Langer Petitions Reno on Behalf of Wen Ho Lee

A PS President James Langer has written to US Attorney General Janet Reno on behalf of imprisoned physicist Wen Ho Lee, formerly a researcher at Los Alamos National Laboratory, objecting to his pretrial treatment. Lee was indicted last year and charged with violations of the Atomic Energy and Espionage Acts, and is presently being held without bail in a penitentiary near Santa Fe.

Lee has been imprisoned since December 10, 1999, on the government's contention that he is both a danger to this nation and a flight risk. The indictment alleges that in 1993 and 1994, Lee knowingly downloaded 19 collections of classified information and is presently being held without bail in a penitentiary.

As President of the American Physical Society, I am writing to express our concern about the pretrial treatment of Dr. Wen Ho Lee, accused of mishandling classified information at the Los Alamos National Laboratory.

We recognize the great importance of the proper handling of classified information to our national security, and we make no judgment about Lee's guilt or innocence. That will be decided in a court of law. However, we are deeply disturbed by the inhumane treatment that he has received in his pretrial incarceration. The extraordinarily harsh conditions under which he is detained suggest to the outside world that he is presumed guilty, and is being punished, before his trial has even begun. This perception has been reinforced by the statement of CIA Director George Tenet that Lee's actions were “taken with intent to harm the United States.” It seems to us that basic principles of American justice are being violated in this case.

I would like to bring another important issue to your attention. One of the principal missions of the American Physical Society is to maintain the strength and vitality of the scientific enterprise in this country. The perception in the physics community that Dr. Lee is not being treated justly has caused great consternation, especially among the large number of scientists in the United States who have come here from abroad. As a result, it is becoming difficult to attract and retain the very best scientists at our weapons laboratories and other facilities. We are deeply concerned, therefore, that our scientific capabilities and national security are being compromised by our government's actions in the case of Wen Ho Lee.

I respectfully urge you to take this matter into consideration.

Sincerely yours,
James S. Langer
PS President
To Advance & Diffuse the Knowledge of Physics

100 Years of the American Physical Society

Excerpts from an exhibit displayed at the APS Centennial Meeting. Curator: Sara Schechner, Gnomon Research House. Exhibit Director: Barrett Rabin
With contributions by Harry Lauting, R. Mark Wilson, and others.

Mechanics of Publishing

Editors of the Physical Review have always been on the lookout for innovations that would improve communication. In 1957, Samuel Coudsmit saw that use of typewriter composition and offset printing instead of hot metal and letterpress would speed up the production of Physical Review Letters. He later introduced computer composition.

Typists had to attach special "harp" keys whenever they needed to insert scientific notation into the article.

Electronic Age

In 1994, the Physical Review set up their first website. Since then, all Physical Review publications have been available online. The APS’s editorial office also inaugurated PROLA, the Physical Review Online Archive, and two electronic journals, Physical Review Focus and Special Topics—Accelerators and Beams (STAB).

“Tipographical Errors”

Editor Simon Pasternak’s blackboard, circa 1976, showing errors found in manuscripts submitted for publication.

Next Month, Final Installment: APS Today

With contributions by Harry Lustig, R. Mark Wilson, and others.
Science on the Threshold of Political Analysis

By Michael S. Lubell, APS Director of Public Affairs

A presidential election is a Washington pundit’s worst nightmare. It doesn’t muzzle a true talking head: nothing will. But the quadrannual political subterfuge, the essence of American democracy, sucks the wind out of the sails of the best of them. In the off-years, when the spotlight is on Washington, pundits pontificate profusely. But inside the beltway that counts, the most savvy Washington analyst is reduced to his State of the Union Address.

Science, like the chic, is forever in the Beltway always current: time, election-year arson. And so began 2000, science burst onto the Washington scene with unexpected fans.

A few years of hand-wringing over budget cuts, deficits and caps, the Clinton Administration gutted its Fiscal Year 2001 budget request that puts science plus-ups on center stage. Prosperity and surpluses do not mean that the Beltway that counts. In the crudest terms, Washington, pundits pontificate profusely.科学发展, like the chic, is forever in the Beltway always current: time, election-year arson. And so began 2000, science burst onto the Washington scene with unexpected fans. But the science portfolio, for obvious reasons, drew an additional chorus of GOPO shouts: “We were there first!” Everyone likes a winner, and this year, science can be just that.

