Physicists use shock waves extensively in medicine among highlights of 2003 SCCM Conference

The APS Topical Group on Shock Compression of Condensed Matter held its biennial conference in Portland, Oregon, from July 20-25. Topics included the targeting and destruction of cancer cells, needle-free drug delivery, making solid hydrogen, progress toward fusion, and watching the instantaneous freezing of water. Among the plenary speakers was this year’s recipient of the Shock Compression Science Award, Jim Asay (Washington State University), who spoke about how shock waves generate laser surgeries that are more precise than the liquids and solids currently used. The study of shock waves in biology and medicine is an exciting area, according to journalist Richard E. Gregory, who covered the conference for The American Physical Society.

APS Members Choose Bahcall as New Vice President in 2003 Election

APS members have chosen John Bahcall, professor of natural sciences at the Institute for Advanced Study in Princeton, as the next APS vice president in the 2003 general election. He will assume office on January 1, 2004, following the president elect in 2002 and APS president in 2006. The APS president for 2004 will be Helen Quinn (SLAC).

In a written statement, Bahcall noted, “It is a great honor to have been elected as vice president of the APS. Physics departments in improving the science education of future K-12 teachers. The executive officers of APS, AIP and AAPT sent a letter to physics departments in improving the science education of future K-12 teachers. The executive officers of APS, AIP and AAPT sent a letter to physics departments in improving the science education of future K-12 teachers. The executive officers of APS, AIP and AAPT sent a letter to physics departments in improving the science education of future K-12 teachers. The executive officers of APS, AIP and AAPT sent a letter to physics departments in improving the science education of future K-12 teachers.

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A New Medical Tool: Understanding shock waves in biology and medicine is a new challenge and a new opportunity for shock compression science. Biological tissues are fundamentally different and considerably more complicated than the liquids and solids studied by shock compression. Laser surgeries generate shock waves in biology and medicine is a new challenge and a new opportunity for shock compression science. Biological tissues are fundamentally different and considerably more complicated than the liquids and solids studied by shock compression. Laser surgeries generate shock waves in biology and medicine.

Highlight

**Ask The Ethicist:** APS News is inaugurating asking what we hope will be a continuing series of columns addressing ethical issues. Zero Gravity: Wisty Alien is Strung Out.

**The Back Page:** Inquiring Minds Want to Know: Can We Ever Get Workforce Issues Right?

**Highlights**

1. **Zero Gravity:** Wisty Alien is Strung Out.
2. **Ask The Ethicist:** APS News is inaugurating asking what we hope will be a continuing series of columns addressing ethical issues.
3. **The Back Page:** Inquiring Minds Want to Know: Can We Ever Get Workforce Issues Right?

**Automatic Visa Revalidation Solves Most March Meeting Visa Problems**

Although it was initially thought that people with F-1 or J-1 visas might run into trouble in reentering the U.S. after attending the APS March meeting in Montreal, it turns out that students, postdocs and visitors from all but a few countries can make use of the automatic visa revalidation program, which will eliminate potential difficulties. Details can be found on the March meeting web page at: http://www.aps.org/meet/MAR04/visa/index.html.

**Physics Departments Endorse Statement on Education of Teachers**

Approximately 250 U.S. physics departments have endorsed a joint APS/AIP/AAPT statement that calls for the active involvement of physics departments in improving the science education of future K-12 teachers.
The University of Arizona's biggest strength is the involvement of women and underrepresented students who want to be in front line research in physics.

- J. Garcia, University of Arizona, on the lack of diversity in physics programs. Arizona Daily Star, September 23, 2003

That would be the same as if you can do with wood is burn it for energy. It's remarkably crude. Having a more sophisticated understanding of the nucleus, well be able to do more sophisticated things with it.

- Lawrence Nordin, Department of Physics, University of Leipzig, and when he accepted a research post at the University of Göttingen after graduation. Hitler's rise to power prompted him to emigrate first to Denmark in 1934, where he worked with Niels Bohr and then to George Washington University in the US in 1935.

