April Meeting Plenary Speakers Set

Eight of the nine plenary lectures at the APS April Meeting in St. Louis, Missouri, April 12-15, 2008, have been confirmed. The slate features many distinguished speakers on a broad range of topics. They are:


Roger Blandford, Stanford, “Recent Developments in Plasma Astrophysics”

Paul Chu, University of Hawaii, “High Temperature Superconductivity 20 Years Later: Achievements and Perspectives”

Wietze Nazarewicz, ORNL, “New Insights Into QGPs and Supernovae Highlight 2007 DNP Meeting”

Nuclear physicists from around the world converged on Newport News Virginia for the annual fall meeting of the APS Division of Nuclear Physics (DNP), held October 11-13. Among the highlights of the technical program were talks on the latest news from the Relativistic Heavy Ion Collider (RHIC), new insights into nucleosynthesis gleaned from observations of metal-poor stars, and the latest research on quark-gluon plasmas, including potential insights to be gleaned from string theory.

Odd Coupling. Collisions of high-energy gold nuclei at Brookhaven’s Relativistic Heavy Ion Collider (RHIC) create exploring droplets of quark-gluon plasma (QGP), the stuff that filled the universe microseconds after the Big Bang. However, the QGP turns out to be close to an ideal liquid, and also attenuates high-energy quarks attempting to pass through it—both properties that standard QCD calculations have not been able to explain satisfactorily.

To help resolve this issue, theoretical physicists are turning to string theory (particularly the gauge-string duality), which has revealed a deep connection between quantum gravity and gauge theories similar to QCD, according to MIT’s Hong Liu. Along with several other speakers, he discussed examples where string theory techniques have been used to shed light on exact data from RHIC, and to make at least one prediction that can be experimentally tested in the near future.

Princeton University’s Steven Galvez has been finding interesting comparisons between QCD and string theory computations regarding thermalization time, energy loss by heavy quarks, and the formation of DNP MEETING continued on page 7

The Big Easy Hosts 2008 March Meeting

The 2008 APS March Meeting will be held March 10-14 in New Orleans, Louisiana. It is the largest annual gathering of professional physicists in the country. The scientific program will feature more than 90 invited sessions and 550 contributed sessions, at which approximately 7000 papers will be presented, covering the latest research in areas represented by the APS division of condensed matter physics, materials physics, polymer physics, chemical physics, biological physics, fluid dynamics, laser science, computational physics, and atomic, molecular and optical physics. Also taking part will be the APS topical groups on Instrument and Measurement Science, Magnetism and its Applications, Shock Compression of Condensed Matter, Statistical and Nonlinear Physics, and Quantum Information, as well as the forums on Industrial and Applied Physics, Physics and Society, History of Physics, International Physics, Education, and Graduate Student Affairs.

Special scheduled events include the annual prize and award presentation, a one-day workshop on energy research for graduate students and postdocs, a panel discussion with APS journal editors, a students lunch with the experts, a technical program, there will be eight half-day tutorials offered on Sunday, March 9. The tutorial topics are: Basics of Density Functional Theory, Static and Time-Dependent Spintronics; Fundamentals of Quantum Entanglement; Neutron and Synchrotron Scatter in Novel Materials; Will Carbon Replace Silicon? The Future of Graphitic Electronics; Nanomagnetism: Manufacturing, Physics, Devices, and Modeling; Quantum Noise, Quantum Limited Measurements, and Conditional Quantum Evolution.

The 5th APS Workshop on Opportunities in Biological Physics, organized by the Division of Biological Physics, will be held on Sunday, March 9. On Saturday, March 8 and Sunday, March 9, the Division of Polymer Physics will host a special short course: High-throughput Approaches to Polymer Physics and Materials Science.

New Orleans is an exciting city, and has achieved significant recovery from hurricane Katrina. The French Quarter is thriving and the many fine restaurants and shops are within walking distance of most of the conference hotels. The headquarters hotel is the New Orleans Marriott on Canal Street, just steps away from the French Quarter. A guide to attractions in New Orleans, compiled for APS by Jim McGuire, chair of the physics department at Tulane University, is available online at the meeting website.

This year small child care grants of $200 will be available to assist attendees bringing small children. The application form is available on the meeting website. A parent-child quiet room will also be available.

More info about the meeting: http://www.aps.org/meetings/march/index.cfm

The recipient of the non-PhD category is Bryce Gadway of Colgate University. In his senior-year research, conducted under the supervision of Kiko Galvez, he created an ensemble of single photons entangled in their polarization and direction of momentum, and used them to test theories of nature based on non-contextual realism. The experimental results ruled out realism or non-contextuality, and both Gadway is now a graduate student at Stony Brook University, pursuing a PhD in physics.

