First superconducting cyclotron runs

The world's first superconducting cyclotron, located on the campus of Michigan State University in East Lansing, was dedicated on the evening of Sept. 27. The cyclotron, with a maximum energy of 500 million electron-volts (500 MeV), is intended for the acceleration of ions of elements ranging in weights from helium to krypton. It will thus supply nuclei of those elements at relativistic energies for experimentation in the newly opening field of high-energy nuclear physics.

The cyclotron, which is the first part of a two-stage project of the National Superconducting Cyclotron Laboratory, is the result of many years of projecting and planning, especially by the director of the NSCL, Henry G. Blosser. By 1985 the NSCL expects to complete an 800-MeV superconducting cyclotron. Thereafter the 500-MeV will serve as injector for the more energetic one as well as operating independently.

The basic design of a cyclotron was worked out 50 years ago by the late Ernest O. Lawrence. The particles to be accelerated enter at the center of a circular vacuum chamber. They move in an ever-widening spiral path to which they are constrained by the field of a large magnet. Energy to accelerate them is imparted by the electric field set up between electrodes known as dees. The name comes from early cyclotrons, which had two D-shaped electrodes back to back with a small gap between them. The particles got an accelerating kick each time they crossed the gap, twice on each time around the circle. The dees for the NSCL cyclotron are actually spiral shaped, and there are three of them, giving three kicks per circuit.

Michigan State Univ

Lab director Blosser (left) installs a dee.

This is the first time that superconductivity has been applied to a cyclotron magnet. Superconductivity is the property of certain metals at very low temperatures (around 4 kelvins) to conduct electricity without resistance. This makes possible a stronger magnet in a smaller space and one that uses far less power than a conventional one. And so there results a smaller cyclotron and one that is cheaper to run for the same energy than a conventional one.

Design and construction of the 500-MeV cyclotron occupied the last five years. Meanwhile, in 1979, design and construction of the 800-MeV cyclotron commenced. To the end of fiscal 1982, design and construction of both together have cost $17,829,000 of which $16,400,000 was provided by the Department of Energy and $1,429,000 by the National Science Foundation. In addition the NSF has granted $9,856,946 for research at the facility. In the first six months of operation 24 experiments are planned. They will involve scientists from 14 institutions in the United States as well as laboratories in France, Hungary, Sweden and West Germany.

—*D. E. Thomsen*

MCC: Research will be its only business

What would prompt 15 rival computer companies to share their research secrets? "The impetus," William Shaffer explains, comes from Europe and Japan, where electronics developers have issued "clear and present declarations [of an intent] to replace the U.S. as the predominant and preeminent source of electronics technology." To meet these "threats," says Shaffer, of Control Data Corp., one of the 15 firms involved, the Microelectronics and Computer Technology Corp. (MCC) was formed.

"MCC will not manufacture or market anything," Shaffer explains. Its sole mission will be to conduct research for the exclusive use, development or licensing of its sponsors. Its staff, independent of the member firms', will be managed by a board of directors. A recruitment drive has already begun for a chief executive officer to oversee the $50 million to $100 million annual operating budget now planned.

Four research areas have been designated: advanced computer architectures, software (programming) productivity, component packaging and computer-assisted design and manufacturing (CAD/CAM). Advanced architecture is itself an umbrella for such developing subfields as artificial intelligence (AI) and parallel processing. Indicating the breadth even the AI endeavors are expected to span, Shaffer pointed out that MCC intends to investigate not only *knowledge-based systems* (which gather all that is known about a topic and organize it so that a machine can draw upon the data to solve limited types of problems) and *expert systems* (which program a computer to emulate the problem-solving thought processes of an expert, and then give it access to stores of data that this expert would have memorized or kept at hand), but also *inferencing systems* (which program a computer to simulate the processes experts might use to intuit an answer when there are gaps in knowledge).

Member companies must decide which — any or all — of the initial four research ventures they will enter. If seven participated in the advanced-architecture program, for example, each would pay one seventh its costs. But more important, only these seven firms would have continual access and rights to use the program's research for their individual and competitive purposes.

Brainchild of CDC's board chairman, William Norris, MCC is aimed at tackling a number of problems plaguing electronics developers, including costly duplication of research and shortage of talent.

MCC's other founders are Advanced Micro Devices, Burroughs Corp., Digital Equipment Corp., Harris Corp., Honeywell Inc., Motorola Inc., Mostek, NCR Corp., National Semiconductor, RCA, Sperry Corp., Signetics, Westinghouse and Xerox Corp.

—*J. Raloff*

Explorer conversion urged

The costs of converting the *Glomar Explorer* for use in scientific ocean drilling "seem modest when weighed against the scientific benefits it promises to yield," concludes the National Academy of Sciences' Committee on Ocean Drilling. The committee, formed at the behest of Congress to review research in marine earth science sponsored by the National Science Foundation, evaluated options proposed for the continuation of the drilling program. The committee recently recommended converting the *Explorer*, built for other uses, to a drilling ship rather than refurbishing the *Glomar Challenger*, which for 13 years has been used for the highly successful Deep Sea Drilling Project. The committee recommends that initially the *Explorer* not be fitted with a riser, a costly addition that would prevent blowouts when the drill hits deposits of oil or natural gas. This feature could be added in the future. Even without the riser, the *Explorer* is attractive for its ability to operate in higher latitudes and in rougher seas than is possible for the much smaller *Challenger*. While the conversion costs for the *Explorer* — estimated between $50 million and $100 million — are high, annual operating costs are expected to be no more than 10 percent more than those for the *Challenger*. The committee stressed the importance of long-range commitment to deep-sea drilling without detracting from other basic research supported by NSF. □