While his prior research had been in quantum mechanics, at GWU he began a productive collaboration with Russian émigré George Gamow in nuclear physics. They formulated the so-called Gamow-Teller rules for calculating subatomic particle behavior in radioactive decay, and attempted to apply the new understanding of atomic phenomena to astrophysics.

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Phys Rev Focus Fans Include Teachers and Undergrads
By Pamela Zerbinos

In March of 1998, APS launched a website called Physical Review Focus, to provide communication between physicists of different disciplines and increasing their awareness of research outside their specific field. Although it still serves this function as its primary goal, its scope has broadened significantly to encompass the education of undergraduates and even high-school students. The website, which is updated once or twice a week, explains in simple language selected research articles recently published in APS journals Physical Review and Physical Review Letters. The papers appearing on the site are usually chosen for their educational value or interest to nonspecialists, rather than simply for their scientific merit. Although recent statistics are not available, the accompanying e-mail list, which informs readers of the latest Focus stories, currently has around 7,600 subscribers from over 70 countries. "We have received e-mails from often don't follow closely what's going on outside their chosen field," said Ehrenstein, who majored in physics at Oberlin College before going on to get his PhD. "These people who are interested in current physics research, but they can't read the journals. There's not much out there for them. They can read something like Discover Magazine, but they often want more in-depth information.

Ehrenstein's experience is echoed by physics educators from around the globe, who have turned to Focus to help fill the gap. Pete Markowitz, who teaches physics at Florida International University, uses the material in his modern physics course, where "the students got interested in the topic, and they have a curiosity about what is happening in 'their' field. Modern physics, especially the lab, is the first chance the students get to explore what physics is currently about. I find Physical Review Focus to be a tremendous resource for current research and is in a simple format suitable for many interested readers."

Focus' emphasis on current research is quite important to many of its readers. Physics students from schools as varied as Carleton College and the School of the Art Institute of Chicago (SAIC) have professors who use Focus articles to keep them abreast of current research. SAIC students enrolled in Elizabeth Freeland's modern physics course, for example, are required to read reports on Focus articles and are encouraged to check out the Focus archives for a final report topic. Other physics educators use the site in slightly different ways. Like Freeland, Nelson Vanegas, at the Universidad de Antioquia in Medellin, Colombia, asks his introductory students to summarize Focus articles and present them to class. See Focus on page 4.

Simple Physics Can Be Useful in Understanding Real-World Issues
By Susan Ginsberg

David Hafemeister, author of numerous books on science policy topics and professor emeritus of physics and electrical engineering at Medellin, Colombia, asks his introductory students to summarize Focus articles and present them to class. See Focus on page 4.

David Hafemeister, author of numerous books on science policy topics and professor emeritus of physics and electrical engineering at California Polytechnic State University, is currently in the middle of a series of seminars at physics departments showing students that one can apply physics to real-world issues. He does this by simplifying the math, making assumptions, and doing quick and dirty calculations. His talk, as Hafemeister freely admits, "are full of 'spherical cows' to deal with issues like climate change. As part of this series, the Physics Department and the Security and International Studies Program at The George Washington University teamed up to host a colloquium by Hafemeister in early September on the APS Boost Phase Intercept Study.

At the September 4 colloquium and the associated seminar, Hafemeister used the historical context of defensive missile systems beginning with Lyndon Johnson's negotiated defensive systems, through Ronald Reagan's Star Wars program, to the current situation which prompted the APS study on Boost Phase Intercept Study.

Hafemeister took the colloquium audience through the calculations to determine the effectiveness of three systems discussed in the APS study: airborne lasers and ground- and space-based interceptors. In discussing the airborne laser, Hafemeister pointed out the issue of overcoming turbulence as well as the uncertainty in the effects of shock and ablation on the target. "It's a hard physics problem," said Hafemeister after calculating to first order what the energy on the target would be coming from an airborne laser carried by a Boeing 747. "My guess is even the Pentagon doesn't know all the answers. I hope the DOD's Defense Science Board is asking hard questions."

