DORIS Gets a Face-Lift

The DORIS particle accelerator at the German electron and synchrotron laboratory, DESY, has had an illustrious history in particle physics. In 1975, for example, DESY physicists using DORIS (which stands for DOuble RIng Storage scheme) were quick to confirm the existence of the J/psi particle, which led to a fundamental reassessment of our understanding of matter. Since then, however, more powerful machines have relegated DORIS to the shade by creating many more particle collisions at far higher energies.

DESY officials now plan to give DORIS a new lease on life by converting it into a second-generation source of synchrotron radiation, a type of high-intensity radiation that has proved very useful in atomic and molecular spectroscopy, solid-state physics, protein crystallography, and many other disciplines where a powerful source of electromagnetic radiation is needed. It will be, hopes Paul Söding, research director at DESY, the equal of Berkeley's Advanced Light Source, currently the state-of-the-art facility for synchrotron radiation research.

This will be the second major overhaul for DORIS. When it started, in 1974, DORIS consisted of two oval vacuum tubes, 288 meters long and one above the other, within which electrons and positrons could be accelerated to an energy of about 3.5 gigaelectron volts. The particles collided at an energy of 7 GeV, enough to confirm the existence of the J/psi particle, but from the beginning the physicists wanted a better machine. In 1979 they unveiled DORIS II, which used a single storage tube; DORIS is therefore a misnomer, but they kept it for sentimental reasons. DORIS II boasted more collisions at higher energies than the original, but despite the improvements is not really a player in the world game.

But if particle physics with DORIS is losing ground, synchrotron research is on the up and up. To high-energy physicists, synchrotron radiation, emitted by electrons as they are forced round a curve, is an energy-sapping nuisance. To DESY, it is the key to DORIS' future.

Synchrotron radiation research is not new to DESY. It started there in 1964. The inauguration of DORIS in 1974 gave the research a further push, and HASYLAB, the HAmburg SYnchrotron LABoratory, was established to coordinate DESY's synchrotron research program. The European Laboratory for Molecular Biology in Heidelberg then set up a lab alongside DORIS to use synchrotron radiation to study biomolecular structure, and in 1979 the Fraunhofer Institute for Solid State Technology moved in too, using DORIS as an x-ray lamp for etching the components of tiny electronic and mechanical devices.

Despite the use made at DESY of synchrotron radiation, until now that has been a minor part of DORIS's job. Only about one-third of the particle beam time has been allocated to HASYLAB. That has typically meant three sessions of 5 or 6 weeks a year. This month, however, work is due to start on DORIS's second face-lift, and when that is completed DORIS III will emerge, transformed into a more plentiful source of synchrotron radiation. HASYLAB will then enjoy fully half of DORIS III's beam time.

The main structural change will be to put bends into one of the straight segments in DORIS's oval accelerator track. That will create a bypass in which nine wigglers and undulators—devices that increase the amount of synchrotron radiation by jiggling the electrons in their path—will be installed at a cost of DM 15 million (almost $9 million). Another nine beam stations will be added to the 29 already present.

The result will be a machine that in effect will double the availability of synchrotron radiation for research. That should bring scientists running, for everything from a deeper understanding of molecular structure to the manufacture of microscopic components. But there may be a problem.

The European Synchrotron Radiation Facility (ESRF) currently being built in Grenoble is scheduled to open in 1995. In addition, many more smaller sources are being planned or built in Europe: Germany will have BESSY II in Berlin and DELTA in Dortmund, Italy will have ELETTRA in Trieste, and the Netherlands is constructing EUTERPE in Eindhoven. Won't that mean an oversupply? Gerhard Materlink, director of HASYLAB, doubts it. "Last year almost a thousand scientists from 142 labs were involved in preparing and performing [synchrotron radiation] experiments with DORIS II," he says.

The European supply of synchrotron radiation amounted to around 400,000 beamline hours last year. Demand is expected to rise by 150,000 hours by the mid-1990s. "This demand cannot be met by the ESRF alone," says Materlink. Which means the new-look DORIS should get plenty of work. ■ **RICHARD SIETMANN**

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Mount Graham Up in the Air

The University of Arizona's 10-year quest to build a $200 million observatory on the summit of that state's Mount Graham—in the middle of the sole habitat of the endangered Mount Graham red squirrel—may be stalling out just as the university was gearing up to begin construction. (*Science*, 22 June, p. 1479.)

The latest blow fell on 26 June, when a study by Congress' General Accounting Office (GAO) concluded that a key environmental permit is flawed and ought to be redone. The permit, a formal opinion that the university could proceed without intolerably jeopardizing the squirrel, was issued on 14 July 1988 by Michael Spear, southwest regional director of the Fish and Wildlife Service. According to the GAO, the observatory development plan outlined in the opinion was not supported by previous biological field studies. Moreover, Spear improperly used a "nonbiological" criterion in reaching his decision—namely, the perceived worth of the observatory. Thus, says the GAO, the opinion needs to be updated.

Perhaps the most critical effect of the report has been to fragment support for the project among the once solidly pro-observatory Arizona delegation. Senators Dennis DeConcini and John McCain and two of the state's five representatives, Morris Udall and Jon Kyl, issued a press release on 26 June calling for all work to cease until the opinion can be revised.

Not surprisingly, environmental groups are hailing the GAO report as a "scathing indictment" of the observatory, which they have long opposed, while University of Arizona officials echo astronomy director Peter Strittmatter, who calls it "an appalling piece of work." Either way, the clock is ticking. The university has stopped work for now. But all its partners in the project—including the Vatican Observatory, the Max Planck Institute in Germany, and several universities in the United States—have served notice that they will pull out unless matters can be resolved very quickly. "The next few days are fairly critical, because they will determine what happens next," says Strittmatter. "If the result is just a get together with all the parties to resolve a few issues, then the whole thing could be settled in a week or two. But if the outcome is another yearlong study, then we can kiss the observatory off."

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