

democratized governance and streamlined management. Reminded of another United Nations leader who came to grief when he tried to lead faster than the world's major powers wished to follow—Dag Hammarskjöld—Mayor pointed out how different the times are in which we now live: The Cold War is ending, and with it, the superpower rivalries that have rendered UN organizations so ineffective through much of their history; new powers such as Japan have emerged, and are ready to assume global responsibilities; UN peace-keeping actions have been accepted as indispensable in places like Iran-Iraq, Afghanistan and the Middle East; and we are faced with global

problems of obvious urgency—the ozone problem, the threatened melting of the Polar caps.

Mayor served his political apprenticeship in Spain, a country that has moved in just 20 years from an autocratic dictatorship, based in an aristocratic-agrarian society, to full-fledged social democracy based in an industrial economy. It was a good setting, perhaps, in which to learn the art of political reconciliation. In the interview, Mayor seemed intent on setting a moderate path for UNESCO that will satisfy North and South, East and West, old and new. But having set that course, he left no doubt that he intends to steer.

—WILLIAM SWEET

WORLD LAB PROMOTES RESEARCH IN THE THIRD WORLD

Speaking in French to an assembly at the World Lab last May, the institution's president and founding father, Antonino Zichichi, drew attention to the fact that today in the world one billion privileged people—most of his audience among them—consume ten times as much as another four billion. What sense does it make, he asked, to offer science to people who are dying of starvation or tuberculosis?

Answering his own question, Zichichi told a Confucius story. To somebody who asked for a fish to relieve his hunger, Confucius said, "If I give one to you, you'll just come back tomorrow and ask me for another; that is why I say no, and instead teach you to fish." If one were to address only the urgent nutritional and medical needs of poor countries, Zichichi continued, one would be contenting oneself with the fish of Confucius. "To provide scientific instruction," on the other hand, "would indicate that one has understood the profound meaning of his maxim."

Acting on the inspiration of that story, several years ago Zichichi persuaded like-minded scientists at CERN and others in Europe and around the world to create a new institution with the mission of training scientists from poor countries and improving opportunities for them to do constructive work in their native lands. The World Lab was formally established on 12 July 1986 in Geneva. It now is based in Lausanne, Switzerland, and already it has an operating budget of 100 million Swiss francs—more than \$50 million. The lion's share of the funding comes directly from the Italian government: Prime Minister Giulio Andreotti was

persuaded that the developing countries need science and culture in addition to food and medical care.

As the major sponsor of the International Centre for Theoretical Physics in Trieste and of the World Lab in Lausanne, the Italian government can now safely be characterized as the world's leading benefactor of physics for development. And with the Italian government's \$50 million contribution secured, the World Lab can be said to have eclipsed UNESCO as the world's leading organization fostering advanced physics education.

As presently constituted, the World Lab has four major programs:

▷ Archimedes, a program of global monitoring and modeling in seismology, volcanology, climate and environment, as well as in education and health

▷ Eloisatron, encompassing plans for establishment in the People's Republic of China of advanced science and technology centers; for neutrino and cosmic-ray studies at Italy's Gran Sasso laboratory and elsewhere; and for a visionary project to build a giant collider, perhaps 100 on 100 TeV, perhaps in Sicily

▷ Improvement of Modern Life, a series of projects in food technology, medicine, environmental science and ecology, and new resource and energy technologies

▷ Controlled nuclear fusion.

Already the World Lab has been instrumental, with crucial guidance from T. D. Lee of Columbia University, in setting up China's Center for Advanced Science and Technology in Beijing. With guidance from Ahmed Ali at DESY, the lab is helping set up something similar to CCAST in Paki-

stan. The World Lab also sponsors a large group of third world students—23 from China, 13 from India and 11 from Pakistan—working on the L3 detector at LEP, headed by Sam Ting, a founding member of the World Lab.

Perhaps its most important current program provides 1000 postdoctoral scholarships enabling students from third world countries to spend one or at most two years at institutions in advanced industrial countries. In principle, students are to return to their native labs after a year, unless renewal is recommended by their sponsoring instructors. In cases of exceptional first-year performance, students may be recommended for participation in projects the World Lab is inaugurating.

Applications to the scholarship programs should be addressed to A. Zichichi, President of the World Laboratory, Palais de Rumine, Place de la Riponne 6, CH-1005 Lausanne, Switzerland.

—WILLIAM SWEET

TEXAS INSTRUMENTS RECEIVES CHIP PATENT IN JAPAN

After a nearly three-decade ordeal, Texas Instruments Inc has been awarded the Japanese patent for the integrated circuit. The patent, first applied for in 1960 and finally issued on 30 October 1989, credits Jack S. Kilby with being the sole inventor of the integrated circuit. Kilby was an engineer with Texas Instruments when he devised the IC.

Integrated circuits, or chips, are now used in nearly all sophisticated electronic devices, from computers to toaster ovens to automobile parts. At the time the patent application was filed, however, few people had a clue to their full potential. "I don't think anyone imagined it would be as significant as it turned out to be," Jim Comfort, a lawyer in the Texas Instruments patent office, told us. "Nobody is smart enough to tell you what technology is going to be the prevailing technology 10 years from now."

