

New England Section Newsletter

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1999 Fall Meeting of the New England Section of the American Physical Society

Colby College, Waterville Maine, November 5 and 6, 1999

The 1999 Fall Meeting of NES/APS will be held at Colby College in Waterville Maine, on Friday and Saturday, November 5 and 6, 1999. Colby College is located in the lakes region of Maine, about 80 miles north of Portland and 15 miles north of Augusta. Waterville can be reached from Exit 33 (Kennedy Memorial Drive) off Interstate 95.

Information on the conference may be obtained at the website: <http://www.colby.edu/physics>. A quick summary of the program is given: Friday afternoon - Quantum Technology, including Quantum Information, Quantum Computing and Quantum Control. Saturday morning - Novel Semiconductors, including Organic LEDs and Organic Transistors. A list of speakers and titles for talks will appear on the website. A banquet will be held Friday evening at 7:00 in Roberts Union at Colby College. The banquet will be preceded by a reception and cash bar at 6:00.

A registration form was included with the notice in APS News. It is also available on the conference website along with travel directions and recommended motels. Registration begins at noon on Friday in the Seely G. Mudd Building. Pre-registration before October 23 will avoid being assessed a late fee.

The local organizing committee includes Charles Conover, Duncan Tate, Shelby Nelson and Murray Campbell. The committee welcomes contributed and poster papers for parallel oral and poster sessions on Saturday morning. Follow the usual rules for submission. The deadline for abstracts is October 22 at 5 pm. For further information, contact Charles Conover, Department of Physics, Colby College, Waterville ME 04901. Telephone (207) 872-3246 or Fax (207) 872-3074. E-mail cwconove@colby.edu.

Spring 1999 Meeting at Yale University

The 1999 Spring Meeting of the New England Section of the American Physical Society was held at Yale University in New Haven Connecticut on April 9 and 10. The first half of Friday was devoted to history and nostalgia. Stefan Machlup of CWRU related experiences in "Lars Onsager at Yale." Onsager was in chemistry and Machlup was his grad student in 1949. Martin Klein of Yale described "J. W. Gibbs at the Beginning of the Twentieth Century." Note that the year 2001 will be the tricentennial of Yale. A period of refreshments gave way to "The Physics of Water" by Eugene Stanley of Boston University. It dealt with unsolved mysteries of water in its liquid and glass phases. The Friday evening banquet was at the New Haven Lawn Club. The banquet speaker was Bradley Schaefer of Yale, who roused us all with "Superflares on Normal Stars just like our Sun."

A variety of topics occupied Saturday morning: "Unlocking the WWW Potential for Teaching and Learning" by Gregor Novak of Indiana University, Purdue University Indianapolis. There is a concept, or perhaps an ideology, called "Just In Time Teaching" or JITT, which allows delay of any topic or technique until the practical need for its understanding or use arises; many new teaching programs employ JITT to some extent. After refreshments, forefront physics took the stage: "The Quest Project" by Jeffrey Snyder of Yale; "The Sudbury Neutrino Observatory" by Robin Ollerhead of University of Guelph. AAPT contributed sessions partly overlapped the APS talks, and AAPT held an early afternoon demonstration session on Saturday.

Some reflections on mathematics suggested by other readings

Martin Chusid, in an analysis of Schubert pieces, wrote "The principal themes of this movement display Schubert's melodic powers at their height. Their sheer beauty and unforgettable quality defy analysis, but perhaps their interrelationships may be examined with profit." This is probably as far as one can convincingly go in evaluating the elegance of a piece of mathematics. An essentially irrelevant feature, but one that commands attention, is the influence of the music or the math on other creative persons in the same fields. Perhaps more commanding is the opening of a brand new field of activity by a single worker (artist?). It is said that Euler invented graph theory and Haydn invented the string quartet.