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Science on the Threshold of Political Success
The Physics Department “Cosmo Quiz”

Editor’s Note: This quiz was prepared as a public service by some of the members of the Task Force on Undergraduate Physics (see story on page 6). Readers are warned that it has no proven diagnostic value whatsoever.

Many popular magazines such as Time, Cosmopolitan, and Mademoiselle feature quizzes that help you evaluate major issues in your life such as whether you are in love or just experiencing a physical attraction (no pun intended). Here is a similar light-hearted quiz to help you judge the health of your undergraduate physics program. Choose the answer to each question that best describes your program, add the points up, and check the bottom of the page to see what we think your score means!

1. In the last five years, how many departments have dropped the requirement that their majors take your introductory course?
   (20 pts) None—our course is so wonderful, other departments have added it to their requirements.
   (15 pts) Only one.
   (10 pts) Only one—but it was the School of Engineering.
   (5 pts) Two or more.
   (0 pts) Nobody requires our introductory course anymore except us.

2. How many graduates (BS/BA) per year have you averaged over the past five years?
   (20 pts) More than 25
   (15 pts) 10 - 25
   (10 pts) 5 - 10
   (5 pts) Fewer than 5
   (0 pts) We haven’t had any since Joe retired.

3. How many graduates (BS/BA) per year for each faculty member have you averaged in the last five years?
   (20 pts) More than 2
   (15 pts) 1 - 2
   (10 pts) Fewer than 1
   (5 pts) Fewer than 0.5
   (0 pts) Fewer than 0.05

4. What fraction of your undergraduate class participate in research?
   (20 pts) Nearly all of them do a senior project.
   (15 pts) About 50% of them do a research project.
   (10 pts) All of them know where the research labs are.
   (5 pts) All of them know theoretically what research is although they don’t actually do it.
   (0 pts) All of them can spell research correctly.

5. What was the change in the number of faculty slots in your department in the last five years?
   (20 pts) We lost three or more
   (15 pts) We lost one or two
   (10 pts) No change
   (5 pts) We gained one or two
   (0 pts) We gained three or more

6. When was the last major revision of the labs for your introductory course?
   (20 pts) Nobody around here remembers, but we think it was before Joe retired.
   (15 pts) About ten years ago
   (10 pts) Five years ago or more
   (5 pts) Between two and five years ago
   (0 pts) It was done within the last two years.

7. What fraction of your undergraduate majors are females?
   (20 pts) More than 30%, and we are a co-ed school
   (15 pts) 15-30%, which beats the national average
   (10 pts) 5-12%
   (5 pts) <5%
   (0 pts) We saw a woman in the hall once, but we think she was looking for the Math Dept.

8. What fraction of your undergraduate majors are underrepresented minorities (African-American, Hispanic, Native American)?
   (0 pts) All of our majors are white, despite the fact that we are an HBCU
   (5 pts) <5%
   (10 pts) 5-15%
   (15 pts) >15%
   (20 pts) Underrepresented minorities are overrepresented among our majors compared to the student body at our institution.

9. How long has your SP’s chapter been defunct?
   (0 pts) What’s SP’s?
   (5 pts) Nobody around here remembers, but we think it folded when Joe retired.
   (10 pts) Less than five years
   (15 pts) It’s in existence now, but only with a few students
   (20 pts) It’s much more active than any of the organizations the faculty believe in.

10. What fraction of your faculty are making serious efforts to improve the quality of the undergraduate courses they teach (reading the physics education literature and trying to apply it, restructuring a course to incorporate recent advances in scientific and technological developments, developing a new course to interest different audiences, etc.)?
   (20 pts) All of them (or so they claim)
   (15 pts) Some of them only
   (10 pts) The ones without tenure
   (5 pts) Hardly any of them, now that Joe is retired
   (0 pts) None of them, since they know it won’t make any difference in their salary or promotion

SCORE

150-200 points — Congratulations! You have a thriving program that could serve as a model for other departments. Please contact the National Task Force on Undergraduate Physics (ntfup@aps.org). (See story on page 6)
100-150 points — Your department is doing OK for the moment, but it would be a good idea to look at improvements other departments are making to strengthen their programs.
50-100 points — This is serious. Call the Dean for help in starting to revitalize your department.
0-50 points — The Dean calls, don’t answer the phone.

