"should be encouraged to do what it has already shown it can do well: public information, including working with science writers and creating and distributing educational materials for the general public; data gathering and analysis; and the management of sizable programs (this could include the Physics Olympiad, as well as visiting-scientist programs)." Ford told PHYSICS TODAY that he now has a larger vision of what AIP might do in education.

Ford will take office as AIP executive director at the end of March. "Until then," he said, "I have a job to do for APS, but I will spend as much time as I can learning about AIP. It is nice to be stepping into a financially healthy organization in which there is so much depth of talent.

"AIP was formed to serve the societies," he went on. "It can do that not only through efficient publishing and business services, but also through broader service to the physics community and, on behalf of physics, to the general public."

Ford has raised seven children (three are in college this year, and one is a graduate student). He admits to a special fondness for New Mexico. He is an instrument-rated commercial pilot and has logged over 3500 hours in airplanes and gliders. He now makes his home in Philadelphia, where his wife Joanne teaches school.

# Corporate Associates meet at Exxon R&E

Each year the American Institute of Physics holds a meeting with representatives of its Corporate Associates—some 105 research-oriented firms that provide AIP with moral, material and intellectual support. This year the Corporate Associates Meeting took place at Exxon Research and Engineering Company in Annandale, New Jersey, on 21–22 October.

Greeting participants at Exxon's sprawling new red-brick research facility near New Brunswick, David R. Clair, president of Exxon R&E, talked about the difficulties of realizing the commercial potential of science. Clair, a businessman by training, assured his audience of academic, government and industry physicists of his faith in the ongoing scientific process. "A lot of onions are a long way from being peeled," he said.

In recent years the Corporate Associates meetings usually have taken place over two days at a host company's research facility, with the first day devoted to current advances in some area of physics of interest to the host lab, and the second day to broader scientific developments and matters of public policy.

This year the initial morning was devoted to the physics of complex materials, and the topics for the most part would be classified as basic research, though each talk also connected with the practicalities of the petroleum industry. Generally the talks were about the structure and dynamics of complex fluids and of disordered and inhomogeneous materials.

Aaron Bloch, the director of the physical-sciences laboratory at Exxon R&E and the main organizer of the technical presentations, observes that the study of disordered systems has emerged as a principal frontier in condensed-matter physics and that this emphasis coincides with the needs of the energy industry, much as discoveries in semiconductors coincided with the needs of the information industry 30 years ago. A decade ago, Bloch notes, basic concepts like fractals and tools such as synchrotron-radiation sources were not yet sufficiently developed to be of use in the study of disordered systems.

**Technical sessions.** The first scientific talk in the morning session was given by James Langer on pattern formation in crystal growth. Langer is a professor at the University of California, Santa Barbara, and is associated with the Institute for Theoretical Physics. His lecture was largely devoted to the fundamental conditions that determine the rates and geometries of growth in fractal and fractal-like structures such as dendrites.

The next talk, by Pierre-Gilles de Gennes, was on interface dynamics and wetting. De Gennes, known for his work on superconductivity, polymers and liquid crystals, is a professor at the Collège de France and is associated with Exxon R&E. He talked mainly about how polymers are attached to surfaces by adsorption, grafting or molecular interaction using sequential copolymers with soluble and insoluble components.

David J. Wilkinson, program leader at Schlumberger–Doll Research in Ridgefield, Connecticut, discussed multiphase flow in porous media, in which the same patterns are found that Langer analyzed in crystals. Sabyasachi Bhattacharya, a staff physicist with Exxon R&E, elucidated the dynamics of ordered fluids.

The morning session closed with an account by Charles P. Slichter of how metal catalysts are probed with nuclear magnetic resonance. Slichter is a professor at the University of Illinois who works closely with John Sinfelt at Exxon. Because of the large surface areas needed for experiments employing nuclear magnetic resonance, one needs the metal in the form of small particles, as in real catalysts.

**'PRTs.'** After lunch in a two-tiered dining area looking out on the New Jersey countryside, resplendent with sun-bathed autumn foliage, the afternoon started with a talk about existing and proposed photon sources.

