those of AT&T's Horst Stormer.

Bell Labs and IBM Research have been restructured in strikingly similar ways, in that both organizations have been downgrading work in basic physics, materials and devices and upgrading software, applications and services. This suggests that both are reacting to fundamental forces and are having to take measures that are not merely the result of tactical mistakes or managerial foibles. Yet at the same time, the adjustments and cuts are going much deeper at IBM, and the much heralded convergence between the two companies has yet to appear.

"To first approximation, Bell is [still] photons and IBM is [still] electrons," comments Emilio Mendez, who leads a group working on quantum optoelectronic phenomena in Smith's department (see the article by Mendez and Gérald Bastard on page 34).

Alliances and other strengths

IBM sometimes is faulted for having had a short attention span and for deserting science that its own researchers have pioneered. Yet even IBM's harshest critics concede IBM Research never could have afforded to pursue every promising lead it unearthed.

In superconductivity, IBM will continue to play a leading role in a research consortium with AT&T and MIT. It is the leader in the effort with Siemens to develop the 64-megabit DRAM and with Siemens and Toshiba to develop the 256-megabit DRAM. Randy Isaacs, a veteran of the Yorktown Heights semiconductor science and technology department, heads up the Siemens–Toshiba project in DRAMs, where IBM still is the world leader.

IBM also has an important alliance with Toshiba in liquid crystal displays, an alliance which—according to Chaudhari—McGroddy engineered. Combining Toshiba's manufacturing skills with IBM's research strengths, the alliance has helped IBM build a surprisingly strong position in laptops.

Other significant alliances include one with GE, AT&T and Honeywell in high-speed optical communications; the Taligent project with Apple and the PowerPC project with Apple and Motorola; and a project on new etching technologies with Lam Research, which Smith has worked on.

IBM remains the world leader in hard drives, developed largely at Almaden, which also has produced heretofore unmatched magnetoresistive head technology. Generally Almaden has specialized in drives, software for databases and polymer sciences. Its Center for Computational Chemistry, a vehicle for selling hardware to the petroleum and chemical industries, is something that the company will build up. Its group in basic physical sciences, though, always has been small, and the physicists still there seem to be the ones most worried that IBM's efforts in basic physics may fall below a certain critical mass and be discontinued altogether.

The long look

Seen in the very broadest perspective, IBM may fairly be said to have been an almost inevitable victim of its own successes. In particular, Dennard's invention of the basic DRAM memory cell, consisting of a transistor and capacitor, so revolutionized the cost of memory, Cocke observes, that "nothing we had been making was competitive with the technology we were developing."

"IBM did well to stay as good as it was for as long as it did," Cocke continues, "and so you can't say management did a dreadful job." While he was one of a group that saw what was coming in workstations and distributed computing, "they [management] had a goose that was laying golden eggs, and so it was hard to get on with things that competed."

Cocke agrees that IBM probably was due—irrespective of tactical and strategic errors and managerial lapses—to take a pounding, no matter what. What remains to be seen is whether the new generation of research managers and corporate leaders will have the foresight to continue pioneering and to stay with the basic sciences and technologies that will be decisive in the next century.

—WILLIAM SWEET

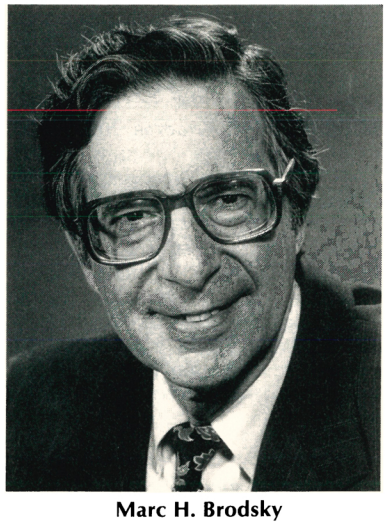
IBM'S BRODSKY WILL SUCCEED FORD AS NEXT EXECUTIVE DIRECTOR OF AIP

Marc H. Brodsky, a physicist at the IBM Thomas J. Watson Research Center in Yorktown Heights, New York, has been named new executive director and CEO of the American Institute of Physics. On 1 November he will succeed Kenneth W. Ford, who is retiring after seven years at AIP's helm.

Brodsky's taking office will coincide with the move of AIP headquarters to College Park, Maryland, where a building for the newly created American Center for Physics is under construction. The center will provide a new home for AIP, the American Physical Society, the American Association of Physics Teachers—which already is based in College Park—and the American Association of Physicists in Medicine (see page 80).

Brodsky, who earned his undergraduate and doctoral degrees in physics at the University of Pennsylvania, joined IBM in 1968. For most of his career there he worked primarily as a researcher; he became a research department manager in 1980 and later a top-level Research Division executive. During the research phase of his career he studied amorphous semiconductors, identifying defects that dominated their optical and electrical properties, especially those associated with dangling bonds.

Brodsky has had a strong personal and professional interest in education. He has served on the American Physical Society's education committee and on local school and library boards.



Marc H. Brodsky

Research highlights

Working with the late Reuben S. Title in the late 1960s and early 1970s, Brodsky identified the electron spin resonance signal from dangling bonds. He did a series of studies with groups of colleagues that correlated defects with excess optical absorption, extrinsic conductivity and density deficiencies. He then performed many experiments that quantified and characterized hydrogen in amorphous silicon.

From 1973 to 1980 Brodsky was

manager of the disordered materials project at IBM, from 1980 to 1987 he was manager of the semiconductor physics and exploratory devices department, and from 1987 to 1989 he led the Advanced Gallium Arsenide Technology Laboratory.