The LeRoy Award is given for outstanding research accomplishments in physics by an undergraduate. Two categories are recognized, one for an undergraduate at an institution that grants the PhD, and the other for an undergraduates at an institution that does not grant the PhD. This year’s recipient in the PhD category is Matthew Becker of the University of Michigan. Working under Timothy McKay, he conducted his senior thesis research on the dynamics of galaxy clusters in the Sloan Digital Sky Survey. He is currently a graduate student at the University of Chicago, pursuing his PhD in astrophysics and cosmology.
December 1938: Discovery of Nuclear Fission

In December 1938, over Christmas vacation, physicists Lise Meitner and Otto Frisch made a startling discovery that would immediately revolutionize nuclear physics and lead to the atomic bomb. Trying to explain a puzzling fissioning made by nuclear chemist Otto Hahn in Berlin, Meitner and Frisch realized that something previously thought to be impossible actually happened: that a uranium nucleus had split into two.

Lise Meitner was born in Vienna in 1878. She grew up in an intellectual family, and studied physics at the University of Vienna, receiving a doctorate in 1906. As a woman, the only position available to her at that time in Vienna was as a schoolteacher, so she went to Berlin in 1907 in search of research opportunities. Meitner, shy but soon became a friend and collaborator of chemist Otto Hahn. In 1912 that Hans Wilhelm Geiger Institute for chemistry was established, and she obtained a position there. During World War I Meitner volunteered as an x-ray nurse in the Austrian army. Upon returning to Berlin she led a life of physics in the University of Oxford, but she had few chances to work with radioactivity.

Over the Christmas holiday, Meitner had a visit from her brother, Otto Frisch. She made a mistake, but the results didn't make sense. At first, they thought there were only two elements heavier than uranium, but then they realized that there were actually three. The third element was carbon, and the fourth was nitrogen.

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October 22, 2007

He has failed us in the worst way to end a remarkable possible way. It is a sad and re-

This work advances at the device level on nanoelectronics for many years, and there have been ad-
vances at the device level on switches and wires. This work


“We are looking at trying to chance and is the worst possible way. It is a sad and re-

Steve Chu, Lawrence Berke-

“We certainly have seen com-


“A fast goodball that drops

Alan Nathan, University of Illinois at Urbana-Champaign, on the effect of high altitude on the World Series games played in Denver, Boston Globe, Octo-

“Literally is like tomogra-

About 200 scientists gathered in Washington, DC November 2-4 to discuss the future of the study of a deep underground science lab to be located in the abandoned Homestake mine in South Dakota. Leonard Suhl, a physicist at Brookhaven National Laboratory, described the process, the need for a deep underground Science and Engineering Laboratory (DUSEL), the technological and political opportunities DUSEL could provide.

The site-independent study group, which included hundreds of scientists from various disciplines, recommended strong support for deep underground science, a cross agency deep science initiative, and construction of a deep underground lab. The study group mapped out some of the compelling scientific questions that could be studied deep underground.

"Deep underground science and engineering represents a new frontier," said Bernard Sadoulet of UC Berkeley, one of the leaders of the study group.

An underground laboratory would help answer several important questions in particle physics, astrophysics, and astroparticle physics, such as: What is the dark matter? What happened to the antimatter that was produced in the Big Bang? Is the universe stable or unstable? What can neutrinos tell us? How did the universe evolve? A quiet environment shielded from the Earth's magnetic field, approaching an unexplored galaxy--a dark matter and neutrinos, as well as rare nuclear process such as neutrino detection--are the key. The decoy and neutralino double beta decay. Trying to observe dark matter at ground level would be like trying to listen to music in the middle of a noisy crowd, said Hitoshi Murayama of the University of California, Santa Barbara.

"We have to go where the physics happens," said Jose Alonso has recently been named the head of Sanford lab. Alonso is a physicist who retired in 2002 from Lawrence Berkeley National Laboratory, where he was involved with developing and managing the Bevatron project, a large accelerator at the University of California. In 2002, the first secretary of the Smithsonian Institution in Washington.

APS News

Many Disciplines Have Stake in Underground Laboratory

As part of its historic sites initiative, APS recently commemorated two major achievements in physics in the US: the discovery of magnetic self-inductance by Joseph Henry in 1832, and the formulation of the relativistic theory of superconductivity by John Bardeen, Leon Cooper and John Schrieffer in 1956-1957. The site of Henry's discovery was the Albany Academy, a preparatory school for boys that was founded in 1813. The school is still in existence, and in the photo at left John Rigden, chair of the APS Historic Sites Committee, watches as Head of the School Carson B. Mason signs the APS register of historic sites, part of the ceremony surrounding the plaque presentation. After leaving Albany Academy, Henry became a professor at Princeton, and later the first secretary of the Smithsonian Institution in Washington.