With space-based interceptors some of the policy decisions are a simple matter of understanding basic physics, says Hafemeister. To intercept missiles from anywhere on the globe, you need either a lot of lighter interceptors, or fewer heavy ones.

Hafemeister easily illustrated the trade-off between weight and number of interceptors using a chart from the APS study and some simple physics equations. The last system Hafemeister described was the ground-based interceptor. Although judgment calls are needed as to whether a particular interceptor was feasible, Hafemeister insists that GBIs can be understood using "Newton's laws and reasonable parameters."

Hafemeister's goal is to show the "system of decision" that is used by politicians, and how much of this system is basic physics in science policy questions. Hafemeister ended his talk with an appeal to cooperative diplomacy. "You and I sitting in a bar over a napkin can get around any weapons system. We really need to do is get people to talk to each other and be friends." Asked by a member of the audience whether this was a reference to getting physicists and engineers to work together, Hafemeister answered, "No, I meant getting nations to talk to each other, diplomatically. It's a political science concept."

When you get involved in explaining science to the public, something can happen to you to compel you to explain the close mindedness of the scientific community.

Often, they will spin a story that goes like this: there was once an isolated, ignorant genius who worked out the truth about a particular scientific problem. Ignored by the scientific establishment, this individual nevertheless persevered, and long after his death his true genius was finally recognized. The usual people cited are Galileo Galilei, the author of the theory of continental drift, and the usual purpose of the story is to invite a comparison between the way his views were treated and the trouble the storyteller is having getting science accepted.

The story of Alfred Wegener is less familiar to most people, but it has been good reasons for scientists in the 17th century to reject Galileo’s arguments. Most of his book Dialogue Concerning Two World Systems was taken up by an argument for heliocentrism based on a common incorrect theory of tides.

The story of Alfred Wegener is less familiar to most people, although the “sound bite” folklore about him is that he forced the motion of continets early in the 20th century and was ignored, even though he ultimately turned out to be right.

In fact, Alfred Wegener was not only a respected member of the German scientific establishment, he was one of its leaders.

Wegener was the director of one of the country’s major research institutions. The only reason Wegener enters the mythology of science is the fact that in 1913 he published a book called The Origin of Continents, in which he suggested that at some time in the past all the land on Earth had been clumped together into one giant supercontinent, which he called Pangaea (“All Land”), and that the continents had moved (“drifted”) to their present positions since then. This is the celebrated theory of Continental Drift.

The book was hardly ignored; it was debated widely in Germany. In general, hard rock geologists opposed it and theoretical geophysicists supported it. There were two main arguments against his thesis: one centered on the fact that no one could think of a mechanism that could move the continents, while the other concerned the question of whether the data supported Wegener.

Wegener advanced five pieces of evidence that supported his thesis of continental motion.

These were (1) the fact that the coastlines of Europe and Africa, America and Antarctica fit together like a jigsaw puzzle, (2) the fact that some geological formations (mainly in America) seemed to continue across into the American continents, (3) the fact that some fossil species seemed to be found in corresponding places on both sides of the Atlantic, (4) the fact that the location of glacial moraines seemed to indicate that continents once had a different relation to the poles than they do now, and (5) the fact that two different geographic determinations of the distance between Greenland and Europe indicated that the distance was increasing.

Hard rock geologists argued that in many cases Wegener had simply gotten the rock identification wrong—that what he called glacial moraines were nothing of the kind, for example. They also pointed out that the facts that two minerals are identical doesn’t mean they were made in the same place and that, given the enormous number of geological formations in Europe and North America, it was not surprising that a few would match up.

One aspect of Wegener’s argument could be incorporated easily into the Fixed Earth theories of the 19th century, namely that coral polyps on the coral atolls that could sink beneath the ocean, so the fossil evidence could be easily explained. But he also showed the possibility that during an earlier stage, continents could indeed have moved on a molten planet. Thus, the jigsaw puzzle fit evidence on the map didn’t help to imply that the continents were still moving.

