Cancellation of German neutron source affects other prospects

The decision by the West German government to cancel the proposed SNQ spallation neutron source has been an acute disappointment for the Jülich Nuclear Research Facility, which hoped to build the machine, but it appears not to be a major reverse for the German and European neutron-scattering communities. The Europeans will continue to have easy access to first-rate major facilities in materials science, and attention is now focusing on the somewhat changed prospects for international participation in Britain's Isis spallation neutron source at Rutherford Appleton Laboratory and the synchrotron-radiation facility slated for Grenoble.

Germany's proposed SNQ (Spallations-Neutronenquelle) would have been the world's largest and most advanced spallation neutron source, and unlike the existing sources at Rutherford, Los Alamos and Argonne, it would have been built entirely from scratch using new technology. It also would have been much more expensive than the existing sources. Whereas the British managed to build Isis for about 50 million pounds—about $35 million at the current exchange rate—the Germans proposed to build their spallation neutron source for roughly 1.4 billion marks or about $500 million in 1985 money. Total costs for Germany's SNQ, assuming a lifetime of ten years, were estimated at about $1 billion.

Coming at a time when the Federal Republic's government had just committed itself to large outlays for other new major physics facilities, SNQ was seen as too expensive when the Jülich supervisory board met to consider the project last June. Just months before, the German government had announced its decision to spend nearly $100 million for a new heavy-ion accelerator at GSI in Darmstadt and its intention to kick in roughly $75 million for the European synchrotron-light source, provided it is built at Grenoble (PHYSICS TODAY, May 1985, page 19).

While there was no direct relationship between the Jülich, Darmstadt and Grenoble decisions according to Hartmut Deyda, head of section for the natural sciences in Germany's science and technology ministry, he says that the decisions were of course implicitly connected because funds are limited.

What doomed Germany's proposed SNQ was the failure of other European countries to contribute funds for its construction. In the estimation of Günter Bauer, deputy director of the spallation project at Jülich, the decisive problem was that "the really important countries—England and France—either were finishing or constructing their own machines in the area of neutron scattering." The British conducted their first experiments on the Isis spallation neutron source in mid-December last year, while the French completed work several years ago on a new steady-state reactor at Saclay, which supplements the capabilities of the big steady-state reactor at the Institut Laue–Langevin in Grenoble.

Before SNQ was canceled, Bauer said, "Germany had a very strong interest in building instruments for [Britain's] Isis with a view to gaining certain kinds of experience for the SNQ project," but "that interest now is naturally somewhat reduced." What remains, he said, is interest in the purely scientific use of Isis, but that is centered mainly at the universities and institutes of technology, not the Jülich laboratory as such.

Isis and Grenoble. A German advisory panel has been established to consider future avenues for German neutron scatterers, and this group is to report to the Federal Ministry of Science and Technology by the end of 1985. It is considered very likely that Germany will build at least one instrument for Isis and quite possibly more than one. Deyda says that the Germans most certainly want to work with the British, though the arrangements remain to be determined.

A good deal of speculation has centered on whether the Federal Republic might contribute money for operation of Britain's Isis, which is underfunded, perhaps in exchange for a British commitment to the Grenoble synchrotron facility. West Germany's current position, Deyda says, is that "the PETRA model" should apply at all major European facilities. That is to say, in the particular instance of Isis the British should cover all construction and operating costs unilaterally, just as the Germans have done at PETRA, the electron–positron storage-ring collider at DESY in Hamburg. At PETRA, Germany provides beam time gratis to foreign scientists who bring instruments to the laboratory for experiments, and so the German position is that Isis should provide neutrons free of charge to other European builders of instruments.

If Germany will not provide general funds for operation of Isis, it would seem to follow that it cannot ask Britain to provide funds for the Grenoble light source as a *quid pro quo*. Just the same, Deyda warns, "it will in no case be possible for Germany to accept having German participation in Isis made a prerequisite for British contributions to Grenoble." He hastens to add that this may be something of an empty warning because it is his impression that the British are pretty firmly on board the synchrotron-light project anyway.

At Isis, the feeling among project leaders seems to be that their position is strong. Alan Leadbetter, scientific director of the project, reports that the machine was running well at 5% of its ultimate power level in September and that it would be at 10% soon, which will bring it above the maximum power level of Argonne's IPNS spallation neutron source. Leadbetter was especially pleased with the performance of the first six instruments, one of which was built by the Bhabha Atomic Research Center in Bombay, and with progress on three more instruments that are under development, one of which is being built in Italy.

Leadbetter reports that Britain is negotiating bilaterally with Italy and France concerning their participation in Isis and Britain's participation in the Grenoble light source. The British are proposing to join the design phase for Grenoble and to defer firm decisions about the construction phase. Leadbet-

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ter says that negotiations with Germany are at an "earlier stage."

US position. Neutron scatterers and materials scientists in the United States remain somewhat disappointed with the pace of US programs. There has been little or no action on the major facilities for materials research recommended last year by the Seitz–Eastman committee (PHYSICS TODAY, September 1984, page 57), and little action on the new capabilities recommended for minor facilities. Gerald H. Lander, director of Argonne National Laboratory's neutron source, observes that no funds have been budgeted for cold-neutron guidehalls at Brookhaven or the National Bureau of Standards, none for an experimental hall at the Los Alamos spallation neutron source and none for enriched-target options at Argonne.