Brian D'Amato wrote a fascinating novel called *Beauty*. (Dell paperback, 1992) It examines the essences and examples of beauty, elegance, smoothness and other attributes of women, and the fascination, selfishness and treachery of the men who tamper with them. Since it lapses into ugliness, abrasion and roughness, this book is not for the squeamish. D'Amato quotes from Edmund Burke's *On the Sublime and the Beautiful* (Section Fourteen - Smoothness):

The next property constantly observable in such objects is smoothness: a quality so essential to beauty, that I do not now recollect anything beautiful that is not smooth. In trees and flowers, smooth leaves are beautiful; smooth slopes of earth in gardens; smooth streams in the

landscape; smooth coats of birds and beasts in animal beauties; in fine women, smooth skins; and in several sorts of ornamental furniture, smooth and polished surfaces. A very considerable part of the effect of beauty is owing to this quality; indeed the most considerable. For, take any beautiful object, and give it a broken and rugged surface; and however well formed it may be in other respects, it pleases no longer.

This argument from Burke via D'Amato is ignorant of the intricate patterns of fractals and the mesmerizing march of a chaotic system in phase space. Or are these not beautiful? Later in the book the obsessed protagonist details his attraction to pimples, scabs, calluses, polyps and acne, but they are in the inflamed eye of the beholder.

New England Section Advisor Report

(Kannan (Jagu) Jagannathan submitted this Council Observer's report on the American Physical Society meeting of May 21, 1999, held in Washington DC.)

This report is not meant to be an exhaustive and faithful record of the discussions at the Council meeting. Instead, I have highlighted the issues that may be of greatest interest to the members of the New England Section. Even with this limitation, it would be impossible for me to do justice to the full range of discussion at the Council meeting on matters I do mention below.

The item of most interest came from a report on proposals for restructuring the Council. At present, up to about 70 people are eligible to sit around the table at these meetings. Many Council members had felt that the number is too large for effective engagement, and a committee had been charged with finding ways of reducing that number. A Task Force had been formed under the chairmanship of Professor Ernest Henley, and was asked to find ways of dealing with the problem. Their report, which was discussed at the meeting, made a number of proposals, most of them non-controversial.

The proposal to cut back the number of Divisional representatives, however, was thought to raise some constitutional concerns. Alternative ways were suggested that might accomplish nearly the same goals, without giving up the principle of proportional representation once a Division met a certain minimum threshold. Some revised proposal taking into account the concerns is likely to come up at the next Council meeting.

The Task Force report also suggested that inclusion of the geographical Section representatives (called Advisors) on the Council be discontinued. Naturally, this proposal met with some resistance, not only from the Section Advisors, but also from many other members of the Council. Moreover, those who wanted these Advisors retained on the Council wished to include them more fully, by giving them vote as well as voice. (Currently, the Advisors have voice but no vote.) There was a near consensus on the importance of the work of the Sections to the APS, but

some divergence on how best to recognize that importance without making the Council unwieldy. In the end, the Task Force was asked to come up with a solution that would have, perhaps, a total of two Section representatives on the Council with full privileges. There are various schemes currently being debated about how the two representatives are to be chosen among all the various Sections. One proposal would arrange some sort of election at the Units Convocation of the APS, where officers from all the Sections would be present. Another would arrange some sort of rotation among the geographical Sections, so that New England would have its turn to nominate a Councilor for a four year term every fourteen years in the steady state! Perhaps before we are through, there will be other creative proposals as well.

A request: This is a matter in which I, as the current New England representative, would welcome input from the members. Please send me e-mail or other correspondence regarding this issue. I will have the opportunity to convey your views to the Section Executive Committee at its Fall meeting, and take its input along with yours to the Council meeting later in the fall. Though the size of the Council is not a problem I personally felt keenly, I have attended only one such meeting, and more importantly, that train may have left the station. The majority of the Council seemed to favor reduction in the total number of Councilors. With the possibility that there may be a push to increase the number of Sections, and increase membership in all of them, the prospect of seven or more new voting members to the Council seems untenable at this stage. The main argument for a Section representative is that this individual helps in communicating the work of the national body to its members whose primary connection to APS is through the Sections. The proposed solutions appear not to be consistent with that argument.