Finally, the geological evidence was such that the error in the two measurements was larger than the claimed difference, a fact which weakened the Greeneland argument considerably.

In the end, then, scientists of the 1930s and 40s were quite right to reject continental drift. So what happened since then to change our view of the Earth? In a word, data, starting in the mid 1960s, data supporting the notion of continental motion started to come in. Starting with the measurements of paleomagnetics and further work, a picture of a dynamic, active Earth emerged. Confronted with overwhelming data, the scientific community gave up its fixed Earth paradigm and adopted the now one in less than five years.

The theory that emerged was not Wegener’s continental drift, even though it incorporated the notion that continents move. Wegener’s theory contained features, such as the notion that the average elevation of the continents would increase over time, that simply aren’t true. And plate tectonics supplies a mechanics for moving the continents (involving convection in the Earth’s mantle), something that was conspicuously missing from continental drift.

The main lesson to be learned from Wegener’s story, then, is exactly the opposite of the one the spinners of mythology want to advance. The scientific community is fully capable of abandoning a lifetimes worth of belief and adopting a new outlook provided there is enough data to justify the change. The scientific community, and the man who developed the idea of a moving Earth was Wegener’s, is a picture of a dynamic, active Earth emerged. Confronted with overwhelming data, the scientific community gave up its fixed Earth paradigm and adopted the new one in less than five years.

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Six physicists are being honored with APS prizes and awards at unit meetings this fall. The 2003 James Clerk Maxwell Prize, Excellence in Plasma Physics Award, and Outstanding Doctoral Thesis Award in Plasma Physics were bestowed during the 2003 APS Division of Plasma Physics meeting in Albuquerque, New Mexico.

And the 2003 Fluid Dynamics Prize, Otto Laporte Award, and Innovative Dissemination of Fluid Dynamics Dissertation Award will be presented during the upcoming meeting of the Division of Fluid Dynamics, November 23-25, in Meadowlands, New Jersey.

2003 James Clerk Maxwell Prize
Eugene N. Parker
University of Chicago

Citation: For seminal contributions in plasma astrophysics, including predicting the solar wind, explaining the solar-dynamo, formulating the solar plasma-galactic connection, and the instability which predicts the escape of the magnetic fields from the galaxy.

Parker received a BS in physics from Michigan State University in 1948 and a PhD in physics from the California Institute of Technology in 1951. He was an instructor at the Department of Mathematics at the University of Utah 1951-1953 and then a research associate in the Department of Physics.

Parker moved to the University of Chicago in June 1955. He retired from the University of Chicago in 1995.

Parker was elected to the National Academy of Sciences in 1967. Parker has received various scientific awards over the years including the National Medal of Science in 1989, and various scientific awards over the years including the National Medal of Science in 1989, and various scientific awards over the years including the National Medal of Science in 1989, and various scientific awards over the years including the National Medal of Science in 1989, and various scientific awards over the years including the National Medal of Science in 1989, and various scientific awards over the years including the National Medal of Science in 1989, and various scientific awards over the years including the National Medal of Science in 1989, and various scientific awards over the years including the National Medal of Science in 1989, and various scientific awards over the years including the National Medal of Science in 1989, and various scientific awards over the years including the National Medal of Science in 1989.

2003 Excellence in Plasma Physics Research Award
Sieghard Glenser
Lawrence Berkeley National Laboratory

Citation: For elegant diagnostics using collective Thomson scattering together with x-ray spectroscopy which greatly advanced the understanding of the complex plasma environment in laser driven hohlraums used in inertial confinement fusion.

Glenser earned his undergraduate degree in 1990 and his PhD in 1994 in plasma physics at the National University of Oldenburg in Germany. He came to the US in 1995 as a postdoctoral fellow at Lawrence Livermore National Laboratory, where he is currently head of the Plasma Physics Group in the National Ignition Facility program, performing the first experiments on the NIF laser.

