Science Advisors Past and Present Gather at APS Centennial

F ormer presidential science advisors from the days of President Dwight D. Eisenhower to the present gathered at the APS Centennial meeting in Atlanta for a special panel discussion on science policy past and present, reminiscing about their days in the White House with an eye to the future. [Current science advisor Neil Lane was scheduled to participate in the historic gathering, but was called back to Washington; his remarks were presented via videotape.]

Although session chair D. Allan Bromley joked that US President Thomas Jefferson “had the best science advisor” — namely, himself — and presidents have long sought scientific counsel, yet the position of national science advisor did not become official until James Killian was appointed to that post under Eisenhower. And while the role has changed since then, some common issues and concerns have endured. Don Hornig, who succeeded Killian under Eisenhower in 1960, recalls his tenure being dominated by three major issues: the Cold War with the Soviet Union, the space program, and basic research and education. The Vietnam War overshadowed the White House during the time that Ed David served under President Richard Nixon. He also found himself struggling with the cold war of the energy crisis at its peak. “We were just beginning to realize that the environment, energy, and economic problems were all interwoven and we still haven’t solved them,” he said. “It may be difficult to admit now that the science and technology community has handed society to the future.”

Frank Press, science advisor under President Jimmy Carter, found himself struggling to improve government ties to American industry, and Administration’s awareness of issues of competitiveness and innovation. Concern over America’s industrial leadership and competitiveness also figured prominently during the tenure of Jay Keyworth, science advisor to President Ronald Reagan.

The next generation of MRI machines will use high-temperature superconductors, as well as hot oil embargoes against the US, as well as setting NASA R&D priorities in the wake of the Apollo program’s success. Guy Stover, who served under President Gerald Ford, came on board when that energy crisis was at its peak. “We were just beginning to realize that the environment, energy, and economic problems were all interwoven and we still haven’t solved them,” he said. “It may be difficult to admit now that the science and technology community has handed society to the future.”

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APS Joins Other Scientific Organizations To Endorse Statement on DOD S&T Funding

The APS, along with the American Institute of Physics (AIP) and the Optical Society of America (OSA), has joined sixteen other scientific and engineering societies to endorse the FY 2000 budget for the Department of Defense’s Science & Technology Program (S&T Program) to $8 billion. This represents a 2.6% increase over the current FY 1999 budget, and an 8% increase above the Administration’s proposed budget. This increase will help stabilize funding that would decline at a precipitous rate in FY 2000, and in the projected out-years in DOD’s five-year plan. This decrease undermines the scientific and technology base that is essential to U.S. security in the 21st century.

DOD’s S&T Program supports research in the nation’s universities that is the bridge between fundamental science discoveries and future military applications. DOD support of university research also plays a critical role in sustaining disciplines where it is a major source of federal funding. These disciplines make essential contributions to national defense by fueling innovation and training the scientists and engineers of tomorrow.

The S&T Program also funds research in the DOD laboratories, and provides a critical role in sustaining disciplines where it is a major source of federal funding. These disciplines make essential contributions to national defense by fueling innovation and training the scientists and engineers of tomorrow. The S&T Program also funds research in the DOD laboratories, and provides a critical role in sustaining disciplines where it is a major source of federal funding. These disciplines make essential contributions to national defense by fueling innovation and training the scientists and engineers of tomorrow.

The statement, endorsed by the APS Executive Committee and issued by the recently formed Coalition for University Research also plays a critical role in sustaining disciplines where it is a major source of federal funding. These disciplines make essential contributions to national defense by fueling innovation and training the scientists and engineers of tomorrow.

Eight billion dollars in FY 2000 for DOD’s S&T Program would support the scientific and engineering research that has produced today’s preemptive U.S. forces demonstrated most recently during Desert Storm and other peacekeeping missions. It is the continued investment in DOD’s S&T Program that will maintain this technologically superior force for the 21st century.
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 Schaeffer Genth, Gnomon Research
Editor: Barrett Ripin
With contributions by Harry Ludvig, R. Mark Wilson, and others.