Smashing Eggs in the Name of Science

By Erika Gebel

Ed. Note: Each year APS sponsors two mass media fellows as part of a program run by the AAS. Typically graduate students in science or a related field, they spend eight weeks over the summer working for a mass media outlet, learning how to communicate science to the public. Last month APS Media Fellow Merid Sie wrote about his experiences; this month it's Erika Gebel's turn.

She spent the summer at the Philadelphia Inquirer and is now completing her Ph.D in biophysics at Johns Hopkins University.

Surrounded by a medley of physics teachers-young, old, female, male, four-eyes, two-eyes-so I was in the back of a classroom that was strangely alive amongst the empty July halls of Ridley High School. Occasionally one of the students would shoot me a curious glance. This was not an uncommon reaction to the presence of a physics outsider, I was from the Phi Delta Epsilon, a physics fraternity that is active in the school.

In addition to the funds from the state of South Dakota, philanthropist S. Denny Sanford has committed $70 million to the Sanford Underground Science and Engineering Laboratory. The Sanford Lab, at 4850 feet below ground, will serve as the first phase of DUSEL, and should be open for science late next year. DUSEL will drop deeper layers, and in addition to the Sanford Lab, should be open for science late next year. DUSEL will drop deeper layers, and in addition to the Sanford Lab, should be open for science late next year. DUSEL will drop deeper layers, and in addition to the Sanford Lab, should be open for science late next year.

Currently the mine is flooded up to a depth of 5000 feet. The water level is still rising, and the water will take another 15 years to reach a steady depth. The site is suitable for a science and engineering laboratory.

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Bardeen, Cooper and Schrieffer did their work at the University of Illinois at Urbana-Champaign. APS President Leo Kadakoff (right) presents the historic sites plaque to UIUC Chancellor Richard Herman. The presentation was part of a celebration of the 50th anniversary of BCS theory, held at UIUC in October. The plaque reads, “In this building, the home of the Department of Illinois’ Physics Department from 1909 to 1959, John Bardeen, Leon Cooper, and J. Robert Schrieffer created the ‘BCS theory of superconductivity, a great achievement of theoretical physics, in 1956-1957. For their work, they were awarded the 1972 Nobel Prize in Physics.”

Providing entertainment was a combination strategy I employed to keep readers interested in science. For a story I wrote about proteins, entropy, and drug design, I likened the game was to determine the mating dance. People love to hear about health too, and that translates into stories about pharmaceuticals. In another piece I wrote about the human genome project, I competed with television, radio, and the internet, we need to paint pictures, tell stories, and provide something beyond the basics of the research, I was careful to tie the findings directly into drugs that have yet to be approved. With the physics education story, I was going to have to wear all three hats. Physics itself is difficult for many to grasp and in deed the mere mention of it will send some into a shivering cold sweat. I had to ease my way into the story with something anyone could enjoy and that required little physics knowledge to understand—smashing eggs.

An integral part of the work shop involved exploring Newtonian physics with gadgets, which, on the day I visited, included a two-story long spring, a weight, and an egg. The object of this experiment was to demonstrate the laws of physics through determining what displacement the spring-attached weight should be raised to before the egg would stand–smashing eggs.

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Not with a Bang, but a Whisper

Isn’t the metaphor “whispering cosmos” a more accurate and aesthetic description than “bang” for the universe’s “big bang” ground radiation the permeates the entire universe? In 1948, radio astronomer Fred Hoyle coined the term big bang to deride Belgian priest George Lemaître’s prediction that the universe expanded from the expansion of a hot “primeval atom.” Yet the term big bang persists. Big bang makes no physical sense, as there was no matter (or energy) near the center that Hoyle’s theory implies. The big bang is a hypothesis. There was no one there to observe it! Other hypotheses may be discovered that can predict the observed Whispering Cosmos as well as the nature and origin of dark matter and dark energy that still challenges physicists.

How can conservatives be faulted for rejecting the imprecise bang metaphor? I believe the Whispering Cosmos is more accurate, eternal, and beautiful. It is consonant with Lemaître’s and Penzias and Robert Herman’s “atom” argument that the very cool microwave background radiation observed by Arno Penzias and Robert W. Wilson in 1964, for which they received the Nobel Prize in 1978.

Fred Hoyle’s continuous cosmology, or steady state theory, cannot explain the microwave background radiation or cosmic whisps, which has cooled from the expansion of a hot “primeval atom.” Yet the term big bang persists. Big bang makes no physical sense, as there was no matter (or energy) near the center that Hoyle’s theory implies. The big bang is a hypothesis. There was no one there to observe it! Other hypotheses may be discovered that can predict the observed Whispering Cosmos as well as the nature and origin of dark matter and dark energy that still challenges physicists.

