

New England Section Newsletter

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**2003 Spring Meeting of the New England Sections of the
American Physical Society and the American Association of
Physics Teachers
Williams College, Williamstown, Massachusetts, April 11 and
12, 2003**

The Spring 2003 Joint Meeting of the New England Sections of the American Physical Society (NES/APS) and the American Association of Physics Teachers (NES/AAPT) will be held at Williams College on Friday and Saturday, April 11 and 12, 2003. Themes are Quantum Mechanics, Ultrafast Pulses Beyond the Visible Spectrum, and Teaching Physics. The Williams contact persons are Kevin Jones, Tiku Majumder and Jefferson Strait. The website for the meeting is www.williams.edu/Physics/aps/index.cfm. Contributed talks and posters are welcome (students, please take note), particularly on the themes named above. Student expenses will be reimbursed up to \$100 by the Section. APS abstract deadline is March 14.

Friday, April 11

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|----------------|--|
| 1:00 - 5:30 pm | Registration, Science Court, Eco-Cafe provides coffee and snacks.
Joint invited talks on Quantum Mechanics, Wege Auditorium |
| 2:30 pm | Bill Wootters, Williams College, quantum computing |
| 3:30 pm | David Branning, University of Illinois, experimental tests of quantum mechanics |

- 4:30 pm David Mermin, Cornell University, from Cbits to Qbits: teaching quantum mechanics to computer scientists
- 2:30 - 4:30 pm AAPT Workshop Session A
- 6:00 pm Reception and joint poster session, Williams Inn. Poster session in lobby/tavern area. Tripods will be provided for you. Posters must be self-supporting.
- 7:00 pm Dinner at the Williams Inn
- 8:00 pm After dinner talk by Richard Wilson, Harvard University, risk analysis and public policy
- 9:00 pm After hours event for students

Saturday, April 12

- 8:00 - 11:00 am Registration, Science Court
- 8:00 - 9:00 am Pastries and coffee in Science Court
- 8:00 - 9:00 am Contributed talks, APS and AAPT in parallel sessions, various locations
APS invited talks on Ultrafast Pulses Beyond the Visible Spectrum, Wege Auditorium
- 9:00 am Xi-Cheng Zhang, Rensselaer (RPI), terahertz wave sensing and imaging
- 10:00 am Philip Bucksbaum, University of Michigan, ultrashort xray pulses
AAPT invited talk on Teaching Physics
- 10:00 am Stuart Crampton, Williams College, teaching advanced physics to nonmajors using interactive computer movies
Joint invited talk on Teaching Physics, Wege Auditorium
- 11:00 am John Hubisz, North Carolina State U, my adventures reviewing the physical science in the most popular physical science texts in U. S. middle schools
- Noon on Lunch Executive Committee meets, AAPT Demos and Workshops B and C, end.

Fall 2002 Joint Meeting at Bridgewater State College, October 25 to

This is a summary of the ebullient description submitted by Ed Deveney on behalf of the terrifically hardworking team at Bridgewater.

The joint fall meeting of the New England APS and AAPT demonstrated unequivocally that astrophysicists, astronomers, atomic and molecular physicists, and physics teachers are not at all fermion-like and happily share the same place at the same time in large numbers. Bose-Einstein statistics was the rule for the weekend, as exploring the physics of the big and small united the "big" of star formation and solar variability with the "small" of the electron's electric dipole moment. Pluto was deemed too small to be considered a planet, and a recently created BEC at a small college looked very big compared to the usual quantum objects.

Dr. Alyssa Goodman of Harvard dynamically presented "A dynamic view of star formation" with a review of older theories and a description of current techniques and theories in the field. Dr. David Hall of Amherst announced the achievement of what may be the first BEC at a small college. David foresees the day when microchip-based BECs will be commonplace at institutions like his for studies of more intriguing quantum phenomena.