The Council meeting took place at a time when the concern and controversy over national security at some of the major DOE labs was a rapidly changing and rapidly evolving "hot potato." The Council adopted a statement affirming the importance of both national security and the free and open exchange of ideas. The debate mostly centered on whether the wording emphasized one issue over the other, and what the right thing to do was in the unstable political climate of the moment. The final statement of the APS on this important matter is available on the APS web page and was printed in the July issue of APS News.

The APS also adopted a resolution that it "applauds and supports the acceptance in physics departments of research in physics education." This statement is printed in the August/September issue of APS News and is also posted on the APS web page.

These then are only some of the highlights of a day-long engaging meeting.

Jagu

"Don't forget to multiply by pi."

I have been reading a wonderful book, *A History of Pi*, by Petr Beckmann. Through examination of the concept and the evaluation of pi, the author uncovers, layer by layer, some history of wide-ranging mathematics, of intellectual activities, of much human behavior of all sorts. His biases coincide with my own, as he berates the eras and the institutions of military domination and religious fanaticism for turning back the hands of the clock of knowledge so as to require a restart in a subsequent century. The ancient beginnings of math and science are in chapter 1, called "Dawn." The Middle Ages in Europe are in chapter 8, called "Night." The Renaissance sees the light in chapter 9, called "Awakening."

You will have an indication of the crusty writing if I merely repeat the opening sentence from each of chapters 8 and 9. "The fall of Rome in 476 A.D. marks the time when the literate barbarians of Rome were replaced by the illiterate barbarians of Germany, and this event is generally considered as the beginning of the Middle Ages." "The classification of history into ancient, mediaeval and modern is but a symptom of the white man's arrogance; for while Europe was suffering the imbecility of the Dark Ages, the rest of the world went on living." The book is filled with valuable information tied together by lively narrative so, like a nourishing and delicious bread, it is not nearly all crust. You may wonder whom the author likes. Greece si, Rome no. Germany, nein. Sovietzkis, nyet. He might like you.

As it happens, the value of pi, if not the notion of pi, has a modern use that did not occur to the author. It is the almost-universal factor, suitably irrational, relating one's wacky expectation to harsh reality. To my knowledge, graduate students of decades ago originated the practice. One of them said, "If all goes well, I should be able to put my equipment into running order, take all the data, and write everything up so as to have my degree in two years." To this another amended, "Don't forget to multiply by pi." Meaning: when did you ever see all going well?

I was reminded of this practice of my student days by several recent events. My department puts out a newsletter each summer, presumably in plenty of time to attract alumni and others for the occasion of an endowed lecture, this year occurring in mid-September. I was all set, as editor and resident English teacher, for June which became July which became August... So what is the hangup? Unlike this Newsletter, for which you have only me to blame, an entire lineup of departmental batters steps up to home plate. Someone prefers his version to yours. And the closer to done you are, the less he likes what you've done. Note that email may be instantaneous, but human hand/brain coordination takes weeks. In a separate venture during the same time period, my wife and I contracted with a builder to do us a portion of a home remodeling. My wife's estimate of the duration of noise, mess and inconvenience did not take into account the factor of pi. As I tap away at my keyboard, it is creeping ever closer to being done without being done. Numerous instances in the past have verified the Laws of Thermodynamics in unorthodox contexts. Zeroth: In summer the workmen get just as hot as the day is. First: They have just so much energy and no more. Second: It gets harder to go further as the job winds its way. Third: As if you were renovating New

York City, you will not get done. (This is not strictly true as, when you are close enough, you stipulate it is done and pay the bill.)

You may ask whether there exists a counter-example and you should be able to think of it yourself. When anticipating life's greatest pleasures, you should be sure to divide by pi to find out how quickly they actually surge to their outcome. So in fact there is a universal factor of pi, and you must simply decide whether to multiply or to divide.

DM

How many Chinas and how many United States are there?