In a letter in the October APS News, Mike Strauss explained the discrepancy between Genesis and microwave background radiation, concluding the age of Earth as due to the “long” Hebrew days in Genesis. Would he be so kind to explain the following:

- The name of the Hebrew “day” (and similarly in Genesis 1, 3–31):
- 4: And saw the light, that it was good: and God divided the light from the darkness.
- 5: And God called the light: Day, and the darkness he called Night.
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I am particularly interested in the reconciliation of “long” days or “periods of time” with the current short days and the conservation of angular momentum of Earth. How did the earth’s rotation increase by such an enormous amount?

Alfred A. Brooks
Oak Ridge, TN

Mike Strauss responds:
I’m glad that Alfred Brooks is looking carefully at the text of Genesis. As with any language, the meaning of the words is found primarily in the context. The sentence in question has two or more different meanings even in the same sentence, as in, “On Christian day it snowed all day, but cleared up at dusk.” In that sentence the first use of the word “day” refers to a period of about 24 hours, while the second refers to a period of daylight, maybe 10 hours. The context tends to reveal the best meaning. The Hebrew word “yom” means “day,” but the word has many different meanings, including (1) 24 hours, (2) the part of a solar day that is light, and (3) a long period of time. “Yom” appears in Genesis.

There are places in Genesis, like parts of verse 4 and 5, that are not included by Alfred Brooks, where the meaning of the word “yom” is given by (2) above. However, many Hebrew linguists believe that the meaning of “yom,” when referring to the six “days” of creation, is best given by (3) above, an “epoch.” The scholar Gleason Archer Jr. wrote, “On the basis of internal evidence, it is the writer’s conviction that ‘yom’ in Genesis I could not have been intended by the Hebrew author to mean a literal twenty-four-hour day.” (From “A Survey of Old Testament Introduction” (1994)). The context indicates that, when referring to the six “days” of creation, the word “yom” in the Hebrew text may best be translated into English as six “epochs” of creation, with each “epoch” representing a period of millions of years or so. There is then no problem with conservation of angular momentum, and no time-scale discrepancy between the biblical text and the known 14-billion-year age of the universe.

The 2007 Ig Nobel Prizes, honoring achievements that first make people LAUGH, and then make them THINK, were awarded at Harvard University’s historic Sanders Theatre in October before 1200 spectators. The event was produced by the science humor magazine Annals of Improbable Research (AIR), and co-sponsored by the Harvard-Radcliffe Science Fiction Association and the Harvard-Radcliffe Society of Physics Students, and the Harvard Computer Society.

The event was broadcast live on the Internet, and can be seen in recorded form at <http://www.improbable.com>. An edited recording of the ceremony will be broadcast on National Public Radio’s “Science Friday” program on the day after Thanksgiving. And the 2007 Ig Nobelists are…

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Brian Witcombe of Gloucester, UK, and Dan Meyer of Antioch, Tennessee, for producing the commer-
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PHYSICS Prize
L. Mahan of Harvard Uni-

Genius and Angular Momentum

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Miliar than I even realized with basic job," he recalls. Because he had been at the University of Iowa, "I thought I was necessary. As an undergraduate at the school. However, his foray into physics was driven, ironically, by financial concerns such as salaries and expenses, and of course, getting juicy stories. "You have to try and stay ahead of the news and make sure your folks are covering the right topics at any given time," he says. "And if you can figure the pieces around on the board quite a bit and at the same time you have to be a reporter and file stories and be productive in that respect." Glanz loves being a journalist. But don’t get him wrong. He enjoys physics, too. "That is something I have since high school. However, his foray into physics was driven, ironically, by financial concerns such as salaries and expenses, and of course, getting juicy stories. "You have to try and stay ahead of the news and make sure your folks are covering the right topics at any given time," he says. "And if you can figure the pieces around on the board quite a bit and at the same time you have to be a reporter and file stories and be productive in that respect." Glanz loves being a journalist. But don’t get him wrong. He enjoys physics, too. "That is something I have since high school. However, his foray into physics was driven, ironically, by financial concerns such as salaries and expenses, and of course, getting juicy stories. "You have to try and stay ahead of the news and make sure your folks are covering the right topics at any given time," he says. "And if you can figure the pieces around on the board quite a bit and at the same time you have to be a reporter and file stories and be productive in that respect." Glanz loves being a journalist. But don’t get him wrong. He enjoys physics, too. "That is something I have since high school.