APS News is now being posted on the web two to three weeks in advance of the appearance of the paper version. APS members who wish to read it on the web can go to the APS homepage, click on aps news online, and then click on “A diverse issue.” This feature is password protected for APS members only.
Physics and Medicine: A Beginning to the Next Wave

By Henry D. I. Abarbanel and Allen I. Silverston

Physics and medicine have a rich joint history. By making it our business to correct his short sightedness. No doubt today he would have had laser surgery to tape the cone down. And you imagine a doctor diagnosing your injured ankle, knee, or shoulder without x-rays and MRI or treating your problem without analyzing your cells, made from space-age materials, to be implanted in your broken bone to ensure its rapid and strong recovery. And soon you will have a remotely powered micro-electromechanical strain gauge implanted to provide a real-time measure of the healing process and to permit your physician to prescribe an optimum course of physical therapy. Cancer is still an enormous problem, but you can be successfully be treated by carefully focused radiation, monitored in real time by a large and sophisticated silicon imaging system to ensure that you receive the correct dosage.

As innovative and important as these contributions do, however, such an approach to the treatment of problems within the nervous systems. Many people are paralyzed for life by injuries to their spinal cords. Fortunately, President Clinton in his State of the Union address challenged scientists, engineers, and physicians to develop solutions to the problem of paralyzed spinal cords. He said that implanted would relay the severed signal to the isolated limbs and restore their function. And many sufferers of Alzheimer’s disease might benefit from bio-circuits that serve as brain pacemakers.

Not surprisingly, American research universities are attracted by the intellectual challenges of the problem. Stanford’s Bio-x Program (http://biochem.stanford.edu/biox/) and the University of Chicago’s Institute for Biophysical Dynamics (http://bmbbsd.uchicago.edu/IBDHome.html) are two prominent examples. Stanford has assembled $43 million in support of a program with significant leadership from physicist Steven Chu and an individual donation of $130 million from Netscape founder Jim Clark. Other universities, including those in the University of California, San Diego. The opportunities for physicists in many fields of biology, neuroscience, and modeling skills and inclinations of physicists, all clearly are present. With the sequencing of the human genome in progress, and physics models in the study of genes expressed by genes taken on an immense and provide an arena in which the skills of physicists will be immediately tested. Other experiments and ongoing action are the major scientific methods of the physical sciences include the dynamics of folding proteins, “bio-inspired materials,” or “signal cells, and similar questions. The opportunities for physicists in many fields of biology, neuroscience in particular, are open to those with physics undergraduate degrees. There are now a few programs in which physicists can receive the training in wet lab neurophysiology utilized in our example, and biologists can be trained in the skills of the physicist. Of course, in starting such a program one may be part of a remarkable next wave of physicists who specialize in the properties of stars, who are正在研究的领域.

Figure 1: The blue trace is for the electrical neuron, the red trace is the current flowing between the neurons, and the black trace is the membrane voltage activity of the biological neuron.

In April 1920, the Natural History Museum in Washington, DC, played host to an historic interchange on competing theories about the scale of the universe. At the center of the controversy were Harlow Shapley, a young ambitious rising star in astronomy who specialized in the properties of stars in binary systems of globular clusters, and Heber D. Curtis, a well-respected established authority on the properties of spiral nebulae known for his conservative approach and frequent skepticism of new theories. Their confrontation at the 1920 meeting of the National Academy of Science in Washington is widely held to be at the crux of a major shift of humanity’s view of its place in the universe.

Ironically, given its historical significance, the actual debate was neither well publicized nor well attended at the time it occurred during the 1920 meeting of the National Academy of Sciences — nor was it a truly formal “debate” in the modern sense of the word. Shapley and Curtis each gave a 40-minute presentation and were allowed one opportunity to rebut the other’s remarks, followed by commentary from the floor. Curtis argued that the universe is composed of many galaxies, among them the Sun’s location in it, while Curtis correctly predicted that the universe is composed of many galaxies, among them Andromeda.