Dr. Neil deGrasse Tyson delivered a humorous and spirited banquet talk Friday night starting with the recent controversy appearing in the New York Times about the status of Pluto in the Solar System. The Times seems to be hung up in third grade when everything the teacher told us about heaven and earth was true. But a better categorization sees four small inner planets, four large outer planets, and separately other orbiting objects, including asteroids, bound comets, faithful Pluto, and perhaps more distant Pluto-like things. Dr. Tyson showed admirable team spirit that afternoon by "saving the day" with almost no warning, as he spoke on the future of aerospace in the United States when an invited speaker did not arrive. Classes would enjoy a field trip to the Hayden Planetarium at the Rose Center for Earth and Space Science in New York, where Dr. Tyson serves as Director.

Saturday morning Dr. Willie Soon of the Harvard Smithsonian Center for Astrophysics told us about "Solar variability and climate change: the quest for physical mechanisms." Earth's climate is affected in multiple ways by the Sun's emissions and by other influences, such as galactic charged particles. Proving that you don't need a big accelerator to do big-time physics, Dr. David DeMille of Yale discussed his breakthrough experiment on the electric dipole moment of the electron, probing the high-energy incredibly small on a table-top and perhaps providing the first glimpse of physics beyond the Standard Model.

The busy Saturday afternoon schedule included a new teachers panel

discussion, a favorite labs and demos session, and several well-attended workshops. During Saturday's banquet Dr. Richard Christman, recently retired from the United States Coast Guard Academy, was named the winner of the Janet Guernsey Award by the executive board, former JGA awardees, and members-at-large of the Section.

Dr. Paul Hewitt gave a passionate Saturday night banquet talk on why we should be teaching physics first, before the other sciences that use physics for understanding, in high school. Paul made clear that physics is not for a select few but should be experienced by all students.

The physics of the big and small continued into Sunday with AAPT workshops. Some very dedicated teachers stuck with it to the very sweet, not at all bitter, end.

PHYSICS ON THE SUBWAY

At the previous fall section meeting Paul Hewitt described his campaign to have physics in high school be provided for all students. Robert Romer sent me the following information, which summarizes the start of a campaign to provide physics puzzles for all bus and subway users. Bob's email address is rhromer@amherst.edu and the website of this project is www.amherst.edu/?physicsganda . This website features placards that can be reprinted.

Bob's email said the bus placards are UP, ON the buses. Although he is the one carrying the ball, it was John King of MIT who handed the ball off to him, like the quarterback to the running back. Bob has been grinding out the yardage. It is about a year since he decided to take it on and at least six months since wording of questions was settled. Details of cardboard size and thickness, plus other non-physics matters, took more time and money than could have been imagined. (But see the editorial warning of several years ago called "don't forget to multiply by pi" when you guesstimate how long something will take when other people and their considerations are involved.) An older and similar idea came from physicists in the UK who tried to carry it out on the London underground.

A story on "Physics on the Subway" in the Daily Hampshire Gazette, a local Northampton paper, was printed on January 7 and also posted on their website. Since this story appeared, Bob has received inquiries from a variety of sources and is enjoying what he and Andy Warhol term "fifteen minutes of fame." If this initial project is successful, Bob hopes

to expand it and that will require outside funding. Amherst College and Five Colleges Inc. have helped with funding but Bob's own pocket has provided money for art and printing. Certainly people are riding the buses and appear to be awake but the best evidence for impact is the growing number of hits on the website.

The following description is taken from the web version of the Gazette's story, **PLACARDS POSE PHYSICS PROBLEMS**, by staff writer Kay Moran. Some guys are sitting in a boat on a lake (she begins). They throw an anchor overboard. Does the level of the lake rise, fall, or stay the same? Illustrated in cartoon format, this physics question now appears on placards inside PVTA buses operated in the Amherst area by UMass Transit. The placards, six in all with different questions, are the brain-children of Robert Romer, a retired Amherst physics professor. The artist is Bruce Aller of Upton, formerly of Amherst. (Note that she credits Bob while he is careful to share the glory with John King. Longtime teachers are very respectful of partial credit.)

"All my life I have been trying to get people of various ages to think about physics and to enjoy doing so, so this is just a continuation of that mission," Romer said. There is an experiment you can try at home to find the answer to the anchor question. That's posted on a separate website. (I hope our students think of a floating plastic container holding a little lead ball in a water-filled tub without needing to consult additional websites.)