Scientific Announcements at Meetings

The Bulletin of the American Physical Society published reports and abstracts of APS meetings from 1899-1903, when the Physical Review took over this job. BAPS was revived in 1925. (See Lessons from BAPS on page 3)

A. Title page of a 1902 BAPS issue listing important papers by Michelson and Rutherford.

B. Abstract of a contributed paper by Bohr and Wheeler, which was among the first on fission presented at an APS meeting (April 1939).


Speaking of Physics...

Scientific communication was the principal object of the early APS and the Physical Society's roots and ties.

Meeting

Meetings were held at Columbia University, the National Bureau of Standards, and jointly with the physics section of the AAAS. These early venues reveal the Society's roots and ties.

APS News in 1910 continued the policy of sending advance information on meetings of the Society to members, and to report the Society to the membership and to its friends and associates.

What's in a Name?

Since the inception of Phys. Rev. and APS, some have been misled by the word physical in their titles. They assumed that the institutions promoted good health or physical. The problem persists to the present day, when venture capitalists have tried to buy APS and the U.S. Post Office has compared Phys. Rev. Letters to periodicals such as boxing world.

Next month: Growth in Membership and Meetings
Lessons from BAPS: Vol 1 (Second Series) by Harry Lustig, Sknte FE NM

The Bulletin of the American Physical Society (BAPS) was founded in 1925 following the Assembly, and it is the society's flagship publication. BAPS is refereed by the American Physical Society (APS) and is an official publication of the American Physical Society (APS). The primary purpose of BAPS is to provide a forum for the exchange of information among physicists and to assist in the advancement of physics.

Northwest Section Holds First Regional Meeting

Physicists from a wide range of sub-fields in physics gathered in British Columbia, Canada, for the first meeting of the APS Northwest Section, held at the University of British Columbia in Vancouver, 21-22 May. More than 70 contributed abstracts were received, once again demonstrating the growing geographical section, and 72 of the 189 registered participants were students. This first meeting was very successful both on and off the program. The meeting was supplemented by such social activities as a Thursday evening reception, Friday evening's dinner and wine, and a pizza session on Saturday evening following the completion of the technical program.

In a Friday morning plenary lecture, Craig Hogan, University of Chicago, discussed using supernovae to survey spacetime. Deep surveys of many kinds since 1912 have made it clear that, averaged over large volumes, are nearly uniform and uniformly expanding with time. Within this simple framework, however, we have to accommodate observable universes with various spatial geometries and expansion histories. According to Hogan, exploding stars called Type Ia supernovae now give a brightness standard for measuring large distances with sufficient precision to begin to measure the history of the cosmic expansion and the large scale geometry of space. Two international teams of researchers have recently succeeded in obtaining high quality data on these objects. The tension between 0.5 and 1.0 is such that the universe may be bigger and emptier than we expected, and likely to expand more than it already has. The rate of expansion may even be accelerating, a sign that the universe may be driven apart by the repulsive gravity of an exotic new form of energy such as the cosmological constant.

Other plenary speakers included Joseph Silk of Duke University, who presented a view of the early universe, and John Bahcall of Princeton University, who discussed both the cosmological and astrophysical aspects of supernovae.

During some sessions, a number of plenary speakers were held in conjunction with the APS Northwest Section meeting. These plenary speakers included Craig Hogan, University of Chicago, who discussed the use of supernovae to survey spacetime, and Joseph Silk, Duke University, who presented a view of the early universe.

Friday afternoon featured a special focus session on exoplanets. The session was organized by Eric Vogt of TRIUMF, University of British Columbia, and included talks on the detection of exoplanets, the techniques used to study these objects, and the implications of exoplanet detection for our understanding of the universe. The session concluded with a panel discussion on the future of exoplanet research, which was moderated by Eric Vogt and included contributions from a number of leading experts in the field.