The Shapley-Curtis debate is one of the most important scientific events of the 20th century, for it set the stage for the modern understanding of the universe. The debate resulted in the establishment of the principle of uniform expansion of the universe, which is the basis for our current understanding of the nature of the universe. The debate also highlighted the importance of scientific debate and the need for open-mindedness in science.

For more information on the Shapley-Curtis debate, see http://antwrp.gsfc.nasa.gov/diamond_jubilee/debate_1920.html.

Birthdays for April:
12. W. J. babes (1895)
22. J. Robert Oppenheimer (1904)
30. Carl Friedrich Gauss (1777)
The APS, AIP, and AAPT Launch Task Force on Undergraduate Physics

A Prize: The Hardest Way To Learn Physics

Editor's Note: This article was written for APS News by Javier Cruz Mena, science editor of the Mexican newspaper Reforma, and a member of UNAM's Physics Department.

When Physics 101 is finally in session at the School of Science of UNAM, Mexico's National University, some unexpected anomalies will be available to help understand a few bizarre concepts of modern physics.

Take the case of Schrödinger's cat. If told that a system may, at any given time, exist in two mutually exclusive states, these students will not be quite as puzzled by the puzzle as some historians of science have been, otherwise, had they not lived through the perplexing nine months of a student strike triggered, back in April of 1999, by the approval of a new constitution that would have been reduced from US$0.02 to about US$140 a year. The amount might seem low, but opponents argued that it was improper to charge students that much when the general income in Mexico has dropped steadily for two decades, as has the Government's commitment to education. Simple, implicate matters further, the wording of the country's Constitution — "All education provided by the State shall be free of charge" — seemed to conflict with the question of whether public colleges should be included.

During those nine months, the University led the kind of uncertain day-to-day existence typical of split personality conditions — much like quantum cats, indeed. This being a student strike, all teaching stopped as schools were closed from day one. But research continued to get done, somehow, throughout UNAM's main campus in Mexico City. It was not being done with a rush. Long walks in the open had to be endured on those days when the strikers' stereotyping committee decided — rather hap hazardly — to ban automobiles access to campus facilities.

While research institutes were allowed to keep their doors open for most of the strike, teaching centers, such as the School of Science — home to Physics, Mathematics and Biology undergraduate studies, Chemistry, Medicine and Engineering — was closed. The experimental work there came to a halt.

But theoretical research wasn't spared either. Getting new work done was much more difficult than the things I am used to — books, notes and article references," said Rodolfo Martínez, full time Professor at the School of Science, who works on high energy particle physics. "These papers which are being refereed right now would have already been published had it not been until just February 6th, when a recently created military police unit showed up on campus — to the strikers' surprise — and took nearly 1,500 thousand pounds of books, students and with and without orders of arrest. For all practical purposes, that was the end of the full-scale student strike.

One might argue that the police action was tantamount to the human measurement of the quantum puma — the university's feline mascot — ending the indeterminacy of its state. Classes are being run as usual, and have not been released, and the puma seems to have been alive after all.

Or was it? The core of the strike's stereotyping continued — is still in jail — accused of "social dangerousness," an oxymoron offense just recently added to the Criminal Code, and as a result, the University is under threat of being closed again.

"The strike has proven highly destructive of all academic activity," said Martínez, "regardless of which facilities were closed. Whether the University will recover is not at all clear.

APS Members Receive National Medal of Science

Four APS members were among the 12 recipients of the 1999 National Medal of Science selected in January by President Clinton. To date, 374 medals have been awarded to scientists and engineers since Congress established the award in 1959. Administered by the National Science Foundation, the National Medal of Science is intended to honor the discoveries and lifetime achievements of the nation’s outstanding scientists. The new medals, the last to be named in the 20th century, were presented to the recipients on March 14 at the White House in Washington, D.C., along with five recipients of the National Medal of Technology.

Among the recipients is James Cronin of the University of Chicago, who shared the 1980 Nobel Prize in Physics with former APS president Val Fitch for proving that charged particles do not act as their own antiparticles. Cronin was honored for "his leadership in fundamental theoretical research to understand the interplay of matter and antimatter in the universe. He is being honored for the predominance of matter over antimatter in the 20th century, received their medals on February 6th, 1999.