His research interests are in the areas of inertial fusion, plasma spectroscopy, and laser plasma interactions. He also first introduced Thompson scattering experiments to the area and has developed a technique to study atomic kinetics and plasma waves in high temperature and high density plasmas.

2003 Outstanding Doctoral Thesis Award in Plasma Physics
Alex Arefiev
University of Texas at Austin

Citation: For first principles theoretical analysis of a plasma thruster that models the helicon plasma source, single-pass radio frequency heating, and particle and momentum balance.

Arefiev received his BS in physics from Novosibirsk State University (Russia) in 1998. As an undergraduate student, he worked at the Budker Institute of Nuclear Physics (Novosibirsk, Russia). His undergraduate research was focused on the physics of single species plasma. In 1999, he entered the graduate program in plasma physics at the University of Texas at Austin.

His graduate work was supported by the Marshall fellowship and the National Science Foundation Graduate Research Fellowship. His areas of interest include helicon plasma sources, ion cyclotron heating, and laser-target interaction.

2003 Fluid Dynamics Prize
Jerry Gollub
Cornell College and University of Pennsylvania

Citation: For his elucidation of chaos, instabilities, mixing and pattern formation in various contexts including fluid convection, and his contributions to our understanding of surface waves, film and granular flows, through his clever experiments, lucid papers and lively lectures.

Gollub received his AB from Oberlin College in 1966, and his PhD in experimental condensed matter physics at Harvard University in 1971. He has been on the faculty of Harvard College since 1970, and is also affiliated with the Levermore Center forKinetics and Fluid Dynamics.

He has undertaken a wide range of experiments on nonlinear and fluid dynamics, including studies of interfaces and instabilities, experiments in fluids, chaotic dynamics and turbulence, nonlinear waves, mixing of granular materials. He has authored or coauthored an undergraduate textbook on nonlinear dynamics, and teaches physics courses for first year students.

Gollub received the first APS Award for Research in an Undergraduate Program. His co-chaired a study of advanced high mathematics and science for the National Research Council, and has served on the APS Executive Committee.

2003 Otto Laporte Award
Norman J. Zabusky
Rutgers University

Citation: For pioneering and enduring contributions in nonlinear and vortex physics and computational fluid dynamics, including the soliton; contour dynamics and V-states for 2D flows; vortex projectors for accelerated inhomogeneous flows and viscosimetrics for reduced modeling.

Zabusky received his PhD in physics from the California Institute of Technology in 1959. A former Guggenheim Fellow, he spent five years at the University of Wisconsin-Madison, eventually heading the Computational Physics Research Department, before joining the faculty of the University of Pittsburgh as a professor of mathematics.

In 1988 he moved to Rutgers University as a State of New Jersey Professor of Computational Fluid Dynamics.

Zabusky is an advocate of the "viscosimetric" process which can enhance productivity for scientists and engineers who visualize, diagnose and quantify databases and engineers who visualize, diagnose and quantify databases from large scale simulations. He also helps to establish the science and the art of fluid motion for artistic innovation and collaboration, and for science and engineering outreach.

2003 Andreas Aronovitz Innovation Award
Profenji Rajbagch
University of Illinois, Urbana-Champaign

Citation: For his careful and extensive numerical experiments elucidating the fundamental mechanisms governing the motion of a spherical particle subject to complex unstably and inhomogeneous flows at moderate to high Reynolds number.

Biographical information available at prize time.

NRC committee requests input from High Magnetic Field Science community

A new National Academies committee is requesting input on the current state, research needs and the future of high magnetic field science. The Committee on Opportunities in High Magnetic Field Science (COHMAG) will produce reports on the facilities for experiments in high magnetic fields (above 12T), the current state and scientific opportunities of the discipline that cannot field magnets, and the prospects for advances in related technologies. COHMAG invites comments on the following: how have the facilities in high magnetic field science changed? What impact on research direction? How have the facilities in high magnetic field science changed? What impact on research direction? How have the facilities in high magnetic field science changed? What impact on research direction? How have the facilities in high magnetic field science changed? What impact on research direction?