Donald Stevens, director for Basic Energy Sciences at DOE, notes that the Seitz–Eastman report recommended delaying any decision about a new high-intensity spallation neutron source until the value of the field is more firmly demonstrated. By comparison with the analytical techniques used for experiments at steady-state sources, Stevens said, analytical techniques for experiments using neutrons from spallation sources are relatively undeveloped. He indicated that DOE funds for improved capabilities at existing sources would be available before any new project on the scale of Isis or SNQ is considered. The DOE appropriation for 1986 does in fact contain $1 million toward the design of an experimental hall for the Los Alamos spallation neutron source.

Meanwhile, Stevens said, European neutron-scattering capabilities will remain impressive. Quite apart from SNS, which will be the world's most powerful spallation neutron source for a time, "the ILL reactor at Grenoble alone has experimental capabilities that exceed the totality of what is available in the United States," he pointed out. "In particular they have a complement of low-energy neutron capabilities that is practically nonexistent in this country. So in terms of experimental facilities, the lead has shifted very dramatically from the United States to Europe.... Flux at US reactors is comparable to ILL, and US scientists are able to do very competitive forefront research, but they must rely on European facilities for some classes of experiments. However, when the Los Alamos spallation source becomes fully developed in 1987 or 1988, it will have the potential of being the highest-flux spallation neutron source in the West and possibly the world."

Status of Jülich KFA. Some neutron scientists in the United States and Europe feel that the Jülich Nuclear Research Facility (Kernforschungs Anlage) shot too high and staked too much on its proposed spallation neutron source, but cancellation of the project is not expected to be a fatal blow to the laboratory. Only 150–200 of its 4500 staff were directly involved in working on the SNQ proposal in the final stages, and they are being reassigned successfully to other work.

Robert Birtcher, an Argonne physicist who recently returned from Jülich, reports that morale remains good in many of the research groups, and he notes that the laboratory has several major programs involving use of large-scale equipment. Among other things, KFA still runs a reactor for neutron-scattering experiments, and it has persisted with work on the conversion of heat into chemical energy by breaking down methane and steam into carbon monoxide, carbon dioxide and hydrogen. The process is to rely on use of helium heated up to 900 ° C.

An eventual source of heat for the process could be the innovative thorium-fueled high-temperature reactor that has been developed at the KFA and Hochtemperatur-Reaktorbau in Mannheim. The THTR 300, a 300-megawatt demonstration reactor built at Schmehausen near Dortmund, is to come into full operation early next year.

Still, Birtcher says that everybody at Jülich has been affected by cancellation of SNQ. "It would have been the focus of the laboratory," he observes.

Bauer, deputy director of the SNQ project, agrees. He describes the project's cancellation as "a rather severe blow because the future concept for the laboratory was centered around SNQ. It was the wish to make KFA a center for many-particle research and to establish a new branch of basic research."

The KFA supervisory board, in an announcement of the SNQ decision last June, said that the Jülich laboratory will remain capable of pursuing both basic and applied research "in a balanced relationship."

As promising areas for applied work, the board singled out energy technology, environmental research, materials research based on the laboratory's experience in developing high-temperature nuclear reactors and—as a new activity—information technology. In basic research, the directors said that the laboratory should continue with research in many-particle systems and nuclear physics.

KFA management does not agree that the areas outlined by the directors would provide an adequate overall mission for the laboratory. They have submitted a proposal to the government calling for establishment at Jülich of a new institute for research on thin layers and ion technology to provide basic knowledge for improved production techniques for semiconductors.

—WILLIAM SWEET

AIP Corporate Associates meet at Kodak

"The Physics of Imaging" was the focus of the 1985 Corporate Associates meeting of the American Institute of Physics that took place at the Eastman Kodak Research Laboratories in Rochester, New York, on 22–23 October. Kodak Chairman Colby H. Chandler welcomed nearly 200 participants, more than one-third of them leaders of industrial laboratories, calling them the family of "the world's mother science." It so happens that Chandler himself holds a degree in physics from the University of Maine and did postgraduate work at MIT in engineering physics. Taking his theme from the meeting's title, he said an enlarged picture of Kodak was emerging as "we come to depend more and more on physics—in our materials, electronics and optics."

These fields were explained by Kodak scientists during tours of the company's research labs. Visitors saw, for instance, how the company produces ultralightweight optical components and frit-bonded mirror structures that remain dimensionally stable in the wide range of temperatures in space. In demonstrating research in spin physics, Kodak researchers showed their capability to record 2000 full-image frames per second on special high-density videotape using new solid-state sensors. Indeed, as Kodak's Timothy Tredwell pointed out in his talk, the physics of charge-coupled devices now makes possible solid-state image sensors capable of resolutions of 1 million or more high-quality picture elements in monochrome or color, with sensitivities of 10–50 photons per picture element. Other discussions and demonstrations dealt with algorithms for computer processing of actual and simulated radiographic images, digital enhancement of fuzzy or grainy photographs, such as those taken through telescopes or from satellites, and the latest advances in electrophotography for recording digital information.

Such snapshots of Kodak research reveal how far the business has come since the Eastman Dry Plate Co started in 1881. A glimpse of history came at a reception in George Eastman's 50-room Palladian-style mansion, built in 1905. In it are storerooms, galleries and