Exxon's David Moncton provided a comprehensive list of synchrotron-radiation sources, including Argonne's proposed "advanced photon source," and he explained how "participating research teams" have been a handy means of involving industrial researchers in synchrotron work.

Described by Moncton as a "straightforward mechanism for doing proprietary research," the participating research team is a concept developed by Martin Blume of Brookhaven National Laboratory. The PRT buys and owns beam time, enabling researchers to move quickly and take risks without worrying about peer or bureaucratic review until afterward, Moncton explained.

A final afternoon talk, by Brian Flannery, was on three-dimensional x-ray microtomography. Flannery, a mathematician who works on data reduction, left an associate professorship at Harvard to work at Exxon. Using a synchrotron x-ray source, Flannery said, he and his colleagues have developed a device that can produce three-dimensional digital maps of a sample's internal structure, without damaging the sample, with 1-micrometer resolution and 1% accuracy. One of the most challenging aspects of the project, he indicated, has been the development of software for data processing.

Following Flannery's talk, attendees were free to wander at will among 12 laboratory stations scattered around Exxon's huge research building. The exhibits that were of special interest to physicists included the ones devoted to x-ray microtomography; Ronald E. Rosenzweig's innovative technique for magnetically stabilizing a gas-fluidized bed (which the American Institute of Chemical Engineers recognized last year by honoring Rosenzweig with the Alpha Chi Sigma Award); Harry W. Deckman's application of microfabrication processes to self-organizing systems to form molecular-scale porous media; Hans Thomann's use of electron spin echoes as a probe of disordered solids; and the investigation of magnetic properties of catalysts by a group that includes Bernard G. Silbernagel.

The day ended with a cocktail party at the local Hilton hotel, a dinner and an after-dinner talk by Michael F. Barnsley, a mathematician at the Georgia Institute of Technology. Barnsley's

## Scientific groups welcome Orlov to US

Yuri Orlov and his wife Irina L. Valitova were welcomed and honored at a reception on 15 October at the New York Academy of Sciences, following Orlov's arrival in the United States a week before from the Soviet Union. In the photo, Orlov is flanked on his right by Sidney Drell, president of The American Physical Society, and on his left by his translator, Catherine Fitzpatrick of Helsinki Watch. The reception was cosponsored by the New York Academy, the Committee of Concerned Scientists and APS, and it was hosted by William Kane, president of the academy; Heinz Pagels, the academy's executive officer; Joel Lebowitz, representing the Committee of Concerned Scientists; Malvin A. Ruderman, representing Scientists for Sakharov, Orlov and Shcharansky; Peter Schmidt, representing CERN's Orlov Committee; and Drell.

In an introductory speech, Drell said that Orlov has long been well known to the international physics community as a distinguished theoretical physicist who has made "fundamental contributions to the theory of how accelerators work, in particular radiation-damping theory and electron synchrotrons." In 1973, Drell said, "we first began to know of him in addition . . . as a humanitarian of great principle," and since 1978, when he was arrested, "we have begun to know him as an individual of enormous bravery and strong character." Drell expressed the feelings of many physicists at the reception who looked forward to the prospect of resuming collaborations with Orlov.

One of the most remarkable things about Orlov, Ruderman observed, is "how, in the face of the really terrible conditions in the prison camp, exacerbated by long stretches in solitary confinement, followed by exile in Siberia in what was initially an extremely hostile environment, he nevertheless managed to produce seven scientific papers, two of which have been published."

Orlov, speaking Russian, opened his brief remarks by telling the audience of some 150 scientists and human-rights activists that he was "very touched, endlessly touched." Urging his audience to persevere in their efforts on behalf of Soviet scientists, Orlov said: "It is important to say that I was so isolated for a period of many years that I didn't know, I simply didn't know, about the great efforts that you had engaged in. . . . It's a little embarrassing for me to admit it now, but sometimes I was seized by a feeling of loneliness, the feeling that I was abandoned. Fortunately I was mistaken."

