAs: Using Semiconductor Materials to Uncover Hidden Topological Order

Gabor A. Csathy
Assistant Professor of Physics
&
Michael J. Manfra
William F. and Patty J. Miller Associate Professor of Physics

Devices based on electron transport through semiconductor heterostructures are such a ubiquitous technology that we largely take them for granted. Everything from the operation of our smart phones to our Blue Ray DVD players depends on electrical currents flowing through sophisticated semiconductor devices. It is fair to say modern life would look quite different without the utilization of semiconductor materials. Semiconductor heterostructures play an equally important place in fundamental condensed matter physics. Over the past decades the study of electron transport in reduced dimensions has created several new paradigms for the study of many-body groundstates – states whose properties are determined by the mutual interaction of many electrons. A classic example is the Fractional Quantum Hall Effect (FQHE) that occurs in a two-dimensional electron gas (2DEG) subjected to low temperatures and high magnetic fields.

Through the use of modern semiconductor growth techniques such as molecular beam epitaxy (MBE) heterostructures of dissimilar semiconductors can be grown. For example to create an electron gas that is only free to move in two dimensions, not three, we can create a stack of AlGaAs and GaAs, followed by another layer of AlGaAs. In this sandwich configuration, the energy for the electrons is lower in the GaAs layer than in the AlGaAs layers so electrons "fall in" to the GaAs layer and are trapped there. The GaAs layer is typically only 30nm wide, so the trapped electrons are for all practical considerations two-dimensional.

If a 2DEG is placed in a large perpendicular magnetic field at low temperatures several interesting anomalies in electrical transport are seen. Classical theory tells us that the Hall voltage, the voltage measured transverse to the direction of current flow in a magnetic field, should be directly proportional to the applied magnetic field and inversely proportion to the density of electrons in our system. However for sufficiently clean 2DEG the Hall resistance shows significant deviations from classical prediction – at very specific values of magnetic field the Hall resistance exhibits flat plateau regions quantized precisely to values $R_H=h/e^2*(1/\nu)$ where are h/e^2 is the ratio of two fundamental constants of nature and has a value of 25,813 Ohms and $\nu=p/q$ is rational simple fraction. The value of ν is known in the parlance as the "filling factor" – the ratio of the number of electrons to the number of available quantum states. The general phenomenology of the FQHE is shown on page 8. Prominent FQHE states are labeled. Also note that precisely where the Hall resistance is quantized the longitudinal resistance goes to zero indicative of an absence of all dissipation. In the FQHE, where ν is not an integer but rather a simple fraction, single particle quantum mechanics is insufficient to describe the formation of plateaus. These plateaus arise from subtle many-body interactions among the electrons in the 2DEG as captured in the famous Laughlin wavefunction named after Robert Laughlin from Stanford University who received part of the 1998 Nobel Prize for his theoretical contribution.



Longitudinal and Hall resistance as a function of magnetic field B(T) for a sample grown and measured at Purdue. Data acquired at T=0.3K.

The study of the FQHE in high purity semiconductor GaAs heterostructures has been pursued for twenty years yet it still remains at the forefront of modern condensed matter physics. This fact is true for a very simple reason: throughout the long history of the FQHE new physics is revealed as sample quality is improved and transport experiments move to ever lower temperatures.

Members of the Purdue University Physics faculty are now playing a leading role in the discovery of new physics associated with FQHE. A group of students and Postdocs led by Prof. Michael Manfra have designed, constructed and operate an advanced MBE system dedicated to the growth of complex GaAs heterostructures needed for the investigation of the most fragile of the fractional quantum Hall states. This machine is located in the Birck Nanotechnology Center and began operation in early 2011. Advances in machine and heterostructure design have allowed the Purdue MBE group to quickly produce samples that display some of the most spectacular and yet to be understood phenomena in solid-state physics. The operating MBE is shown in the picture on page 1.

In order to study many-body effects in the FQHE, the samples must be extremely high purity. Impurities can introduction disorder and obscure subtle effects that occur at low energies scales. To achieve this purity the samples are grown in a vacuum chamber with a background pressure of ~$1x10^{-12}$ torr – fifteen orders of magnitude below atmospheric pressure. MBE grown GaAs can achieve background impurity levels lower than 10^{13}cm^{-3}, this amounts to 1 part in 10^{10} purity! In addition the flexibility of this system allows several novel device concepts to be implemented – facilitating interrogation of the FQHE via low temperature optical and transport experiments.