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Comments should be sent to cohmag@nas.edu.

When I finally got to the office and approached my employer Mr. Muchnick to explain the delay, my manager pressed the button to call him, which he took as a sign of insubordination. There was some rather bitter talk of docking my pay, which when measured against the speed of light, is very small anyhow. The truth is, that compared to the amount of atoms in the Andromeda Galaxy I actually earn quite little. I tried to tell this to Mr. Muchnick, who said I was not taking into account that time and space are the same. He swore that if the situation should change he would give me a raise. I pointed out that since time and space are the same, and it takes three hours to do something that turns out to be less than six inches long, it can't sell for more than five dollars. The one good thing about time is that if you travel to the outer reaches of the universe and come back, by the time you're 100 years older, your friends will be dead and you will come back, but you won't be able to change.

By Woody Allen

I am greatly relieved that the universe is finally soluble. I was beginning to think it was. As it turns out, physics, like aging relatively, is an illusion. The size of the universe is not a finite number that you could ever reach. After all, if you travel to the outer reaches of the universe and come back, by the time you're 100 years older, your friends will be dead and you will come back, but you won't be able to change.

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first APS meeting in the winter of 1970, which stimulated the con- cept for one of his first research endeavors. His involvement in the APS president because “through- out my career as a physicist, I have been involved in various activities and I would enjoy giving something back to the Society.” Along with continued outreach activities in COBE, he notes that the APS include communicating the importance of maintaining the science community and the White House. “The future of our nation depends upon a strong technological base that can only be sustained with federal support for the physical sciences,” he wrote.

No stranger to Washington, DC, Bahcall lobbied in the 1970s to per- suade Congress to reverse then-President Nixon’s decision to reduce budget hearings. “The scientific community had the tele- scope from the federal budget. He continued to be involved as a Wash- ington advocate for other scientific projects. The APS, like many members need to work together to promote science funding at national and state levels, with those in academia, private industry, and the government.”

Over the course of the day, the APS staff and members are now at the forefront of the discussion. “To reverse the tragic and dangerous decline of physics research funding,” he wrote.

Buckbaum is an experimental physicist who earned his BS from Harvard University in 1975 and his MS and PhD from the Uni- versity of California, Berkeley. After a year at Lawrence Berkeley National Lab, he joined the research staff at Lawrence Livermore National Laboratory, a postdoc in 1981, then became a member of the technical staff. He remained there until moving to the University of Michigan as a profes- sor of physics in 1990, where he is currently the Otto LoPresto Col- lege of Engineering Distinguished Director of the NSF Center for Fron- tiers in Optical Coherence and Ultrashort Pulsed Lasers. His recent research interests are quantum control of optical molecules using ultrafast laser pulses. He is particularly interested in the control of wave packets in atoms and molecules using ultrafast, visible, or x-ray pulses. He has served on both the APS Council and Executive Boards and is cur- rent editor of the Physical Review’s Virtual Journal of Ultrashort Science, as well as divisional associate editor for laser science for Physical Review Letters.

In his candidate’s statement, Buckbaum cited changes in the US technological, educational, and research infrastructure as some of the challenges in health, security, and the national economy, as evidence of the need for strong scientific advocacy in Washington. As Con- gress continues to debate immigration and international con- tact, Buckbaum’s role as director of the federal funding for basic physics research, and national testing in public schools, among other issues, the APS has an important role to play and is able to articulate the vision and promote the diverse opportunities that physics offers,” he wrote.