That the Japanese patent office took 29 years to award the integrated circuit patent is not surprising: Credit for the integrated circuit was long disputed in the United States. The US patent application for the "miniaturized electronic circuit"—an electronic circuit with all of its components integrated on a piece of semiconducting material—was first filed by Kilby in January 1959. Robert N. Noyce of Fairchild Semiconductor,

working independently of Kilby, developed a similar idea that suggested a way to connect the components in such a device by depositing the interconnections "at the same time and in the same manner" as the components, using the planar process. Noyce filed a patent application for his "semiconductor device-and-lead structure" in July 1959. A lengthy legal battle ensued between Fairchild and TI over which invention was actually the integrated circuit.

Eventually the US patent office awarded Kilby the patent for the basic concept of the integrated circuit and Noyce a separate patent for his idea of interconnecting the chip's components. While the patents were being settled, however, the two companies worked out a cross license that in essence recognized both firms' claims to the device and enabled them to proceed with chip manufacturing. Any other company that wished to make integrated circuits had to obtain separate licenses from TI and Fairchild. Both US patents have since expired.

(Kilby and Noyce recently were awarded the National Academy of Engineering's Charles Stark Draper Prize for their work on the integrated circuit—see PHYSICS TODAY, November page 52.)

New chip patent

The Japanese patent, which is valid through 2001, covers all integrated circuits sold by Japanese companies in Japan, but not in the US. It does not cover chips sold by Japanese companies in Japan before the ruling.

In the past American companies have frequently complained about the Japanese patent system, which takes on average twice as long as the US to issue patents. As the chip patent dispute dragged on year after year, some US industry officials accused the Japanese government of intentionally delaying a decision to allow its own chip industry to catch up with foreign rivals. But the recent ruling now has Japanese companies griping: They claim that by awarding the patent for such a basic and widely used technology to an American company, the Japanese government is making a token goodwill gesture toward the US, for which Japanese chip makers will have to pay.

The news has industry analysts speculating wildly about potential royalty income for TI, with estimates ranging from \$240 million to \$700 million per year. In 1989 the company received about \$165 million in royalties from all its patents combined.

Texas Instruments, however, has remained sober throughout. Any dollar estimates of how much the company may stand to gain are just "absolute, pure speculation" at this point, a TI spokesperson said. The company won't begin to profit from the decision until 1991, when current cross-licensing agreements with Japanese chip manufacturers lapse and are renegotiated. When that happens, the new patent will be considered one part—albeit an important part—of the company's entire patent portfolio; the company will most likely arrange for exchanges of proprietary technologies with the individual Japanese companies, along with some royalty payments.

The current cross licenses, which date from 1986–87, are based on successful lawsuits brought against Japanese and Korean chip makers for infringing on TI's American patents. The company has since received \$440 million in royalty income based on chips sold in the US.

Comfort was reluctant to criticize Japan's protracted patent process. "We've had good experience getting patents there. These things just take time." The 29 years it took Texas Instruments to win the chip patent were due primarily, he said, to "procedural delays," with numerous rounds of rejections (by Japan's patent office), appeals (by TI), and objections (by rival companies). He estimated that the company files over 100 patent applications each year in Japan.

Texas Instruments didn't even disclose the integrated circuit patent decision until after a Japanese newspaper announced it in a front-page story on 20 November. A class-action suit has since been filed against TI and three of its executives in Dallas Federal District Court, claiming the company knew in August that it had won the patent. In response, a company spokesperson said Texas Instruments "is confident that it has fully complied with US disclosure requirements. . . . We plan to defend the suit vigorously."

—JEAN KUMAGAI

MOTOROLA JOINS IBM IN SYNCHROTRON LITHOGRAPHY EFFORT

At the end of October it was announced that Motorola Corporation has reached an agreement with IBM providing for the assignment of six to eight Motorola engineers to IBM's x-ray lithography program. The announcement was made in East Fish-

kill, New York, at the dedication of IBM's \$500 million Advanced Synchrotron Technology Center, which will house a synchrotron radiation facility.

The facility will include the country's first synchrotron radiation ring dedicated to the commercial etching of computer chips. In that process, circuit patterns are exposed on silicon wafers when x rays pass through a mask. The ring, which is being developed by Oxford Instruments Group PLC of Great Britain, is to become operational by 1991. In the meantime, IBM's experimental and development work is being conducted at the National Synchrotron Light Source at Brookhaven National Laboratory.

The terms of Motorola's agreement with IBM are limited to 21 months but provide Motorola the option of extending the agreement or of employing IBM technology to build its own x-ray production facility. The financial terms of the agreement were not disclosed.

The ultimate aim of the lithography project is to permit the production of chips containing more than 64 million transistors. Jack D. Keuhler, the president of IBM, has been quoted as saying that between 15 and 19 facilities similar to IBM's East Fishkill installation are under construction in Japan.

SONY ENDOWS BARDEEN CHAIR AT ILLINOIS

The University of Illinois has received a \$3 million endowed chair from Sony Corporation, the largest gift Sony has ever made to an American school. The endowment was announced at the October dedication of the university's new \$13.5 million Microelectronics Laboratory.

Sony's endowment will support the John Bardeen Chair of Electrical and Computer Engineering and Physics. Research done by Bardeen over the years has contributed to Sony's success as a leading manufacturer of consumer electronics equipment, company executives said. One of Sony's first products was a portable radio that made use of the transistor effect discovered by Bardeen, Walter H. Brattain and William Shockley at Bell Laboratories in 1947. An international search is under way to fill the new position.

Bardeen joined the University of Illinois faculty in 1951, and is now professor emeritus in the physics and