Ten years ago, scientists found it a challenge to create plasmas at temperatures cool enough not to damage surfaces, but this can now be done fairly easily. Cold plasmas are proving useful as a means of sterilizing heat-sensitive medical tools, and decontaminating skin wounds. This has already been demonstrated in vivo, according to Eva Stoffels of the University of Tennessee, Knoxville. While searching for a topic for his PhD thesis, he happened to find a research group that was working in medical physics. That subject caught his interest, and he decided to join the group. He soon realized he wanted to GONZALEZ continued on page 7

GEC Conference Features Latest Research on Plasma Phenomena and Processes

Carbon nanowalls, space plasma propulsion, and applying cold plasmas to facilitate wound healing were among the highlights of the annual Gaseous Electronics Conference, held October 2-5 in Arlington, Virginia. The meeting’s focus was on plasma and plasma processes in partially ionized gases, and on the theory and measurement of basic aspects of their behavior. But he has an advantage. Glanz opines that being a journalist is "not that different from when I was a physicist. At some basic levels you want to say the best thing is grappling with reality, learning about it and being able to write about it to some kind of public. I love all aspects of it. I love the reporting, I love the writing. I love the fact that…there’s reality that you’re using as material for that whole process, for which me is a very visceral kind of thing and one I can’t imagine living without." Copyright 2007, Alaina G. Levine.

Profiles in Versatility

From Physicist to War Correspondent: Mr. Glanz Goes to Baghdad

By Alaina G. Levine

Jim Glanz, who received his PhD from Princeton’s Astrophysical Sciences Department with a concentration on “all kinds of funky waves,” as he puts it, is not a genius at physics, says Glanz, because, “I really wasn’t a genius [at physics],” he says. “It wasn’t just a way of understanding what they did, it was also a way of getting them to talk to us. There were all these reporters clamoring for their attention, [and] we had a big advantage because we were out ahead, knowledge-wise...We came off as some of the most knowledgeable reporters down there. We had our ducks in a row and we constantly got in and get tips and interviews.”

This entry into story scoops continues today in Iraq. “It’s been a real boost for me because… I have a natural connection to all the engineers who were here,” Glanz describes. “As he interacts with Iraqi engineers, he is seen as someone who can speak a language more important than Arabic or English, that is the language of science.

Jim Glanz (right) interviews the Iranian ambassador to Iraq, Hassan Kazemi Qurni, in the Iranian Embassy in Baghdad.

Gonzalez Labors in the “Trenches” of Cancer Treatment Research

Medical physics is not a well-known field, but it’s an extremely important one, says medical physicist Albin Gonzalez. As chief medical physicist at the Firelands Cancer Center in Sandusky, Ohio, Gonzalez works with a team that is responsible for patient treatment and safety. Every day, Gonzalez applies his knowledge of physics, biology, medicine, and computer technology to give patients the best possible treatment. “We are actually implementing new technology to do new types of treatments,” he says. “Physicists have been responsible for many of the improvements in cancer treatment, Gonzalez says. For instance, just a few years ago, people who had some types of cancer were treated with large beams of radiation that were too large for their cells. But now, a new type of treatment called intensity modulated radiation therapy allows doctors to shape the beam more precisely, so the patient avoids healthy tissue. “And all this improvement has been done by physicists. Physicians have been the champions of bringing a lot of new technology, says Gonzalez.”

Like many medical physicists, Gonzalez started going to Ground Zero shortly after the September 11 attacks. Originally from Panama, Gonzalez came to the United States to pursue an ad

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APS NEWS

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GEC Conference Features Latest Research on Plasma Phenomena and Processes

Carbon nanowalls, space plasma propulsion, and applying cold plasmas to facilitate wound healing were among the highlights of the annual Gaseous Electronics Conference, held October 2-5 in Arlington, Virginia. The meeting’s focus was on plasma and plasma processes in partially ionized gases, and on the theory and measurement of basic aspects of their behavior. But he has an advantage. Glanz opines that being a journalist is "not that different from when I was a physicist. At some basic levels you want to say the best thing is grappling with reality, learning about it and being able to write about it to some kind of public. I love all aspects of it. I love the reporting, I love the writing. I love the fact that…there’s reality that you’re using as material for that whole process, for which me is a very visceral kind of thing and one I can’t imagine living without." Copyright 2007, Alaina G. Levine.

Profiles in Versatility

From Physicist to War Correspondent: Mr. Glanz Goes to Baghdad

By Alaina G. Levine

Jim Glanz, who received his PhD from Princeton’s Astrophysical Sciences Department with a concentration on “all kinds of funky waves,” as he puts it, is not a genius at physics, says Glanz, because, “I really wasn’t a genius [at physics],” he says. “It wasn’t just a way of understanding what they did, it was also a way of getting them to talk to us. There were all these reporters clamoring for their attention, [and] we had a big advantage because we were out ahead, knowledge-wise...We came off as some of the most knowledgeable reporters down there. We had our ducks in a row and we constantly got in and get tips and interviews.”

This entry into story scoops continues today in Iraq. “It’s been a real boost for me because… I have a natural connection to all the engineers who were here,” Glanz describes. “As he interacts with Iraqi engineers, he is seen as someone who can speak a language more important than Arabic or English, that is the language of science.