Concluding his remarks, Orlov advised his audience not to worry about what Soviet authorities will say or think and instead to adhere to Tolstoy's advice: "Do what you must, and let things be as they may."

discussion of fractal-image encoding was of particular interest to physicists who are working on the development of electronic cameras—cameras that woud dispense with film.

**Policy session.** Opening the next day's meeting with a ringing denunciation of mediocrity in US education, D. Allan Bromley of Yale University claimed that he once received a thesis at Yale from a Harvard BA that opened with the sentence, "This field of research is so virginal that no human eyeball has ever set foot in it."

Summarizing the findings of the Packard panel of the White House Science Council, on which he served as vice-chairman (PHYSICS TODAY, March, page 65), Bromley characterized university research as suffering from shortages of equipment, facilities and faculty, shortages of computer scientists and engineers, and shortages of incoming US students—a problem associated with the failure of pre-college education in the United States to meet world standards.

Taking a different tack, Alan L. McClelland, an assistant to the vice-president at Du Pont, said he and his colleagues "see no major shortages and believe we are getting the best scientists and engineers ever." McClelland expressed the belief that the educational system on the whole is working well, despite some "troubling demographics."

What did worry McClelland was the general state of scientific literacy in the United States and the suspicion in which science is held by much of the public. Observing that Latin and Greek once were the core of the educated person's curriculum, McClelland feared that physics and chemistry may follow them into general oblivion. What would help, he argued, would be to take a cue from musical instruction and focus on the distinction between the teaching of performance and the teaching of appreciation.

Following McClelland came a plea for unfettered research by Donald Braben, head of the Venture Research Unit of British Petroleum Ltd. Venture operates on the philosophy, Braben claimed, that we need to support "credible heretics," select "curiosity-driven research," recognize that "disciplinary boundaries don't exist" and be on the lookout for "subtle blindnesses."

The policy sessions ended with a talk by Shirley Malcom of the American Association for the Advancement of Science, who spoke mainly about a recent report by the Carnegie Foundation's task force on teaching as a profession. As described by Malcom, the report calls for teacher and advanced teacher certification by a national board; the development of standards based on what teachers need to know; restructuring the school system to give teachers more support and more autonomy; phasing out the undergraduate education degree; and development of a new curriculum, leading to a master's in education, that would stress content as well as method.

Following Malcom's talk, AIP Governing Board Chairman Hans Frauenfelder heartily endorsed the call for more substance and less method in the training of high-school teachers. He remarked on the good fortune he had as a high-school student in Schaffhausen,

Switzerland, to be taught by a brilliant physicist who had been one of Einstein's closest friends—Konrad Habicht, a member of the so-called Olympia Academy.

**Physics frontiers.** The final sessions on frontiers in physics ranged from the very small to the very big. Robert B. Laughlin of Lawrence Livermore Laboratory described the theoretical work on the fractional quantum Hall effect. James L. Smith, a fellow at the Los Alamos National Laboratory, followed with a talk about heavy electrons. Smith, contrasting his subject with Laughlin's, emphasized the absence of a credible theory.

Moving to the big, Albert R. Hibbs of the Jet Propulsion Laboratory gave a beautifully illustrated lecture on the Voyager 2 probe of Uranus. Particularly absorbing was his description of how Voyager's navigators overcame various technical obstacles to obtain the superb photographs of Uranus and its moons that they finally got. By the time Voyager reached Uranus, Hibbs said, it was "arthritic, semi-senile and somewhat deaf"—that is, there was a problem with its camera arm, it had lost half its computer memory and, to communicate with one of its radios, transmitters on Earth had to compensate for Doppler effects in advance.

Wallace Broecker of Columbia University and Lamont–Doherty Geophysical Laboratory gave the concluding talk on $CO_2$ greenhouse effects, which he considers cause for serious concern. Citing evidence from ice borings done in Antarctica by teams from Grenoble and elsewhere, Broecker said that there was no change in the $CO_2$ composition of the atmosphere until around 1800, when it started to rise steadily. If it were to double in the next century, which seems likely in light of the historical evidence and current environmental trends, the Earth's temperature might increase by 2.5–4.5 °C, Broecker said.

