ing some of the responsibilities each man had argued should be his. When Hicks proposed last May that he take over a new position of "Undersecretary for Acquisition," recommended by a Presidential commission on DOD headed by David Packard of Hewlett-Packard, he was told by Weinberger that the job would go to someone else.

The ruckus Hicks has kicked up does not amuse the Pentagon, but many there, including Deputy Secretary Taft, agree with his right to talk tough to those who scold while seeking funds.

—IRWIN GOODWIN

# For Wisconsin's synchrotron ring, the future is bright

Time was running out on the 1-GeV storage ring at the University of Wisconsin. Ever since the National Science Foundation issued what appeared to be a death sentence a year ago for the chronically feeble light source at the Synchrotron Radiation Center near Stoughton, Wisconsin, by canceling all support for the Aladdin project (PHYSICS TODAY, August, page 45), the machine has been running on NSF's reduced funding and the university's own research funds. The university made it clear that it would continue to pay the bills to improve the machine only until this June. On campus the dire situation was characterized by a melodramatic metaphor: "the perils of Pauline."

Then, just in the nick of time, NSF rescued the 1-GeV ring. NSF Director Erich Bloch presented convincing evidence to the National Science Board on 16 May that Aladdin's remains had been resurrected for a machine that could now return to the land of the living. He was pleased to report that an agency review team had found the light source to be performing beyond all expectations in the spectral range from vacuum ultraviolet to soft x rays.

Though the Wisconsin center had asked for nearly $11 million to operate for the next three years, Bloch recommended that the Science Board approve a total of $8.75 million through fiscal 1989. As soon as the board agreed to support the 1-GeV project, the decision was relayed to Stoughton, where one scientist broke open a case of André champagne to celebrate. "We're jubilant," said the center's director, David L. Huber. "It had been something of a cliffhanger."

**Topping Tantalus.** The troubles with Aladdin go back nearly ten years. Its original design in 1976 called for 1 ampere at 750 MeV. At that time Aladdin had two straight sections. This was changed to three and then to four straight sections in 1977, when the goals were modified to 500 milliamps at 1 GeV. Even so, by Christmas 1984, more than two years after Aladdin began operating, its circulating beam current had not surpassed 2.5 milliamps with an energy of 0.75 GeV—not much better than the center's smaller, 0.24-GeV light source, named Tantalus.

It was then that NSF began a series of site vists and expert reviews of Aladdin. To improve the machine, the experts concluded, would require a virtual transformation, costing as much as $30 million. This was too much for Bloch. He had no difficulty convincing the Science Board to pull the plug on Aladdin.

Concurrent with these events, Wisconsin scientists identified the machine's main problem as trapped ions that disrupt the electron beams. Once additional clearing electrodes were inserted to prevent ion trapping, the electron-beam currents increased impressively. Three months after NSF's decision to kill Aladdin, the ring accelerated beams of 40 milliamps to an energy of 800 MeV (PHYSICS TODAY, November, page 58).

By last January, currents had reached 120 milliamps at 800 MeV—the electron energy that many users of synchrotron light find to their liking for running experiments (PHYSICS TODAY, March, page 19). Now, maximum currents of 154 milliamps at 800 MeV have been attained—a sixfold increase in stored electron-beam currents over the past year. Huber has "reasonable expectations," moreover, that the machine can eventually run reliably at 200–250 milliamps without enountering problems of overheating. Notwithstanding such success, NSF refuses to call the 1-GeV machine Aladdin because it never lived up to the original specifications under its given name.

**Backed by users.** What convinced the agency to back the modified machine was the enthusiasm of the user community, which increasingly demands more electron-beam machines as possibly the most promising way of making the next generation of electronic devices. The shortage of ultraviolet and soft-x-ray synchrotron light sources in the US was clearly significant in the decision to support the 1-GeV machine. Its present and proposed user programs were seen by the NSF panel as "fully competitive with the best research done at any facility of this type in the world." Indeed, the proposal submitted to NSF last October for renewing and increasing the level of funding for the Wisconsin center included a batch of endorsements from users, many specifying exactly what kind of experiments they expect to perform on the 1-GeV machine. High among the reasons users gave for backing the light source was the urgent need for more beam time to supplement the already overcrowded conditions at Brookhaven's National Synchrotron Light Source (which achieved its design current of 1 ampere at 750 MeV, with a one-hour lifetime, in the vacuum-ultraviolet ring for the first time on 6 June, though not without struggles, studies and shutdowns for improvements) and the Stanford Synchrotron Radiation Lab.

In their testimonials favoring the 1-GeV light source, many users express enthusiasm for the new extended-range "grasshopper" monochromators and for the seven beam lines already in place. The beam lines came from Tantalus, which will be shut down in October after its two remaining beam lines are shifted to the 1-GeV ring.

The new ring offers promising research opportunities because of its extended spectral range and the possibility that many more beam lines could be installed at 36 bending-magnet ports and three long straight sections. It is possible that the machine would have 17 operating lines and then could be outfitted with 18 additional beam lines as well as special devices called wigglers and undulators to provide extra brightness. One effort to improve the machine involves a collaboration of Wisconsin, the University of Minnesota and the Xerox Corp to construct a special-purpose beam line to handle the light generated by an insertion device currently on loan from SSRL.

**Mini-synchrotrons.** Demand for synchrotron radiation centers is increasing rapidly in advanced industrialized countries. In consequence, national facilities are being built or planned in Britain, France, West Germany and Japan. Another development is expected to bring down the cost, size and complexity of such machines: That is the production of compact "tabletop" synchrotrons by commercial firms for such industrial applications as x-ray lithography and for manufacturing submicron integrated circuits. Among the companies that are developing such miniature light sources are West Germany's COSY-MicroTec, Britain's Oxford Instruments and Japan's Hitachi. All the machines would dispense with the large and expensive electron-injection systems and use microtrons, which are smaller and cheaper. The goal is to produce x rays just as intense as those from bigger machines.

—IRWIN GOODWIN □