UMass Transit is donating space for the placards instead of charging advertizing rates. "I think it's great," said Allan Byam, UMass Transit manager. "I'm very interested to see how many hits his website gets. It's nice to have some positive stuff up on the bus, instead of just (the usual signs) 'Don't eat on the bus' and 'Report hate crimes' and such." Romer and King have the ambitious plan to put physics question placards on playgrounds, matchbook covers and other places where they will be seen by a lot of people. The two are retired and of course are as busy as ever. (UConn has poetry on campus buses. I contributed a poem but it had the defects of rhyme, rhythm and ease of understanding. I haven't seen it since. Editor)

QUANTUM SIGHTINGS IN NON-QUANTUM SITUATIONS

Literary people are very fond of quantum concepts. They are very suggestive to the imagination and instill richness, mystery and humor in many cases. Of course they may be overdone or inapt, but you and I can decide on that. The literary work may be a gem regardless. We can

decide that too.

My kids give me thought-provoking wonderfully written books. So last year I read Schrodinger's Baby, the first novel by H. R. McGregor. Born in Uganda, she lives on a houseboat in Oxford, England, and teaches at the National Film and Television School. The characters share a student house in Glasgow, Scotland. I don't know who your roommates were in college, but these troubled young people are the scariest since Jennifer Jason Leigh terrorized Bridget Fonda in Single White Female, the movie of the novel SWF Seeks Same.

One housemate finds a corpse under the staircase but does not report it. Instead she goes out and returns to see that the corpse has disappeared. Most of life's ambiguities are not this stark but they often prey on your mind until you are half-convinced you did not see a corpse, or have some other experience that seemed real, at all. Polar opposites can coexist, especially in a mental landscape, but an outcome is generally decided one way.

Another housemate is pregnant, maybe, the reason for the book's title. We're not sure and then we suspect she's not sure. She has had opportunity or else she would be negatively sure. There are a male roommate and a number of guests who stick around for days and nights in a daze or a haze. They indulge in sex games, S & M sessions, suicidal impulses, and other behaviors associated more with biology and abnormal (or am I hopelessly oldfashioned?) psychology than physics. As many authors have cautioned us, ambiguity and weirdness are true of the classical, and not just of the quantum, world. Unless the corpse and the pregnancy have an entangled state, strangeness of the students is not a quantum number.

Now we come to the book's jacket, or we could have come there first. It concludes: "Told with the intensity that London's Daily Telegraph called 'frighteningly confident,' Schrodinger's Baby is a smart dark ride through the lives of three students whose sense of morality is no more real than a physics equation and whose complex ties to one another may cost them everything." Well excu-u-use me. There is nothing more real than a physics equation. It is almost the only thing real, in the sense of a glimpse into an enduring truth. It represents the reality Plato imagined to be casting the shadows forming experiences and observations on the cave wall. This criticism is not of the book's author, nor does it detract from the shivery power of the novel. I would run to see the movie if one were made.

There's no morbidity associated with this next citation, from The Atlantic Monthly of December, 2002. The last page is, as usual, the column Word Fugitives by Barbara Wallraff and is devoted to requesting and locating elusive existing words or suggesting new words to fill gaps. Previously words were sought for several human relationships. As mother or father is a parent and sister or brother is a sibling, is there one word for niece or nephew and one word for aunt or uncle? Various suggestions appear, including these from Susan Hodge, who teaches genetic counseling: nibling for niece or nephew and auncle for aunt or uncle. "Interestingly, (she writes) there is now a Heisenberg effect in

play. Several of my respondents wrote back, 'Gee, Sue, I've never heard that word before, and I think I'll start using it.'" Thus measuring usage causes usage, which I guess would give Heisenberg a kick. Wallraff: "...for rigor, diligence, and influence on the real world, Hodge takes top honors here."