Relations between China and the United States suffered several setbacks this year. I'm sure each reader can state at least three examples. The spying and theft scandal has been nicknamed "Chinagate" in keeping with the neologism that summarized Nixon's downfall. The House of Representatives probe of Chinese infiltration and access to US technical secrets, embodied in the Cox report, demonizes students and other guests from China, whatever their purposes, and places under suspicion even Chinese-Americans in sensitive positions. The Republicans in Congress consider the "gate" to be open still, as the gatekeeper remains for now Democratic. American academics have a great stake in the feud over visitors and workers of other nationalities, in particular from countries whose friendship is not wholehearted. You cannot help noting the makeup of our classes and our labs.

Alan Chodos, senior research physicist at Yale, responded to the to-do with an Op-Ed editorial in the New York Times of Friday, July 23. I don't mind treating the NYT as part of New England since Greenwich has decided it is in New York. Chodos's article is entitled Wanted: American Physicists and summarized by "If our national labs are full of foreign scientists, blame Congress." He compares the 1990s to the 1960s in noting declines in science funding, in numbers of physics bachelor's degrees awarded, in numbers of grad students, and most precipitously in numbers of American grad students in physics. At Yale there is one American in eight theoretical physics grad students. The present Congress is happier taking pot shots at laboratories and their personnel than reversing the trend of making science departments and science jobs unattractive to American citizens.

Tom Plate of UCLA wrote for the Los Angeles Times an article reprinted in the Hartford Courant of Sunday, July 25. It was headed Cox Report Was 'An Exercise In Amateur-Hour Paranoia'. This is the assessment of critics cited by Plate, including Warren Rudman, chairman of the president's foreign intelligence advisory board, which reviewed security lapses at US labs, and Jonathan Pollack, Rand's senior East Asia expert, who cites the incendiary character of the Cox report, which suggests that Chinese Americans are potential "sleeper agents, who can be used at any time but may not be tasked for a decade or more." The author writes that China is justifiably angry at the report's accusations and that the American people have a lot to be angry about in the insecure and

paranoid picture painted of America.

Wasn't it a short time ago when the conscience of a substantial part of America was moved by reports that poor Asian workers were stitching sports clothes and Nike footwear for twelve hours a day to make Americans feel rich and pampered and Michael Jordan be rich and pampered? It is a new group of Asians in our scopes and probably a new group of Americans focused on them, but our country is now regarding "those other guys" as predator instead of as prey.

Another fable for our time

Whitlow Whiner was discussing grad students with P. I. Swinger at their school. This is the kid brother of Grant Swinger, who perfected the art of traveling around the world at other people's expense. Those times are gone, perhaps forever. And as you'll see, other times of advantage to senior scientists may be gone with the wind too.

Whiner was doing what he does best. "I don't know what's wrong with students nowadays, P. I. They don't give you the loyalty and respect they used to. When I was growing up, not that I'm ancient now, we ate, slept and did everything else at our experimental stations. Why, we were practically chained to our equipment, for the glory of physics and of our advisor. Do you see that sort of devotion any more? My student, X____, I should say my ex-student, I thought he was my protege, left for Wall Street without his degree. My other student, Y____, wants a week off to have her baby, at a crucial stage, I mean a crucial stage of the research. Why me?" He went on in this vein, not noticing that P. I. was gesturing vigorously for his attention.

"Follow me," said Swinger. So they descended into the bowels of the earth where he had his giant bank of detectors that were not allowed to see the light of day. Whiner groped for support until Swinger handed him a pair of infra-red goggles. "You get used to the low light level but this is faster." Equipment was purring, chirping, glowing and flickering. Plenty of activity. No sensory deprivation here. Whiner made out two human forms, sitting on stools and working away at computer consoles. They were chained at the ankles to their tables. "Can they see?" he wondered. "Of course, they can see," assured P. I., "I'm not inhumane." Whiner observed that they were a young man and a young woman, slight and apparently sallow, which was perfectly understandable under the circumstances. They tapped away without cease. "Wow," Whiner commented, "this is impressive. Who are they?"