Friday afternoon also featured a special focus session on the history of physics, which was organized by John Stauffer of the University of British Columbia. The session included talks on the history of physics, with a focus on the development of quantum mechanics and the role of physics in the development of the universe. The session concluded with a panel discussion on the future of physics research, which was moderated by John Stauffer and included contributions from a number of leading experts in the field.

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Northwest Section Holds First Regional Meeting

The Northwest Section of the APS held its first regional meeting on Saturday, 21-22 May, in Vancouver, British Columbia, Canada. The meeting featured over 70 contributed abstracts and was supplemented by a Thursday evening reception, Friday evening's dinner and wine, and a pizza session on Saturday evening following the completion of the technical program. The meeting was successful both on and off the program, with social activities such as a Thursday evening reception, Friday evening's dinner and wine, and a pizza session on Saturday evening.

Lessons from BAPS: Vol 1 (Second Series)

BAPS is the Bulletin of the American Physical Society, which was founded in 1925 following the Assembly of the American Physical Society in New York City. The Bulletin is an official publication of the American Physical Society (APS) and is an official publication of the American Physical Society (APS). The Bulletin is published in two series: the First Series, which covers the history of physics, and the Second Series, which covers the history of physics research.

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**FESTIVAL PROFILE**

**Foam: Food for Thought**

Beer is head food with universal appeal, judging by the physicists and general public alike who crowded into the Georgia Pacific Building auditorium in Atlanta at the end of the hectic, week-long APS Centennial meeting to hear Emory University’s Sid Perkowitz. There he elucidated not only the physics of beer, but also of trivia, souffles, Monthlies, mousses, whipped cream (both real and “non-dairy”), cappuccino and latte, marshmallows, champagne, carbonated soda and other foamy food and drink.

“There is a lot of science, technology and just sheer human ingenuity that goes into some of these foods, and the techniques employed [to create them] are highly evolved, some dating back thousands of years,” said Perkowitz.

Born and raised in New York City, Perkowitz recalls gravitating towards science early on in childhood, an interest fostered by the physics and mathematics of soap bubbles, the physics and mathematics of beer, and by the activities found in shaving cream. “I think science for me was kind of an escape from emotional turmoil, along with reading and other intellectual activity,” he says. “It was a way to operate in a world where human mesiness doesn’t enter in to a certain extent. I wouldn’t be surprised if the same were true for other people in the field as well.”

A graduate of the Polytechnic Institute of Brooklyn, he went on to earn his PhD in solid state physics from the University of Pennsylvania. He has written for many newspapers and magazines, and authored the book says. He has written for many newspapers and magazines, and authored the book

**The Astronomer’s Drinking Song**

**Author Unknown**

It should come as no surprise to anyone that astronomers have their very own drinking song. [All that nighttime star-gazing is bound to work up a thirst.] Not surprisingly, given the esoteric nature of the profession, the quality of the lyrics is several cuts above the old college standard, “99 Bottles of Beer on the Wall.” The author is unknown, but the notation “written about 1880” is included in the Augustus De Morgan’s Budget of Paradoxes (1866). And is to be sung to the well known ditty “The Vicar of Bray.”

Now if only we could locate a physicists’ drinking song...
Putting a New Spin on MRI with Laser-Polarized Nobel Gases

Researchers at several institutions around the US reported—progress toward developing next-generation magnetic resonance imaging (MRI) technology, to image the respiratory system during the APS Centennial meeting. Minimally-invasive, high-resolution imaging is expected to have critical applications in respiratory medicine, including surgical pre-screening, assessing disease progression and response to therapy, investigating fundamental lung physiology, and providing a better understanding of pulmonary effects of harmful agents.