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APS Grants Online Journal Access to Troubled Russian Institutes

Physicists in the politically and economically troubled former Soviet Union have struggled in recent years to maintain subscriptions to the premier scientific journals, including those published by the APS. The situation became critical earlier this year when the Open Society Institute discontinued its support for Russian institutions for journal subscriptions. APS Editor-in-Chief Martin Blume devised a plan to provide free electronic access to international research results for Russian scientists, in its February meeting the APS Executive Board approved a plan for short-term emergency online access to the Society’s journals.

Under the proposed scheme, Russian academic and government institutions may petition the Society directly for free subscriptions to the online versions of Physical Review (all sections), Physical Review Letters, Physical Review Online Archives (PROLA), Reviews of Modern Physics, and Physical Review Special Topics: Accelerators and Beams. APS President James Langer believes this will ensure that such online access is provided only to the Russian institutions where access is both desired and necessary. It also protects existing paid subscriptions from industrial laboratories in the region.

In future years, online access will be gained through annual subscription to the APS by each institution, and the Society expects to begin charging for all online journal access beginning in 2001. The size of the charge will depend on the amount of supplementary support provided by other agencies, such as the Russian Foundation for Basic Research (RFBR), and by the effect of the subsidized online subscriptions on the existing subscriptions within Russia. The RFBR is a self-governing state-funded organization whose primary goal is to support the most promising research initiatives in all fields of fundamental science without departmental restrictions. It is currently the only such organization providing funds for subscriptions to foreign print and electronic journals in Russia.

Under discussion is a cost-effective scheme for providing access to the APS journals to researchers in countries with little or no access to the Internet. APS Editor-in-Chief Martin Blume devised a plan while visiting the International Center for Theoretical Physics in Trieste, Italy, in which the Society would provide CDs of the most recent year’s issues of APS journals, which ITP would then distribute to a list of 75 institutions, subject to APS approval. The APS Committee on International Scientific Affairs will discuss the proposed program, to be jointly sponsored by the APS and ITP, at its upcoming meeting, with plans to present the plan to the APS Executive Board and Council this spring.

Institutions requesting emergency online journal access can do so via FAX: (301) 209-0844 or email FFC@aps.org. Online agreements are available on the APS web site: http://publish.aps.org/LEGAL/nonmember.html.

Krauss and Lane Win AAAS Awards

APS Fellows Lawrence Krauss and Neal Lane received awards at the American Association for the Advancement of Science’s February meeting in Washington, D.C. Krauss, an astrophysicist, is the chair and Ambrose Swasy Professor of Physics at Case Western Reserve University. Neal Lane is the Assistant to the President for Science and Technology, and Director of the White House Office of Science and Technology Policy.

Krauss, author of the best-selling book, The Physics of Star Trek, received the 1999-2000 AAAS Public Understand- ing of Science and Technology Award. Established in 1987, the award honors those who improve communication between the scientific community and the public.

In addition to The Physics of Star Trek, Krauss is the author of The Extraordinary Ordinary World, The Physics of Star Trek, The Search for Dark Matter in the Universe, Fear of Physics, and Beyond Star Trek. He has a book under way called Genesis: The Lives of an Atom, which will be a companion to a five-part PBS series. Krauss says his quest is to remove "the nonsense and non-science" from the public debate.

Krauss’s work has been featured in the pages of PBS’s previously written articles, the New York Times, and countless other media appearances. He has given more than 300 lectures and media interviews, and is a frequent contributor to the op-ed pages of the New York Times.

Lawrence Krauss

Neal Lane
The Imprisonment of Dr. Wen Ho Lee

By Edward Gerjuoy

Editor's Note: What follows is an excerpt of Edward Gerjuoy's article. The full text is available in the April Online edition at http://www.aps.org/ pubnews/ (accessible to APS members only until May 2000.

A number of readers of APS News are aware, Dr. Wen Ho Lee—who until last year was employed by the Los Alamos National Laboratory (LANL)—is presently being held without bail in a penitentiary near Santa Fe, charged with violations of the Atomic Energy Act and Espionage Acts. This article describes the circumstances of Dr. Lee's arrest, incarceration and detention hearings, in rather greater detail than has heretofore been made public. Unless otherwise stated, this article is based solely on the transcripts of Dr. Lee's bail hearings in federal district court and on the information compiled in the course of his defense.