As advanced growth techniques allow access to ever increasingly fine energy scales measurement techniques must also improve to study these effects. Importantly, the Purdue Physics department also has expertise in measuring the properties of semiconductors at ultra-low temperature. Prof. Gabor Csathy's group has designed and built a one-of-a-kind dilution refrigerator capable of cooling electrons in GaAs down to 5mK – just 0.005 degrees above absolute zero. This major experimental development allows Prof. Csathy's group to study the most fragile and poorly understood fractional quantum Hall states. A picture of Csathy's low temperature transport facilities is shown above right.

One of the most exciting recent developments in condensed matter physics is the realization that certain Hamiltonians can possess non-trivial topological order – theorists call these topological states of matter. Topological phases of matter are characterized by degenerate groundstates which are separated from their excitations by a finite energy gap. Furthermore topological states are insensitive to local perturbations and therefore are theorized to be useful for certain schemes of fault-resistant quantum computation. Several material systems are theorized to possess topological phases, but the most likely candidate at the present is the fractional quantum Hall state at filling factor 5/2. An example of a particularly strong 5/2 state is shown on page 10. This sample was grown and measured at Purdue by the Manfra and Csathy groups. The strong plateau in the Hall resistance and zero of longitudinal resistance at 5/2 cannot be explained with "conventional" theories of the FQHE. Interestingly the strength of the gap at 5/2 in this Purdue sample is one of the largest ever reported. It is believed, but yet to be experimentally confirmed, that the quantization at 5/2 is due to a novel topological phase described by the non-Abelian Pfaffian wavefunction. This state is very different from the "standard" Laughlin wavefunction. The non-Abelian Pfaffian state may be useful for a particular flavor of quantum computing called topological quantum computing.

Cryostat housing the dilution refrigerator and low signal level electronics needed to measure the FQHE.

The Purdue collaboration working on the physics of the FQHE has been particularly productive throughout 2011, resulting in several new publications and invited seminars for Professors Csathy and Manfra.

(continued on page 10)

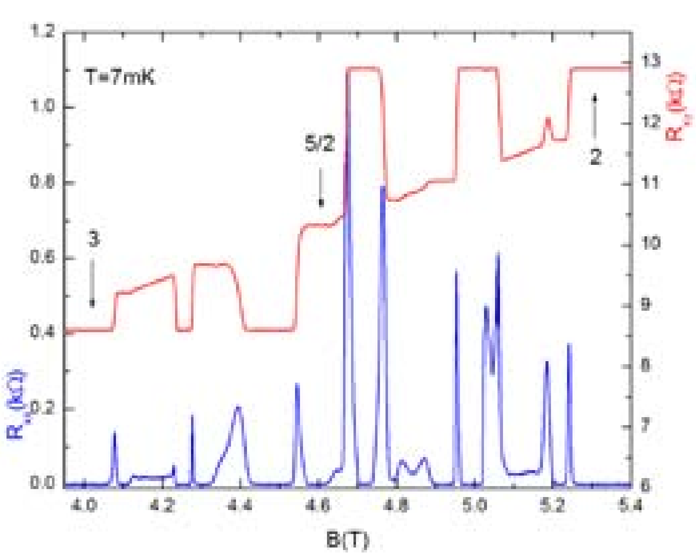
Speakers and Visitors

Margaret Murnane, Distinguished Professor of Physics at the University of Colorado, gave the 18th Hubert M. James Memorial Lecture on November 4th, 2010. Her lecture was on "Attosecond Light and Science at the Time-scale of the Electron - Coherent X-Rays from Tabletop Ultrafast Lasers."

Siegfried S. Hecker, Director Emeritus of Los Alamos National Laboratory, visited Purdue on March 23-24, 2011, and delivered two lectures. "Nuclear Promise or Nuclear Peril?" outlined the problems facing the world as nuclear power becomes an increasingly vital source of energy. "North Korea: Reactors, Bombs, and People" recounted his experiences during invited tours of North Korean nuclear facilities in 2004-2011.

Sankar Das Sarma, the Richard E. Prange Chair in Physics and Distinguished University Professor at the University of Maryland, delivered the 19th Hubert M. James Lecture on October 6, 2011. Das Sarma's lecture was entitled "Computing with Quantum Knots: Majorana Fermions, Non-Abelian Anyons, and Topological Quantum Computation.

Fractional Quantum Hall Effect (cont.)