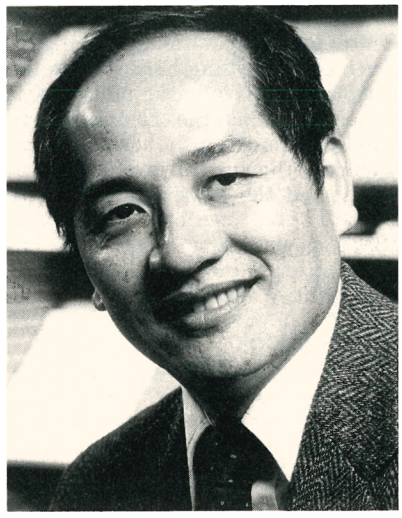
Commenting on the persistent dominance of silicon in most integrated circuit applications, Brodsky quotes a well-known tongue-in-cheek comment to the effect that "gallium arsenide is the material of the future, always has been and always will be." In a more serious vein, he points out that gallium arsenide is a unique vehicle for research in quantum physics as well as a material with many applications in optoelectronics and high-speed circuitry.

From 1989 to 1991 Brodsky was director of technical planning for the IBM Research Division, serving first under John A. Armstrong and then James C. McGroddy, who recently was named corporate vice president for science and technology (see story above). In that position Brodsky was responsible for reviewing technical strategy, plans and budgets for the division's laboratories.

In 1991–92 he was a Technology Administration Fellow of the Institute of Electrical and Electronics Engineers, assigned to US Under Secretary of Commerce Robert M. White. While there, he says, he was "part of a chorus documenting the need for high-technology manufacturing in the US, as well as continued funding for the country's research and development." Without a manufacturing base, he explains, "we're not going to be able to afford many important things in our society, including an adequate level of industrial and government-funded science."

ASTRONOMICAL SOCIETY ELECTS SHU PRESIDENT

Frank H. Shu of the University of California, Berkeley, is the new president-elect of the American Astronomical Society. He will succeed Sidney Wolff, the director of the National Optical Astronomy Observatories, in June 1994 when her two-year term expires. France A. Córdova of Pennsylvania State University was elected to a vice presidency with a term that runs from 1993 to 1996. (AAS has three vice presidents, who serve staggered terms.) She replaces Paul W. Hodge of the University of Washington.



Frank H. Shu

Shu, a theoretical astrophysicist, earned his undergraduate degree at MIT in 1963 and his PhD in astronomy at Harvard in 1968. He taught at the State University of New York, Stony Brook, from 1968 to 1973, when he joined the faculty at the University of California, Berkeley. He became a full professor there in 1976 and served as astronomy department head from 1984 to 1988. His principal research interests have been galactic structure and dynamics, interacting binary stars, planetary rings, formation of stars and planetary systems, and the interstellar medium.

Shu helped devise the accepted explanation of why many galaxies have spiral arms, developed a theory of the dynamics of mass transfer in semidetached binary star systems, and proposed a unified picture for the formation of Sun-like stars and protoplanetary disks.

As president of AAS, Shu said in his candidacy statement, he would "try to expand the society's role in public education and national policy making, as well as promote more opportunities for young astronomers, women and minorities."

Also, he said that as an AAS member he "helped to change former NSF policy that kept hidden from principal investigators the scientific content of reviewers' criticisms of their grant proposals."

Shu previously has served AAS as a councilor, a vice president, a lecturer in the Harlow Shapley Visiting Professors Program and as chairman of a membership survey committee. On that committee, he said in his statement, he "discovered troubling inequities in the way men and women perceive the level of sexual discrimination in our profession."

Córdova, who joins James E. Hesser of the Dominion Astrophysical Observatory (Victoria, British Columbia) and Donald B. Campbell of Cornell University as a vice president, is a native of France who earned her bachelor's degree at Stanford in 1969 and her PhD in physics at Caltech in 1979. From 1979 to 1989 she was a staff member and deputy group leader in space astronomy and astrophysics at Los Alamos National Laboratory. In 1989 she was named a professor and department head of astronomy and astrophysics at Pennsylvania State University.

Córdova's research interests are observational and experimental astrophysics, multispectral research on x-ray and gamma-ray sources, and space-borne instrumentation.

She served on the board of the Associated Universities for Research in Astronomy, NSF's advisory committee for astronomy and NASA's space science and applications advisory committee. She has been chair and vice-chair of the AAS high-energy astrophysics division, and she is a Shapley lecturer.

In other balloting results, C. Robert O'Dell of Rice University was reelected treasurer; Bruce Balick (University of Washington), Judith Pipher (University of Rochester) and Lee Anne Willson (Iowa State University) were elected councilors; Hugh Van Horn (University of Rochester) is publications board chair; Julie H. Lutz (Washington State University) was nominated to the US national committee for the International Astronomical Union; and J. Craig Wheeler (University of Texas) was elected to the nominating committee.

AIP SELLS NEW YORK BUILDING TO REPUBLIC OF KOREA

The American Institute of Physics has completed the sale of its headquarters building in Manhattan to the Republic of Korea. The four-story building and its 10 000 square feet of land, which is across from the United Nations, sold for $8.3 million.

Under the terms of the sale, AIP, the American Physical Society and the American Association of Physicists in Medicine will continue to occupy the building on East 45th Street until their offices move to the American Center for Physics, which is now being built in College Park, Maryland (see PHYSICS TODAY, September 1992, page 61). The move is scheduled to take place in fall 1993. ■