According to Ron Walsworth of the Harvard-Smithsonian Center for Astrophysics (HSCA), the respiratory system has been the most challenging for non-invasive medical imaging. The current clinical methods involve measuring lung motion using x-ray tomography of inhaled radioactive isotopes, which provide mediocre image resolution imaging is expected to have critical applications in respiratory medicine, including surgical pre-screening, assessing disease progression and response to therapy, investigating fundamental lung physiology, and providing a better understanding of pulmonary effects of harmful agents.

The HSCA team recently demonstrated laser-polarized noble gas imaging using a simple, low-cost MRI system that provides a magnetic field about 1,000 times smaller than conventional MRI machines. Advantages include the possibility of using a geometric magnets instead of the claustrophobia-inducing closed magnets used in many hospital MRI units, says Walsworth—as well as low-cost portable MRI instruments for imaging lungs and sinuses. Furthermore, using gases and low magnetic fields will aid in such non-medical applications as imaging porous materials and the interior of metallic objects.

A group of researchers at the University of Michigan are investigating MRI using a similar customized laser optical pumping system to polarize molecules of xenon gas, delivered via single-breath doses. According to Scott Swanson, U-M Professor of Nuclear Medicine, xenon has several advantages over MRI. ‘The gas dissolves in the bloodstream is non-reactive and safe in measured doses, and can be polarized in higher concentrations than water molecules. It also differentiates between tissue, blood, and gas.’

‘While many technical obstacles remain before the technology is ready for human use, our results indicate it could be used to monitor perfusion through the heart, respiratory mechanics, and entire self-assembling optical bench erected around the US reported—progress toward developing next-generation magnetic resonance imaging (MRI) technology, to image the respiratory system during the APS Centennial meeting. Minimally-invasive, high-resolution imaging is expected to have critical applications in respiratory medicine, including surgical pre-screening, assessing disease progression and response to therapy, investigating fundamental lung physiology, and providing a better understanding of pulmonary effects of harmful agents.

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Walecka received a PhD from MIT in 1958. He spent a year at CERN and another at Stanford on an NSF postdoctoral fellowship before joining the Stanford faculty in 1969. He became Professor Emeritus in 1987. In 1986, Walecka was appointed Scientific Director of the Jefferson National Accelerator Facility, and served in that capacity until 1992, where he took a joint appointment as Senior Fellow at CEBAF and Governor's Distinguished CEBAF Professor at the College of William and Mary. In 1987, he joined the physics faculty at the College of William and Mary, where he has been active for many years in advising U.S. government agencies on the application of research in physical sciences, optoelectronic and electronic devices, fiber optics and related areas. Previously he was Executive Director of the Physics Division at AT&T Bell Laboratories and President of Research at Sandia National Laboratories in Albuquerque, NM. He received his PhD (physics) degree from the University of Massachusetts in 1965. He joined Bell Laboratories in 1966 and held the position of Director of the Physical Research Laboratory from 1981 until moving to Sandia in 1984. He returned to Bell Laboratories in 1987 to become Executive Director of the Physics Research Division. In 1993, he became Physical Sciences Research Vice President, his current position. He has worked on theories of condensed matter and his early work also involved the theory of excitations in metals and other highly correlated Fermi liquids. This resulted in a new approach to highly correlated liquids in terms of almost localized liquids. As manager of an industrial research organization with a budget of $200 million, he is strongly interested in improving technology conversion and improving the connection between research and products. W. F. Brinkman was the recipient of the 1994 George Pake Prize.