Jim Glanz (right) interviews the Iranian ambassador to Iraq, Hassan Kazemi Qurni, in the Iranian Embassy in Baghdad.

Gonzalez Labors in the “Trenches” of Cancer Treatment Research

Medical physics is not a well-known field, but it’s an extremely important one, says medical physicist Albin Gonzalez. As chief medical physicist at the Firelands Cancer Center in Sandusky, Ohio, Gonzalez works with a team that is responsible for patient treatment and safety. Every day, Gonzalez applies his knowledge of physics, biology, medicine, and computer technology to give patients the best possible treatment. “We are actually implementing new technology to do new types of treatments,” he says. “Physicists have been responsible for many of the improvements in cancer treatment, Gonzalez says. For instance, just a few years ago, people who had some types of cancer were treated with large beams of radiation that were too large for their cells. But now, a new type of treatment called intensity modulated radiation therapy allows doctors to shape the beam more precisely, so the patient avoids healthy tissue. “And all this improvement has been done by physicists. Physicians have been the champions of bringing a lot of new technology, says Gonzalez.”

Like many medical physicists, Gonzalez started going to Ground Zero shortly after the September 11 attacks. Originally from Panama, Gonzalez came to the United States to pursue an ad

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Focus on Topic Groups

The topical group on statistical and nonlinear physics (GSNP) brings together people studying widely diverse phenomena, from earthquakes and breaking waves to quantum mechanical entanglement and biological processes. Conventional wisdom holds that physicists are too cerebral, what’s so cerebral about science anyway? says Marchetti. “For a long time physicists have focused on systems at or near thermal equilibrium. Equilibrium statistical mechanics is an old and well developed subject, although many open questions remain, says Marchetti. On the other hand, the majority of phenomena in nature are not in equilibrium, Marchetti points out, “so it is clearly always the case in biology.

The membership of GSNP has grown steadily in recent years. Most of the GSNP activities take place at the March Meeting, where every year GSNP sponsors many Focus Group activities and awards. The group also organise funds in coordination with other units. Although most of the GSNP members attend the March Meeting, there is also significant GSNP representation at the annual DFD November meeting. Each year GSNP recommends three APS Fellows to Council for election. GSNP also sponsors two other activities at the March Meeting. The first is the “Gallery of Images” modelled after a similar exhibition started years ago by DFD. GSNP members are invited to submit a poster or video that provides some striking yet informative display of work in the area of statistical or nonlinear physics. Such images arise from experiments or from numerical studies, and can be strikingly beautiful while carrying critical scientific information. For example, drops splashing on surfaces create fascinating images when caught by a high speed camera. The entries are displayed at the March Meeting, and winning entries are published in the journal Chaos. Examples from recent contests include visual representations of the community structure in the U.S. House of Representatives, the crowd synchrony on the London Millennium Bridge, and the edge of chaos in pipe flow. Starting next year there will also be a cash prize for the winning entry.

The second GSNP-sponsored activity at the March Meeting is an award for the best graduate student talk or poster. Inspired by the Nobel Prize, GSNP members are invited to submit nominations of students for the award, and a number of students are selected to give talks or present posters at the March Meeting, with a cash prize awarded for the best presentation.

As Drew Westen, a well-known author and psychoanalyst, says, “Too cerebral, what’s so cerebral about the human brain?” He didn’t win them for science, he won them by scaring the bejeezus out of his audience,” says Marchetti. “What unifies them are the notions of scale, size nonequilibrium and dynamical behavior and undergo a phase transition. Concerns remain about potential cytotoxicity, but Stoffels’ recently completed in vitro studies on long-term cellular damage were “satisfying,” paving the way for clinical applications such as disinfecting wounds and dental cavities. The chemistry of plasma etching is extremely useful to make MEMs and other micromachined components, but Stoffels’ recent work is important for understanding how reactive plasmas can be used to produce device features with precisely controlled nanoscale dimensions, surprisingly little is known about the interaction of the plasma with the organic molecules arranged in the surface pattern, not to mention the chemical, morphological and topographic changes induced by these interactions. Gotthilf Oeh- relein of the University of Maryland in Deciding the Fate of a Nanostructure, he notes in his recent book, "The political brain – The Role of Emotion in Deciding the Fate of a Nation" (Public Affairs Books, New York, 2007), Republican guru Karl Rove had it figured out perfectly, years ago, well before brain-scan technology gave the principle any scientific gravitas: “It’s no accident that George W. Bush used terrorism as the winning strategy in the 2004 election or that his father used the Willie Horton ad to destroy Michael Dukakis in 1988. Or that two decades earlier, Lyndon Johnson ever so briefly used the granddaddy of fear-mongering negative ads—a mushroom cloud over a field of daisies—to torpedo Barry Goldwa- ter’s White House campaign ship in 1964. The flip-side of fear, love, also works wonders. Bill Clinton “felt everybody’s pain” in 1992 and, despite being tainted by more than whiffs of scandalous sexual adventures and competitive in- 

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“The plasma needle does not cause fatal cell injury and allows for precise and localized cell removal, as well as bacterial disinfection. Stoffels reported that the plasma does not necrose the cells, has clear anti-microbial effects, and stimulates fibroblast cells towards faster attachment and proliferation. Concerns remain about potential cytotoxicity, but Stoffels recently completed in vitro studies on long-term cellular damage were "satisfying," paving the way for clinical applications such as disinfecting wounds and dental cavities.