Dr. Lee is 60 years old and a native of Taiwan. He received his mechanical engineering Ph.D. from Texas A&M in 1969, and a Master of Business Administration in 1984. In 1970 he became a naturalized US citizen.

The conditions of Lee's incarceration have been... disturbingly inhumane.

Dr. Lee was hired by LANL in 1989, and worked at LANL until he was fired on March 8, 1999. About a year after being hired, and after receiving a Q clearance, he was assigned to LANL's X Division, which is responsible for very sensitive nuclear weapons weapon design codes and design. On or about December 23, 1998, he was transferred to the LANL X Division, where he worked on unclassified tasks for the remainder of his tenure at LANL. Between March 8 and December 10, 1998, when he was arrested under an indictment whose terms are described below, Lee was unemployed; during this interval he resided at his home. On December 10, 1998, he was arrested under an indictment whose terms are described below; Lee was employed; during this interval he resided at his home in White Rock, New Mexico, a small community in the Los Alamos area, under around-the-clock surveillance by the FBI, who followed both him and his wife wherever they went. He has been imprisoned since December 10, 1999, on the government's contention that he is both a danger to this nation and a flight risk.

The conditions of Dr. Lee's incarceration have been, and continue to be, disturbingly inhumane. Lee's briefs assert, without contradiction, that Lee was denied access to any newspapers or magazines while in jail; Lee was also denied access to any newspapers or magazines while on bail. Lee was allowed to have books only if they were mailed directly to him from the bookseller; i.e., his family could not bring him any books; that he was not permitted to have any contacts with other prisoners; and that the one hour a day when he was released from his cell had to be spent in isolation, i.e., never seeing anyone else. Lee's counsel has further informed me that Lee's incarceration conditions recently have been eased somewhat, in that now (February 28, 2000, the date this article was submitted to APS News) he is allowed a daily newspaper; that speaking Chinese during family's visits is forbidden, i.e., all conversations must be in English; in the presence of an FBI operative who attended all family visits; that his attorneys and his immediate family; that his phone would not adequately ensure the appearance of conditions of pretrial release "that will reasonably assure the appearance of Dr. Lee as required and the safety of... the nation." Judge Parker's holding has been appealed to the next higher court, the Tenth Circuit Court of Appeals, headquartered in Denver, whose only superior is the US Supreme Court.

The government's witnesses in the two detention hearings, in addition to two FBI Special Agents and a Federal "Pretrial Services Officer," were: Dr. Stephen Younger, LANL associate director for nuclear weapons; Cheryl Wampler, LANL deputy group leader for computing services; Dr. Richard Krajick, Deputy Division Director of the LANL Division; John Romero, team leader for one of LANL's nuclear weapons design codes; and Paul Robinson, President of Sandia National Laboratories. The issue before the court in these hearings was whether Lee should be denied bail, not whether Lee was guilty of the charges in the indictment. Lee's only witnesses were Jean and Don Marshall, his married neighbors for 19 years. Although Mark Halburns were Q-cleared X Division employees, they had not worked on the same projects as Lee and merely testified to Lee's good citizenship and concerned and caring family.

To want to take revenge against the United States for revenge is one of the single largest motivating factors for persons who commit espionage. Lee's counsel testified at Lee's belated bail hearing that Lee had no familial or personal motivation for espionage and that Lee was "persuaded by the government's claim that if the downloaded files were as classified as claimed they infringed Lee's Fifth Amendment rights. Dr. Robinson testified that "the tapes represent a portfolio of information that would allow one to develop a simple, easily manufacture weapon such as a terrorist weapon all the way up to the very best that the United States is capable of designing.

"I have got to say that this Court, I believe, faces a you-bet-your-country decision.

The government's witnesses included the testimony to hold Lee without bail was initiated before US District Court Judge James Parker. Judge Parker's order on the magistrate judge's order, in a written opinion which held there was no combination of conditions of pretrial release "that will reasonably assure the appearance of Dr. Lee as required and the safety of... the nation." Judge Parker's holding has been appealed to the next higher court, the Tenth Circuit Court of Appeals, headquartered in Denver, whose only superior is the US Supreme Court.

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