As of 1993, Brinkman’s responsibilities include the direction of research in physical sciences, optoelectronic and electronic devices, fiber optics and related areas. Previously he was Executive Director of the Physics Division at AT&T Bell Laboratories and President of Research at Sandia National Laboratories in Albuquerque, NM. He received his PhD (physics) degree from the University of Massachusetts in 1965. He joined Bell Laboratories in 1966 and held the position of Director of the Physical Research Laboratory from 1981 until moving to Sandia in 1984. He returned to Bell Laboratories in 1987 to become Executive Director of the Physics Research Division. In 1993, he became Physical Sciences Research Vice President, his current position. He has worked on theories of condensed matter and his early work also involved the theory of excitations in metals and other highly correlated Fermi liquids. This resulted in a new approach to highly correlated liquids in terms of almost localized liquids. As manager of an industrial research organization with a budget of $200 million, he is strongly interested in improving technology conversion and improving the connection between research and products. W. F. Brinkman was the recipient of the 1994 George Pake Prize.

Lu is a condensed matter theorist, educated at Pui Ching Middle School, Hong Kong; Portsmouth College of Technology, Portsmouth; Imperial College, University of London (BC); University of Cambridge, England (PhD). After three years as a research associate at University of California, San Diego, a year as an assistant professor at University of California, Irvine, and a year as a reader in applied mathematics at Queen Mary College, University of London, he returned to join the physics faculty in San Diego. For Pure and Applied Physical Sciences (1991-95), and Chair, Department of Physics (1995-98). Lu’s research is mainly concerned with the interplay of many-body and charge effects in solids. He has been working on the electron-phonon interaction, electronic properties and non-linear optical processes in semiconductor heterostructures. He served four years concurrently on the Executive Committee for the Division of Condensed Matter Physics and as a General Councillor.

Curran is Professor of Physics and Chairman of the Physics Department at Princeton University. He works in theoretical elementary particle physics and his research has covered a wide range of topics, including the phenomenology of K-meson decays, the role of the renormalization group in QCD and the use of string theory to explain black hole entropy. He received his Ph.D. in physics from Princeton in 1964. After a postdoctoral year at Princeton he held an assistant professorship in the Harvard Physics Department and a long-term membership at the Institute for Advanced Study. In 1972, he returned to Princeton as Professor of Physics and has remained there ever since. Apart from his teaching and research responsibilities, he has been active for many years in advising U.S. government agencies on the applications of science and technology to national security problems. He has recently been very interested in the opportunities for physics and physicists in post-genomic biology and is working on the planning for an interdisciplinary Center for Genomic Analysis at Princeton.
Science Advisors, continued from page 1

the creation of the Korean Institute of Science and Technology as one of the highlights of his tenure. David, a pioneer of speech recognition in computers, laments that he was unable to introduce computers to the White House during his stint, although they are now integral to government operations. As for secretaries, he says, "I am not one to be forgotten to survive," he joked. Stevers regrets the stalled talks with the Soviet Union due to increasing pressure on Nixon from the Watergate scandal, but considers his work re-establishing the Office of Science and Technology in the White House under Ford to be the greatest pleasure, as it "put the issue of S&T on the national agenda."

BAPS, continued from page 3

chairman, K.T. Compton, on Doelelectric Constants and Molecular Structure. Compton’s chairmanship of AAS’s Section B illustrates the continued close connection and interlocking directorships of AAS and APS.

All of the APS meetings sported a dinner at a hotel or club. The cost of these dinners was around $20. The local chapters paid the bills. The APS underwrote the costs. All of the APS dinners dropped to $1.25-$1.50 in Washington, evidently reflecting the Depression. In the 1930s, the rate for a single room at the Hotel Pennsylvania, in New York City, was $3.50. The Bulletin (six issues) could be subscribed to for $1.00 per year.

Guarantors, Membership and Other Information

In addition to programs, abstracts, and announcements of future meetings, the Bulletin, in 1925-26, included notices of oversubscription of the constitution and bylaws of the Society. The second was the lengthy Report by the Educational Committee of the American Physical Society on The Teaching of Physics – With Special Reference to the Teaching of Physics to Students in Agriculture. It was the fourth (and last) in a series of APS reports on the teaching of physics to various student constituencies and it amplified the preceding years’ involvement, if intermittent, with education.