Pattern Recognition: Deep etching of silicon is used widely to build MEMs and other micro-electronic components, but Remi Dussart of the Universite d’Orleans’ GREMID program is interested in developing the cryoetching process as a faster and cleaner alternative. A major challenge is achieving precise control of the formation of the wafer’s passivation layer. He and his GREMID colleagues have developed an improved cryoetching process using SF6 and O2 as basic gases that form an SiOFx passivation layer in an inductively-coupled plasma (ICP) reactor at very low temperatures. Despite the widespread use of plasma-based etching to produce device features with precisely controlled nanoscale dimensions, surprisingly little is known about the interaction of the plasma with the organic molecules arranged in the surface pattern, not to mention the chemical, morphological and topographic changes induced by these interactions. Gotthilf Oehrelein of the University of Maryland, in his book, Deciding the Fate of a Nanostructure, he notes in his recent book, "The political brain – The Role of Emotion in Deciding the Fate of a Nation" (Public Affairs Books, New York, 2007), Republican guru Karl Rove had it figured out perfectly, years ago, well before brain-scan technology gave the principle any scientific gravitas: “It’s no accident that George W. Bush used terrorism as the winning strategy in the 2004 election or that his father used the Willie Horton ad to destroy Michael Dukakis in 1988. Or that two decades earlier, Lyndon Johnson ever so briefly used the granddaddy of fear-mongering negative ads—a mushroom cloud over a field of daisies—to torpedo Barry Goldwater’s White House campaign ship in 1964. The flip-side of fear, love, also works wonders. Bill Clinton “felt everybody’s pain” in 1992 and, despite being tainted by more than whiffs of scandalous sexual adventures and competitive in-
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of sonic booms. The string theory computations hinge on dynamics of black horizon in a fifth dimension, but Gubser argues that while such horizons “may appear fanciful, they in fact provide very practical and di- rect insights into the dynamical properties of the QGP.”

There are a few string theory predic- tions that are quite close to experi- mentally favored values, although he cautions that there are still significant barriers to making those predictions more concrete.

Elemental Matters. According to NSCL’s Fernando Montes, re- cent observations of the abundances of the light elements and additional mechanism besides the known r-process is responsible for the production of material within a specific region (nucleosynthesis). He finds that mixing the r-process pat- tern found in such stars with a light element primary process (LPP) can account for the observed abundances. He has used the LPP abundance pat- tern based on those observations to explore the astrophysical conditions that would create it.

Why Stars Explode. Physicists continue to explore potential explo- sions of stars. Core-collapse supernovae explosions, an area of research that spans four decades. While much progress has been made in understanding the basic physics and hydrodynamics, there is still no truly satisfactory explanation. Ac- cording to Adam Burrows of the University of Arizona, an acousto- mechanical mechanism and one relying on magnetohydrodynamics are the most promising possibilities.

For instance, over the next de- cade, there will be a number of ex- perimental studies of neutrinos and neutrino-meson symmetries, and nu- clear theory will play a critical role in interpreting those results and their implications for the “New Standard Model” of fundamental interactions. Michael Ramsey-Muñoz of the University of Wisconsin-Madison discussed a few of the biggest chal- lenges for nuclear theory, including neutrino-less double-beta decay, electric dipole moments, and preci- sion measurements of neutrino prop- erties and electroweak processes.

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do more than just academic research, he wanted to directly affect patient care by working in a clinical setting.

Gonzalez has been doing that for several years now, working “in the trenches” he says, at the Firelands Cancer Center in Sandusky, Ohio. He is certified by the American Board of Radiology.

Gonzalez collaborates with a team of radiation oncologists, radiation therapists, and a dosimetrist, who calculates the dose of radiation for each patient. Gonzalez’s job is to ensure the patient is safe in the treatment area. “It’s a wide environment,” he says.

On a typical day, Gonzalez and his coworkers must check patient charts and review treatment plans. Gonzalez must also check the equip- ment. He describes a lot of his work as “quality assurance.” He uses de- tectors to make measurements to check that the machines are deliver- ing the correct dose of radiation. He also has to check several computers that control the treatment and make sure all these computers are working together correctly.