Laura Lippman is an Edgar Award-winning author of finely crafted mysteries. The city of In A Strange City is twofold: It is Baltimore where lies the gravesite of Edgar Allan Poe. It is also from Poe's The City In The Sea in the line "Death has reared himself a throne in a strange city..." Here is a provocative quote, presumably from Poe, in the novel:

There are some qualities--some incorporate things,
That have a double life, which thus is made
A type of that twin entity which springs
From matter and light, evinced in solid and shade.

That is a staggering depiction of duality of matter and energy and of particle and wave. If it is Poe, he preceded Bohr by a good half-century. If it is Lippman, she is some poet.

Giving way to her dual awe of the human heart and modern physics, she writes about her character Kitty and a man others think not good enough for her: "She loved him, and Tess had decided she would master string theory before she deconstructed this particular puzzle of the universe." As I always say about something I find hopeless to understand, it's inexplicable, like love. Why is the foundation of the world (allegedly) strings? I don't know but I do have an inkling of why a man and a woman sometimes feel like getting together. Answers upon request.

Laura Lippman's detective is Tess Monaghan. She is one of a large number of very tough women, descendants of Philip Marlowe and Sam Spade. They give and they get physical and mental violence. Poe is renowned as the inventor of the detective genre. Having read numerous American and British novels, I can summarize the differences:

I knocked the suspect into a chair that crashed into the wall. "Awright, Charlie, since I broke your jaw, I guess you won't be saying much. Think about it while I have my coffee and a few cigarettes."

I motioned the suspect into a chair by the fire. "Sir Charles, you have the right to remain silent. Anything you say may be brought up in a court of law. Now let's all have a cup of tea. Sugar?"

On another subject, Stephen Hawking and other forefront physicists brought us a history of time. Steven Weinberg gave us a significant three minutes of it. Now Robert Levine of Cal State Fresno presents A Geography Of Time (Basic Books paperback). More than physical time, he explores psychological time in many cultures. Time sense and use may be contrasted in various ways. For example, there is clock time and there is event time. For most of my schooling I was bound by clock time. A class might be in the middle of a story, a report, a problem, a project. The bell rings and we're all off to the next class. It's highly organized but may be a poor way to accomplish something that takes longer than 50 minutes. As long as a time interval is being used profitably, without

fatigue setting in, keep extending it. That's how the artist, scientist, chef and many others work. The event determines the time it takes.

We all know what a New York minute is: The microsecond it takes a driver behind you to honk his horn if your car doesn't move when your traffic light turns green. I became acquainted with Navaho time on a July day in Arizona. The baked sand toasted my feet through sandals and socks as I learned that a scheduled noon performance meant some time before nightfall. Not knowing an opponent's perception of time can spell disaster. Hostage taking is a popular pastime around the world. A negotiator for authorities plays for time trying to calm the gunman. Knowing when to send in the SWAT team is a hardwon skill. In a notable case in the Middle East, hostage holders issued a 48 hour ultimatum. Their more peaceful countrymen explained that meant some nonhostile step should be taken within a few days. Disaster averted.

THE PHYSICIST AS A NEW WESTERN HERO

It is a truism that the geographic frontier no longer exists. The age of cowboys and indians is long past. Whether you regard it romantically, as men being men in nature and winning the west, or realistically, as European immigrants taking land and killing buffaloes that Native Americans had for many centuries, it's gone. Even other continents, as forbidding as they may still be, are largely explored if not tamed. The Congo River will not take you to Conrad's heart of darkness. There are other darkneses now, namely the diseases, but they are not the same thing. Only in rare places, parts of the Amazon jungle for example, are there frontiers where Western civilization has not materially touched an indigenous population.

Many suggestions have been made of new frontiers: space, the brain (inner space as opposed to outer space), ability to do genetic manipulation. Physics is penetrating the frontier of the "edge" of the universe, exceedingly distant in space and backward to the beginning of time. Physics is also focusing onto the unimaginably small: into the quark, gluon and lepton, and what next? The string that gives string theory its catchy name?

There are strong analogies between the American cowboy and the current physicist (probably anywhere in the world). Excuse the sexism but cowboys really were male. Physicists are everyone doing physics. The analogies range over the romantic and the realistic realms. Physicists too live in nature, the natural world we study. I don't consider it hardship of the same scope or intensity, but I know physicists who stay

up all night to carry out the work, because they can't sleep otherwise, almost like the cowboys not resting till the herds are corraled or driven to market.

