Briefing:

Wisconsin Synchrotron Ring Back in Business

At its May meeting, the National Science Board approved funding for operation of the University of Wisconsin's Synchrotron Radiation Center (SRC) in Stoughton, including its new 1-billion-electron-volt (1-GeV) storage ring. The new source of vacuum- and extreme-ultraviolet radiation will replace Tantalus, an older, smaller, and less powerful storage ring that had provided the light for many pioneering experiments during its decade and a half of service at the SRC.

Approval of funding for operation rather than for construction is news because the 1-GeV ring already has a lengthy and troubled history. A year ago when it seemed unlikely the machine would meet its specifications without substantial new expenditures, the National Science Foundation announced it was throwing in the towel and canceling its sponsorship of the 1-GeV ring, although it continued to fund Tantalus. However, just then performance was finally beginning to improve significantly, and last fall, when NSF support officially ended, the university continued operation of the 1-GeV ring with its own money.

Meanwhile, the light output had grown progressively brighter to the point where the 1-GeV ring was already brighter than Tantalus and showed every sign of further improvement. So, at the time it took over funding, Wisconsin also proposed to NSF that the older storage ring, which was servicing 200 users annually and was overcrowded, be replaced by the newer one. Among other benefits, the 1-GeV ring generated light penetrating farther into the extreme ultraviolet to the soft x-ray region of the spectrum, and its larger size permitted the servicing of a much larger number of users, who draw their light from beamlines that radiate out from the circumference of the storage ring.

It is this proposal that has now been accepted after NSF director Erich Bloch recommended its approval. Among the factors cited by Bloch was a sixfold increase in stored beam current in the 1-GeV ring over the past year. Inability to store much current was the reason for the previous poor light output. A team of site visitors picked to scrutinize the Wisconsin proposal had also overwhelmingly recommended its approval. An important factor in the recommendation was a clear shortage of ultraviolet and soft x-ray synchrotron light facilities in the United States.

"We're in business," declared the director of the Synchrotron Radiation Center, David Huber, although official awarding of a grant or contract awaits the usual paperwork. The award will be for a maximum of $8.75 million to cover 3 years of operation, beginning retroactively on 1 March. Some of this money can be used for improvements of the 1-GeV ring itself and for the development of beamlines to service users. At the moment there are 7 beamlines already in place at the new source, a number that will grow to 17 during the period funded. Only two beamlines remain at Tantalus, which will be shut down "as soon as we can," Huber declares.

Huber lists three projects to be emphasized during the next year in addition to generating light for weary users who have been making do with the crowded Tantalus while waiting for commissioning of the 1-GeV ring to be completed. The first job is to finish the construction of several new monochromators, the instruments that convert the continuous synchrotron radiation spectrum into specific wavelengths for spectroscopic studies.

The second project ties the SRC directly into the future of synchrotron radiation, which increasingly lies with so-called insertion devices, special arrays of magnets that are inserted into the straight section of a storage ring. The light from electrons as they follow an oscillatory trajectory through an insertion device is much brighter than the light from electrons gently curving through the bending magnets that define the circumference of the storage ring. When the 1-GeV ring was designed in the mid-1970's, it was assumed that bending magnets would be the main source of light. Now a three-way collaboration between Wisconsin, the University of Minnesota, and the Xerox Corporation plans to construct a new special-purpose beamline to handle the light generated by an insertion device presently on loan from the Stanford Synchrotron Radiation Laboratory.

Finally, the third project links the SRC with what may be the future of the microelectronics industry; namely, the use of soft x-rays as the means by which the increasingly tiny patterns of transistors and interconnections making up an integrated circuit are imprinted. The SRC has set aside for x-ray lithography research five of the 36 ports from which radiation may be extracted around the 1-GeV ring and is exploring several approaches toward an agreement with the semiconductor industry to set up its own beamlines for this purpose. These would complement lithography research already under way at the SRC. ■

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GAO Hits Accounting on DOE Accelerators

The Department of Energy and the physics community must change the way they sell new experimental facilities and accelerator upgrades to Congress. That is the message conveyed in a lengthy General Accounting Office review of cost estimates provided to Congress on a range of expensive high-energy and nuclear physics machines. GAO suggests that there has been a systematic understatement of project R&D, construction, and start-up expenses—findings that DOE officials strongly reject.

At the heart of the matter is a debate about the accounting practices used by DOE and laboratories with high-energy and nuclear physics facilities. GAO says that in the future, project estimates provided to Congress should contain detailed figures that cover not just construction and major component costs, but also related computers, particle detectors, experiment halls, and other expenses. There should also be a full assessment of technical uncertainties, adds GAO. Congress has not been fully apprised in the past of the potential risks that could set back new accelerator projects, GAO contends.

For example, GAO complains that total costs for the Superconducting Super Collider (SSC) have not yet been reflected in formal budget submissions to Congress. Although DOE's estimate has not been transmitted to Congress in an official budget document, department officials say that the figures have been discussed in testimony before key committees, and it is therefore ludicrous for GAO to assert that legislators are unware of the SSC's potential costs. DOE officials say they have refrained from providing a detailed breakdown to Congress until more thorough cost calculations have been completed and a departmental decision to proceed with the project has been made. A new cost appraisal could be completed by late June, and indications are that the figure will be slightly under GAO's projection of $4.9 billion.

On another front, GAO questions DOE's policy of not fully reporting the cost of R&D to develop new accelerator concepts before projects have been approved for construction. In particular, it contends that $69 million in R&D expenditures were not adequately identified by DOE in the total costs of the Relativistic Heavy Ion Collider at Brookhaven National Laboratory and the Los Alamos Meson Physics Facility II.

GAO argues that such research expenditures on potential projects should be clearly identified in annual budget submissions to