Most of the time, Gonzalez does not work directly with patients, but occasionally he is called upon to talk with them. For instance, some patients receiving some types of ra- diation therapy worry that they are radioactive and ask Gonzalez if they should avoid their family if they go home. Gonzalez explains the physics involved in the treatment, and assures them that from a radiation safety standpoint they are quite safe.

Gonzalez likes the challenge of solving medical problems every day. Sometimes the technology is so new that it’s not known how best to use it. The technology is constantly being improved. Gonzalez has to un- derstand the principles of how the treatments work so he can find the right combination for each patient’s needs. His physics training is “useful.” “I think the most important thing is that as a physician, you have problem-solving skills,” he says. In the clinical set- ting, it’s extremely important that everything work correctly, because people’s lives and health are at stake.

Gonzalez is actually taking care of real people. You cannot put people in danger,” he says.

Gonzalez wishes people knew how much radiation is delivered in a typical treatment session. “It’s a lot more radiation than people think,” he says. But nowhere is it written that ef- fectively taps into the emotions of the American voter. Compet- ence will count heavily, as well, but policy specifics, that have no emotional context, no matter the clarity of the communication, will have little to do with the outcome. Physicians might critique at such a prediction. Good, unbiased sci- ence, after all, must be free from emotional content.

But nowhere is it written that ef- fective communication of science should not tap into the emotion of the listener. In fact, Westen’s studies suggest it must. Whether the audience is policy makers, elected officials, the media, or students in the classroom, establishing an emotional connection is an essential precursor to commu- nicating serious information. Lighting up the amygdala gets the rest of the human brain to pay at- empt.
Boosting America’s Energy Security Requires Multi-Front Effort, New Thinking

by Byron Dorgan

For decades, most Members of Congress deferred the decision making on fuel economy standards to the National Highway Traffic and Safety Administration (NHTSA). Since the mid 1980’s NHTSA has done little to boost fuel efficiency standards, and we’ve made little progress as a result. With all the technological marvels made to passenger vehicles in 25 years–keyless entry, better cup holders, automatic trunk openers–fuel economy has not increased.

Over the past two decades, automakers have made substantial gains with respect to convenience, safety, power, and performance. In the next two decades, we need to focus on incredible innovative efforts on improvements in fuel economy for all vehicles. Congress must now weigh in to take a much more pro-active role in setting fuel economy standards.

Raising the automobile fuel efficiency standard to a fleet average of 35 miles per gallon in the United States by 2020 will, alone, save 2 to 2.5 million barrels of oil per day. Unlike the old CAFE standards, this new system will group vehicles into separate classifications based on their attributes such as by weight, size and other features rather than pitting different vehicles against each other. Also, medium and heavy duty trucks have been brought into the system for the first time.

The Energy Bill requires all cars to achieve a fleet average of 35 miles per gallon by 2020, and 40 miles per gallon by 2025. The Senate Appropriations Committee has provided $2.8 billion for the RFS to increase domestic renewable fuel production, even with our insistence that it not be done in an environmentally sound way, will not be easy. Some in the Senate are working hard to block that effort.

We are working, with the Administration, to develop alternative fuels and use our resources more efficiently. The development of our own resources is not only urgent but long overdue. For that matter, we put gas in a 2007 Ford Fusion the same way that we did in a 1927 Ford. It’s time to think and act differently.

I am proud to say that the Energy and Water Subcommittee, under my chairmanship, has funded the Department of Energy’s energy programs—the programs seek to develop new energy technologies—with $3.7 billion for the coming year. That funding is $536 million above the President’s request. The Senate Appropriations Committee has provided $2.8 billion for the RFS to increase domestic renewable fuel production, even with our insistence that it not be done in an environmentally sound way, will not be easy. Some in the Senate are working hard to block that effort. The need to develop new energy technologies is not only urgent but long overdue.

In short, if we are to strengthen America’s energy security and what it takes to do that could be catastrophic—we must do many things.

We must make better use of our own fossil and renewable energy resources here at home. We must do more to increase our energy efficiency, especially when it comes to automobile fuel economy standards. We must work with our allies to expand and strengthen the diplomatic infrastructure critical to avoiding political disputes that can disrupt energy supplies and in helping to resolve those disputes so they don’t develop into full scale diplomatic alliances.

If we do all this, Americans and our economy will be safer. We can shift our military resources away from protecting the global oil system and begin committing more resources to preserve the Planet Earth for future generations by protecting the environment.

Our energy security problems are urgent and long-standing. We have fought too long, and too often, the same old battles exactly the way we have for the past 30 years will take us no where closer to solutions than in the past. We need to end the senseless war and set to work to make America’s energy future a more secure one.


APS NEWS welcome's and encourages letters and submissions from its members responding to these and other issues. Responses may be sent to: letters@aps.org