—William Sweet

## Goldsmith receives AIP science-writing award

Donald Goldsmith, an astronomer who currently works as a tax attorney with Pillsbury, Madison & Sutro in San Francisco, is the 1986 scientist winner of AIP's Science Writing Award in Physics and Astronomy. Each year AIP makes two science-writing awards, one to a scientist and one to a journalist. Goldsmith won the scientist award for his book *Nemesis: The Death Star*, which was published by Walker & Company in New York.

Goldsmith received a BA from Harvard University in 1963 and a PhD in astronomy from the University of California, Berkeley, in 1969. After postdocs at Berkeley and Stanford University's Institute for Plasma Research, Goldsmith taught at the State University of New York at Stony Brook from 1972 to 1974. After that, while working as a science writer and studying law, Goldsmith held temporary and part-time teaching positions at the University of California campuses in Berkeley, Santa Cruz and Irvine; Stanford University; and Chabot College in Hayward, California. He was a visiting professor at the Niels Bohr Institute in Copenhagen in 1977.

Goldsmith is the author of seven books and the editor of two. He served as a consultant to Carl Sagan's "Cosmos" public-television series, and he has just finished work on a program about the search for extraterrestrial intelligence, which was aired on 18 November, with Lily Tomlin as a narrator.

AIP Executive Director H. William Koch presented the science-writing award to Goldsmith on 22 October at a ceremony during the annual AIP Corporate Associates meeting at Exxon Research and Engineering Company in Annandale, New Jersey. The award consists of a $1500 check and a certificate.

## AAPM chooses Barnes to be president-elect for 1987

The American Association of Physicists in Medicine has chosen Gary T. Barnes as its president-elect for 1987. At the beginning of 1988 Barnes will succeed Paul L. Carson (University of Michigan), who becomes AAPM president at the beginning of 1987.

Barnes is a professor and director of the physics division in the department of radiology at the University of Alabama, Birmingham. He joined the department as assistant professor in 1972 and became associate professor in 1976, director of the physics division in 1976 and full professor in 1981.

Barnes earned his BS in physics at Case Institute of Technology, Cleveland, in 1964. He received a PhD in physics from Wayne State University in 1970. He was a trainee in medical physics at the University of Wisconsin, Madison, in 1971–72, and was awarded a BA in radiological physics in 1976.

Barnes has done research on x-ray image quality, scatter control, mammography, digital radiography and dual-energy imaging.

As an AAPM officer, Barnes would like to improve and publicize the scientific foundation of medical physics with improved documentation and education programs, encourage scientists and engineers to join AAPM and participate in its annual meetings, develop a long-range financial plan, and work with Federal agencies and other scientific societies to obtain recognition of the scientific contributions made by physicists in medicine.

BARNES

## Browder is named outstanding SPS chapter adviser in 1986

The Society of Physics Students has announced that J. Steve Browder, head of the physics department at Jacksonville University, is the recipient of the 1986 Outstanding SPS Chapter Adviser Award. He is to receive the award in a ceremony on 1 December.

Browder received his BA in physics from Rollins College in Winter Park, Florida, in 1961, and earned an MS in 1963 and a PhD in 1967 at the University of Florida. He held a postdoc at the University of Florida in 1968 and taught at Northwestern State University of Louisiana from 1968 to 1971, when he joined the faculty of Jacksonville University.

Browder has served as chapter adviser to the Jacksonville University chapters of SPS and Sigma Pi Sigma since 1971. Under his leadership, the Jacksonville University SPS chapter was the recipient of Outstanding SPS Chapter Awards in 1983–84, 1984–85 and 1985–86.

## in brief

The Health Physics Society, which represents professionals in occupational radiation protection, and the National Bureau of Standards have launched a new national program to accredit laboratories that calibrate instruments used to measure ionizing radiation. □