The most voluminous non-meeting oriented section of the Bulletin was the Membership List of July 1926. There were seven honorary members.

involved in the initial design and later the field testing of some of the world’s largest electrostatic ion beam accelerators. Norton’s responsibilities involve all phases of customer relations, product development and promotion of electrostatic accelerators and complete beam line analysis and materials modification systems. This involves the adaptation of the principles and techniques developed in experimental nuclear physics for use in a wide variety of applications. Norton is a member of the Division of Nuclear Physics, Nuclear Physics of Beams and the Forum on Industrial and Applied Physics.

STUART J. FREEDMAN
Professor of Physics, University of California at Berkeley; Faculty Senior Scientist, Lawrence Berkeley National Laboratory; Fellow of the American Physical Society

Freedman is an experimental physicist working in areas of nuclear and particle physics. He has held a joint appointment in the Berkeley Physics Department and the Lawrence Berkeley National Laboratory since 1991. His research focuses on problems related to the fundamental structure of protons, symmetry breaking, neutrino mass, and particle searches. Freedman received his PhD in 1972 from Berkeley for his experimental test of Bell’s inequality with a two-photon cascade in atomic calcium. He was instructor and lecturer working in nuclear physics at Princeton University until 1976 when he left to become assistant professor at Stanford University. He joined the Argonne Physics Division in 1982 as Staff Physicist, becoming Senior Physicist in 1986. In 1987, he joined the Chicago Physics Department as Professor joint with Argonne National Laboratory. He conducted experiments in nuclear physics and nuclear astrophysics at a number of small accelerators and neutron experiments at the LAMPF accelerator in Los Alamos. He returned to Berkeley in 1991. He was the 1999-2000 chair of the Division of Nuclear Physics.

BERTRAM BATLOGG
Department Head, Bell Laboratories, Lucent Technologies

Batlogg is department head for the Materials Physics Research Department at Bell Laboratories in Mummy Hill, NJ. His research is in the area of materials-based condensed matter physics with the goal of creating and understanding new materials and their phenomena, and exploiting them for applications. He received his PhD in Physics from the Swiss Federal Institute of Technology in Zürich, and the Doctorate in Natural Sciences degree also from ETH in 1979. He joined Bell Laboratories the same year and in 1986 became department head, first of the Solid State and Physics of Materials Research Department, then of the Materials Physics Research Department. Within the APS, he served the Division of Condensed Matter Physics in various functions and is also a member of the Division of the Materials Physics and the Forum on Industrial and Applied Physics (RAP).
Nuclear Weapons After the Cold War

by W. K. H. Panofsky

T he Cold War is over but little has changed in respect to US nuclear weapons policy. Yet the nature of the threats against which nuclear weapons has shifted dramatically since the end of World War II. Today the likelihood of a nuclear attack against the US is much less than the risk of a nuclear weapon accident, unauthorized use, or the threat from the proliferation of nuclear weapons across the globe.

During the Cold War we saw a dramatic nuclear build-up, reaching a rate on the US side of more than 5,000 weapons per year. The current shift to a build-down of nuclear weapons, proceeds at a rate of around 1,500 per year. The peak of the build-up, which peaked at over 60,000 nuclear weapons—an immeasurable fact—was considered to be one nuclear weapons, with the explosive power of about one-tenth of the average weapons in current stockpiles, killed about 100,000 people in Japan. The build-up continues as the Cold War peak by about one only.

One reason for this is that nuclear weapons are still viewed by many as an important and realistic tool for deterring threats. Although many have argued that nuclear weapons are still an effective tool to deter nuclear attack, the reality is that nuclear weapons have not been used in anger. The threat of nuclear proliferation is a constant reality. The United States has no intention of using nuclear weapons as an international norm exists.

Nuclear weapons are still viewed by many as a symbol of power. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely motivated by politics, not by a profound and realistic analysis of security needs. The recent nuclear tests in India and Pakistan were largely mot