Hall and longitudinal resistance at ultra-low temperatures in the vicinity of the filling factor 5/2 fractional quantum Hall state.

(continued from page 9) Most importantly it represents an example of the high level of collaboration taking place throughout the condensed matter community at Purdue. Csathy and Manfra and their students regularly collaborate with other Purdue Physics colleagues including the experimental groups of Professors Rokhinson and Chen and the theory groups of Professors Lyanda-Geller and Giuliani.

Professor Manfra and Csathy's research is supported by the Department of Energy, the National Science Foundation, and Alcatel-Lucent Inc.

Undergraduate News

Department of Physics Hosts Conference for Undergraduate Women in Physics

The Physics Department and its Undergraduate Women in Physics organization hosted over 100 undergraduate women from across the Midwest at the 4th Annual Midwest Conference for Undergraduate Women in Physics (UWIP) on January 14-16, 2011. Regional UWIP conferences throughout the country offer young women the resources and motivation to enter graduate school and successfully complete a Ph.D. in physics and to inform those not choosing graduate school of the wide range of career opportunities available to them. The Purdue conference featured a series of research talks by women physicists, panel discussions with Purdue alumnae and graduate students on graduate school and physics careers, student presentation sessions, and opportunities for networking and informal mentoring.

Purdue President and Physics Professor France Córdova delivered the conference's keynote address, which was simulcast to the other three regional confrence sites at University of Southern California, North Carolina State University and Massachusetts Institute of Technology. Other speakers included:

- Florencia Canelli, Assistant Professor of Physics, University of Chicago
- Sima Setayeshgar, Associate Professor of Physics, Indiana University
- Laura Greene, Professor of Physics, University of Illinois at Urbana-Champaign
- Lisa L. Everett, Associate Professor of Physics, University of Wisconsin
- Evalyn Gates, Executive Director, Cleveland Museum of History

Purdue Physics alumnae participated in a panel discussion on career opportunities.

- Matti Neustadt Storie (BS, 1998), Attorney, Stoel Rives LLP
- Debra Guillemaud (BS, 1979, MS, 1980), Director of Application Specific Products (ASP) Quality, Texas Instruments
- L. Celeste Bottorff (BS, 1975), Vice President of Living Well, Coca-Cola North America
- Katherine Harkay (MS, 1984, PhD, 1993), Physicist, Argonne National Laboratory

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Purdue University Provost's Office
Purdue University Vice Provost for Diversity
Science Women for Purdue
David G. Seiler
Kathleen M. Yang

Alumni News

2011 Distinguished Science Alumni Award

Thomas A. Longo

BS '47 Physics and Chemistry

BS '47 Naval Science

MS '53 Physics

PhD '57 Physics

The Physics Department and the College of Science honored Dr. Thomas Longo as its 2011 Distinguished Alumnus on April 8, 2011.

Dr. Longo joined the navy at the age of 17 in 1944 and entered an officers' training program. In 1947, at the age of 20 he received two degrees from Purdue (BS in Naval Science and a BS in Physics and Chemistry). At that time he was commissioned as an officer in the U.S. Navy. In 1950, he resigned his regular naval commission and accepted a reserve commission to return to graduate school at Purdue. In 1953, after receiving an MS in Physics, he began working on silicon research for Dr. Karl Lark-Horovitz and received a PhD in 1957. He was then appointed as an Assistant Professor in the Department of Physics.

In 1958, Dr. Longo became Manager of Device Research at Sylvania Semiconductor in Massachusetts, eventually rising to the position of Director of Research and Engineering. While at Sylvania, he introduced the first sub-10 nanosecond high-performance integrated circuits, transistor to transistor logic (TTL) in 1963 and developed the first semiconductor memory, a 16-bit random access memory (RAM) in 1966.

Dr. Longo joined Fairchild Semiconductor in 1970 as Vice-President in charge of integrated circuits. At Fairchild, he introduced the first practical sub-nanosecond emitter coupled logic (ECL – F100K) and 1 Kbit ECL RAM. In 1975, after supplying all of the logic and memory ECL circuits for the first Cray computers, the fastest and most powerful computers in the world, he became a member of the Cray Board of Directors, where he served until 1992.

In 1985, Dr. Longo started the company Performance Semiconductor to develop submicron CMOS technology and microprocessors for military application. In 1987 Performance Semiconductor introduced the first submicron CMOS technology, and the PACE 1750A became the armed forces first standard microprocessor for avionics, missiles, and satellite applications and remained so for the next 15 years. Dr. Longo retired in 2003 after 50 years of continuous silicon activities.