Historically the physicist and the cowboy have commonality. The cowboys were not the first group on the land. The Native Americans had their traditions and their explanations long before. Before there was physics and chemistry, there was natural philosophy (often more philosophy than nature, being more thought than observation and experiment) and alchemy. Newer practices, including science, often cause older ones to become discredited, but consider that we now can transmute elements through nuclear reactions. Nuclear physicists are the new alchemists.

Temperamentally the physicist and the cowboy share a lot as well. Not to overdo it, but both are loners. If you want to be gregarious, there are many more compatible lines of work. The cowboy is at home with his horse and his saddle in an environment that does not admit most people. It is even a harsh environment, knowing dust and drought alternating with flash floods and raging rivers. He is ill at ease in the presence of noncowboys. If he must work in a large team, rounding up the huge herds, he makes sure they are all cowboys. The physicist is in a lab or at a computer that most people would find intimidating. The drought that besets the investigator who needs lots of financial support is the figurative one of being refused funding. Sometimes the equipment fails and sometimes it hums along so well that there's nothing else in life worth pursuing. In the large teams working with super-accelerators the physicist is surrounded by other physicists, engineers and technicians, and is supremely happy.

I know we all have several lives, including home, hearth, friends and family. By necessity the cowboy often took up with segments of the general society as well. Without the biological imperative animals of all sorts would become extinct. Come to think of it, the traditional cowboy is pretty much extinct. The giant ranches are run by giant corporations. Is that what physics has come to? Don't don't don't let it happen.

THERE'S ROOM FOR MORE BOY WONDERS AT THE TOP

Harris Porter and the Standard Model dazzled the world with its insight into the heart of the matter. Now new at your bookstands: Harris Porter and the Second Law. He amazes his friends by showing for each that his wishes come true with the same frequency as those of the others except for the one who wins millions in the lottery. That one wishes everyone

would leave him alone but of course they don't. "How did I get so many cousins who never invited me to their house?" Other exceptions are maggles, those with much worse luck than the average.

Unlikely things happen. Highly unlikely things don't. You may know someone who won the lottery but it isn't you. "Why not you?" ask the ads. "You have the same chance as the winners." And "you can't win if you don't play." Oh sure. Suggestions are welcome for more Harris Porter (boy wonder) books in the future.

Cats in the news

"I don't know why they keep chanting 'Give peace a chance.' We've given peace every chance. It always fails and ends in war." --
Schrodinger's cat

Leaves of Amazing Grass

Amazing grass, how sweet it is, how sweet it's ever been,
A constant source of heavenly bliss, the best I've ever seen.

Amazing grass, I place my trust when smoke gets in my eye.
I was so low and now I'm high, but not as high as Lucy in the sky

With diamonds and rust. Now end this I must.

Thanks For Reminding Me

Two views of the Columbia disaster, one east, one west:

The prostrate prayers gleefully claim their God's punishment.	Headbowed or kneeling, we suffer they solemnly intone our mere mortality.
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PDQ

Important note to nonmembers:

Are you not a member of the New England Section? Or is your department harboring nonmembers? Your APS dues will not increase at all if you check the New England Section the next time you pay your APS bill. The Section receives a small portion of the yearly dues to APS for each member of the national organization who is also a member of the Section. You will help support many worthwhile activities, including the two meetings per year that cost so much less than a large national meeting and yet bring national figures to speak with us on their research or teaching programs. We help subsidize topical meetings, notably the annual gathering on statistical mechanics that Brandeis hosts and is open to all of us who are interested in attending, including giving one of the mini-talks that fill an autumn day. Upon request we pay travel expenses of students to a Section meeting.

A final sighting of a cleverly used physics concept in a nonphysics context, this one strictly classical: A book review by Peter Temes last year in the Baltimore Sun under the heading The Maxwell demons acquaints us with Stewart O'Nan's novel Wish You Were Here. The demons of course inhabit the Maxwell family and are psychological.

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