"Let's not disturb them," Swinger said. "Come over here. He is Yu Hu and she is Mi Tu. They're from China and they are determined not to leave here without their degrees. Their chains are just long enough that they can hand each other documents. Anything else would be a needless distraction. I'm expecting a third Chinese named Hu Mi to fill a niche. Everything's working out real well." Whiner repeated "Impressive." He wondered how he could benefit.

Skip a few months and now Swinger is whining and Whiner is not. The

whole case has been blown and P. I. is under investigation. "That third guy, Hu Mi, was not a student but was a secret agent. He released the two others and what's worse, he grabbed the data printout on local dark matter. Now it appears that it breaches the security of the US dark matter weaponry project and I'm in deep trouble." He looked so forlorn. "I knew this would happen," Whiner mused.

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THE LAST BANG

Now I'm reading a book called *The Third Culture* by John Brockman. Those of you with culture will identify the title as a takeoff of the mildly influential book of a previous generation, C. P. Snow's *The Two Cultures*. I was led to this new book by a laudatory review in *Smithsonian Magazine*.

It enjoys at least two favorable reviews, in that the cover quotes the journal *New Scientist*: "The most important book on how science is done since *The Double Helix*." Well, is it?

The two cultures in the Snow-job were science and technology versus arts and letters. As I recall, the two were supposed to be quite disjoint and unable to speak to each other in a common language. Science is from Mars, art is from Venus - that kind of thing. I don't know where I'm from, since I've always felt that math, art and music were the same thing expressed in different modalities. At any rate, Brockman has identified a third culture, consisting of scientists well-versed in the arts. Or religion. Or philosophy. But I will let the author express it as he does in the first sentence of his introduction, before we are presented with the numbered chapters:

The third culture consists of those scientists and other thinkers in the empirical world who, through their work and expository writing, are taking the place of the traditional intellectual in rendering visible the deeper meanings of our lives, redefining who and what we are.

Brockman's choice of scientific thinker is skewed toward certain fields. One is biology, especially evolution, which is understandable, since it should bear directly on who and what we are. A second is cosmology and grand unification. This wondrous and challenging discipline seems to be a totally different book, one that does not illuminate our lives in a conventional sense. We may find a Theory of Everything but it won't mean anything to the biologists. Another direction of skew in this book is toward computer science, especially artificial intelligence (AI). The computer is smarter and faster than I in solving an equation or playing chess. It is dumber and slower than I in recognizing my neighbor in a Hallowe'en costume or following a child's poem. Sometimes AI is replaced by artificially serious stupidity (ASS). Misspell an instruction in a note for the milkman and you will still get your milk. Do the same for the computer and you may lose your document. The final skew direction is geographic: the Santa Fe Institute.

Now I don't want to get off on a rant here but if this is the most important book on how science is done, then will someone else please start writing on the subject? An overabundance of comments are testimony by one scientist on what a great guy another is. They fall over each other to congratulate the other's work, ideas, support, friendship. It was gratifying to me, after several chapters of sweetness, to find some attacking others for being crummy guys. Way to go, fellers. There is one woman embedded in this array of testy people, and she incites the only instance of unanimity. It appears that any of the others who know her hate her. She is Lynn Margulis, Distinguished University Professor, Department of Biology, UMass Amherst. She is as surely the sole inventor of the theory of endosymbiosis, the eukaryotic cell a symbiotic union of primitive prokaryotic cells, as Einstein was of general relativity and Guth is of the inflationary universe. Simply put, a distant ancestor of one of my cells was some adventurous bacteria getting together for a good time. Evidence mounts favoring it. She is the most impressive character in the book. So what's not to like? It's a matter of her style. She tells everyone else where he is wrong. She has the effrontery to be right.

One perplexing recurring idea is "Earth is an organism," a notion called Gaia (ancient Greek earth goddess). Not even new-agers think that. The scientists dismiss it only to repeat it, like picking at a scab. Margulis says "Gaia is a tough bitch" and Brockman uses that as the heading to her chapter. Much of the writing annoys me. Still, how can you dislike a book that treats you to expressions like "a bricolage of identities"? My opinion. I could be wrong.

DM

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