Career Highlights

- 1989 Performance Semiconductor CMOS PACE 1750A selected by the armed forces as microprocessor standard
- 1975 Appointed to Cray Research Board of Directors
- 1973 Named by Electronic News as one of the top contributors in the first 25 years of the semiconductor industry
- 1972 Named an IEEE fellow for the development of high performance TTL and the first semiconductor memory, 16-bit RAM
- 1957 Appointed Assistant Professor of Physics immediately after receiving PhD

2011 Outstanding Alumni Awards

The Physics Department and the College of Science hosted the 2011 Outstanding Alumni on September 30, 2011. Charles Beetz and Penny Warren were honored for their contributions and leadership within their professions.

Dr. Charles P. Beetz
Charles Beetz began his career as an applied physicist at General Motors Research Laboratory, rising to the position of Principal Research Scientist and Section Manager for Materials Physics. Leaving GMRL, Dr. Beetz began a streak of successful startup companies. In 1988, he cofounded Advanced Technology Materials, Inc., a global leader in specialty semiconductor and high-purity materials that went on the NASDAQ in 1993. In 1995 he co-founded NanoSciences Corporation, originally named NanoSystems, Inc., using micromachining technology to fabricate nanowire structures for applications in magnetic memory and advanced photocathodes. Dr. Beetz co-founded ZoomEssence, Inc., in 2008 where he is responsible for the design and development of novel atomization and powder drying technology. In addition to his work in science and technology industry, Dr. Beetz owns Rose Hill Farm Winery with his wife, Virginia. Dr. Beetz earned a B.S. in Physics and Mathematics from Morehead State University in 1970 and completed a Ph.D. at Purdue University in 1978 under the direction of Prof. Gianni Ascarelli.

Dr. Penny Warren
Penny Warren is a Detector Area Functional Manager and Principal Detector Engineer at Ball Aerospace & Technologies Corporation where she has worked since 2002. Prior to that, she was a Research Physicist in the Optical Sciences Division of the Naval Research Laboratory in Washington, DC. Penny earned a B.S. in Physics from Kansas State University in 1987 and completed a Ph.D. at Purdue University in 1996 under the direction of Profs. Andrew Hirsch and Rolf Scharenberg. Penny and her spouse, Eric Johnson, reside in Boulder, Colorado. They welcomed their first child in April 2011.

Alumni News

From the Director of Development

Greetings from Purdue Physics!

As I am certain you have read by now, 2011 has certainly been an amazing year in the Physics Department! With a constant strive to innovate and learn, it's no surprise the accomplishments our department has had over the past year. I have enjoyed sharing the news and developments in Physics with many of the alumni and enthusiasts across the country, and in turn, have enjoyed learning about the advangtages a Purdue Physics degree provides.

One aspect all alumni & friends have managed to agree upon is that Physics provides a strong fundamental, logical thought process which has proved useful within many, varied disciplines. It is our sincere hope that the education you received at Purdue, both in and outside of the classroom, has aided in your achievements.

In order to provide others with the same caliber of education and experience, it is necessary to have world class faculty and facilities. State funding and tuition alone does not cover the cost of operating a university, retaining excellent instructors, and assisting students as they progress through our program. We need your help to support our efforts. Please consider a gift to the Department of Physics. It would be my pleasure to speak with you and discuss how your gift could be used to support the department. If you have any questions, or if there is anything I can help you with, feel free to contact me.

Boiler up!

Kaethe Ann Beck
Director of Development
765.494.0669
beck35@purdue,.edu

Alumni Notes

Timothy Beers (BS, 1979) was named Director of the Kitt Peak National Observatory.

Nitin Samarth (PhD 1986) was appointed the George A. and Margarert M. Downsbrough Head of the Department of Physics at Penn State University.

Stephen Hoover (BS 2003) received the Mitsuyoshi Tanaka Dissertation Award in Experimental Particle Physics from the American Physical Society.

Trinanjan Datta (PhD 2007) was named an Anacapa Scholar by the Anacopa Society to promote research in theoretical physics at primarily undergraduate instistutions.

Corporate Donors

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Recognizing Our Donors

We recognize and thank our donors who made gifts to the Department of Physics in fiscal year 2011 (July 1, 2010 – June 30, 2011).

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