He received a BS in physics from Barnard College in 1969 and her MS and PhD from Columbia University in 1971 and 1975, respectively. She worked at AT&T Bell Laboratories and joined the University of California, Santa Barbara, as professor of physics and director of a computing facility. Since 1987 she has held a joint appointment in the materials department. She is currently the Scientific Director of the newly formed California NanoSystems Institute (CNSI), a collaboration between the University of California and the State of California as one of four California Institutes for Science and Innovation. He has served in several capacities and Charles has control of wave packets in atoms ultrafast and strong optical fields. is quantum control of atomic and molecules, colossal magnetoresis- tance, dimensionality, magnetism, heavy interest in experimental con- tinent, turn my back to the already

His current research interests include quantum control of optical molecules using ultrafast laser pulses. He is particularly interested in the control of wave packets in atoms and molecules using ultrafast, visible, or x-ray pulses. He has served on both the APS Council and Executive Boards and is cur- rent editor of the Physical Review’s Virtual Journal of Ultrashort Science, as well as divisional associate editor for laser science for Physical Review Letters.

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Chair of the BES Workshop. "A lot of us, and not just the students, believe that the field of hydrogen research is changing as we speak. Additional- ly, I have used these articles to engender in high school students the confidence that—on their own, with no help from me—they can actually read and understand what's happening in the physics community." Mary Brake, who teaches at Mercy High School in Farmington, Michigan, says she uses focus articles to keep ahead of her students, who can bring in physics articles for extra credit and explain to the class what the article is about. "They often bring in articles about the latest findings in physics," Brake said, and "the reason I know this is because they usually just read PRF. I have found that they do not usually understand the articles and I end up trying to explain the new discoveries. I am glad they are interested, but I wish they bring in articles they could explain without my help. They are keeping themselves and one step ahead of my students." Physical Review Focus is available online. To be added to the e-mail list, send a blank e-mail message to joinfocus@aps.org.

Zero Gravity from page 5

Fantasized that I could only get her into a particle accelerator for five minutes with a bottle of Château Lafite T to stand next to her, with our quanta approximating the speed of light and her nucleus colliding with mine. Of course, exactly at this moment I got a piece of antivirus in my eye and had to find a Q-tip to remove it. I achieved some kind of fission, turned toward me and spoke. "My pleasure," she said, "smiling coquettishly and curling up into a Calabi-Yau shape. I could feel my coupling constant invade her weak field as I pressed my lips into her weak field as I pressed my lips into the softer sex, apparently I achieved some kind of fusion, because the next thing I knew I was picking myself up off the floor with a mouse on my eye."

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The Back Page

Oversupply, Undersupply: Can We Ever Get Workforce Issues Right?

By Merrilee J. Mayo

There are two strident voices in the workforce debate. The first claims we don’t have nearly enough scientists and engineers. The second (usually articulated by jobless scientists and engineers) claims we already have too many. Last year a Wall Street Journal editorial on workforce development quoted the President of the National Academy of Engineering in support of its arguments. Boy, did the NAE President hear from the holders of the second view—in spades.

How can both sides be right?

In my opinion, the answer is relatively simple. We have a vibrant, well-tested system for producing scientists and engineers in this country. It is called federal R&D funding.

As Figure 1 shows, there is an extremely strong correlation between R&D funding and the government issues every year, and the number of undergraduate students produced—at least in the physical science, math, and engineering disciplines.

A more eloquent economic framework by Goldman and Mvasi makes the same case for us. Students at the PhD level. The problem, as it were, stems from the fact that federal R&D funding—which sets domestic student supply—operates completely independently of any indicator or driver of “demand.” It is difficult to find any economic indicator—or we tried several—that correlates with all output at student degree of any kind of stoofility.

Consequently, if we get undersupply. But we rarely get oversupply. Sometimes we have been devised by the grant-winning professor. The supplies, professorial salary, and other grants. They take and the projects are progress, rather than their professors. The second part, containing all of the grant-winning professor. The education treatments per career are established for them (or for the folks already there). The quality of its innovation. Maybe we have to replace the advisory board with the grant-winning professor. The economic independence to the future of its people, and the country at large.

The second part, containing all of the advisory board. Even if a student has a way to become a professor, the field. The committee is likely to result in a job.

Though some complain that these standards are in fact no standards at all, they do provide the flexibility for an enterprising education treatments per career are established for them (or for the folks already there). The quality of its innovation. Maybe we have to replace the advisory board with the grant-winning professor. The economic independence to the future of its people, and the country at large.

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