Approval Near for European Synchrotron

France and Germany have reached an agreement; funding and location remain to be settled, but construction could begin next year

Paris. Almost 8 years after the idea was first raised in the European scientific community, the governments of France and Germany have decided in principle to collaborate in building a 5-billion-electron-volt (GeV) synchrotron radiation facility—a multidisciplinary machine which uses intense beams of x-rays to explore the structure of both organic and inorganic matter.

The formal announcement of the new project is expected some time over the next few months, and construction could begin as early as next year. The exact timing depends on the outcome of two sets of negotiations currently under way. One concerns the level of financial contributions that might be expected from other European sources—in particular from the United Kingdom and from the Commission of the European Economic Community (EEC) in Brussels—and the other involves the exact choice of a site, for which there are several rival candidates.

The project has already been discussed several times between the French Minister for Industry and Research, Laurent Fabius, and his German counterpart, Heinz Riesenhüber. Both ministers have publicly awarded the project top priority and there now seems little doubt that it will receive the green light. Its political attributes include relatively low cost (under $200 million) compared to "big science" projects such as particle accelerators or space missions, the fact that the construction of such a machine could put Europe at least temporarily ahead of the United States in a research field of rapidly growing importance, its wide range of potential industrial applications, and a broad desire by political leaders in the two countries to strengthen their scientific ties.

The European Synchrotron Radiation Facility, as the project is currently known, will be one of the first major achievements of the Strasbourg-based European Science Foundation, set up just over 10 years ago to explore ways of encouraging greater European cooperation in basic research.

The idea was initially floated in the mid-1970's in informal discussions with scientists by the foundation's first president, Brian Flowers, rector of Imperial College in London. Subsequent studies attested to the need for a new European laboratory and proposed a design for a 5-GeV machine.

The project was endorsed by the foundation at the end of 1980. Since then, the technical specifications have been continuously updated by an independent group which based itself at the European Laboratory for Particle Physics (CERN) in Geneva. The latest plan is for a 772-meter circumference ring, using a combination of bending magnets and 30 straight sections containing either multipole wigglers or undulators, which give the machine much greater flexibility because each can be tailored to the needs of individual experiments.

Given that similar projects are already under discussion in the United States, supporters of the European project are keen that it should be built as quickly as possible. "The competition is becoming tougher and tougher, and scientists are anxious to have a decision made," says Yves Farge, a top official in the Ministry of Industry and Research in Paris, who helped produce the original design.

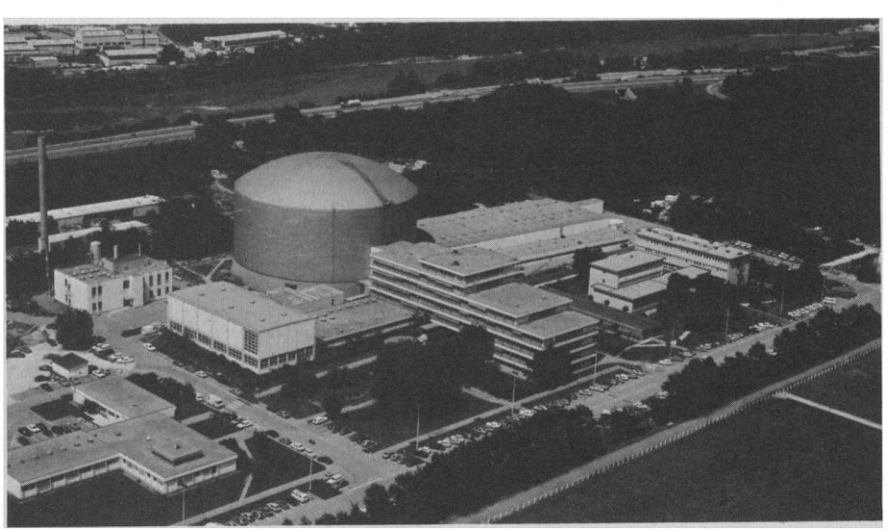
However, the European Science Foundation is a nongovernmental body with no official status; generating the necessary political support to turn the project into reality has turned out to be a more difficult process than reaching a consensus on technical feasibility.

One strategy employed by the foundation was to create a community of potential users by demonstrating the breadth of the uses of synchrotron radiation. A survey circulated throughout all European countries in 1982 brought encouraging results: over 2500 replies were received from more than 600 research groups. This was sufficiently impressive to support the foundation's claim that such a facility was urgently needed.

Some countries have needed little convincing. France, in particular, has long been an enthusiastic supporter of the idea of a large European facility. It currently lacks the type of newer domestic synchrotron facilities already available in Britain and Germany but has extensive experience in radiation experiments.

Britain's Science and Engineering Research Council, in contrast, opened its own Synchrotron Radiation Source at the Daresbury Laboratory in Cheshire, based on a 2-GeV storage ring, only 3 years ago. With heavy pressures on the whole of the science budget already preventing the full use of this facility, it has been reluctant to commit substantial funds to a new machine.

The key country in the negotiations has therefore proved to be West Germany, which, until the beginning of 1984, had also been the major stumbling block. A report on national priorities for new physics facilities, prepared in 1980 by a



Institut Laue-Langevin

Unofficial French candidate has support from Britain.

committee chaired by Klaus Pinkau, director of the Max-Planck-Institute for Physics and Astrophysics in Munich, had given demands for a new synchrotron facility lower priority than requests from the scientific community both for a new particle accelerator (HERA) at the national particle physics laboratory near Hamburg, and for a spallation neutron source proposed for the nuclear research center at Jülich, near Cologne.

Sitting in third place on the priority list, supporters of the European Synchrotron Radiation Facility found it difficult to stimulate much political enthusiasm in Bonn, even though some individual *länder* (regional governments) had shown much greater interest. Over the past year, however, the whole situation has changed. First, German research minister Riesenhüber has given the go-ahead for the construction of HERA. Second, the Pinkau committee, in a new report presented to Riesenhüber at the end of last year, announced that its priorities had changed and the synchrotron facility, for which support had been rapidly growing in the German scientific community, was now felt to be a higher priority than proposals for a neutron source—which, not irrelevantly, is a considerably more expensive project.

With France and Germany now seeing eye to eye on the question of priorities, political negotiations between the two have shifted to creating a package deal acceptable to each country. The current proposal is that agreement should be reached simultaneously on joint funding for two new research facilities of roughly comparable size, one the synchrotron facility and the other an advanced wind tunnel. "Both of these projects are very good projects, and the idea would be to do one in each country," French research minister Fabius said in June, adding that he had already discussed such a deal several times with Riesenhüber.

The synchrotron project has already received enthusiastic support from the Commission of the EEC in Brussels. According to EEC officials, the potential industrial applications of synchrotron radiation means that it will be able to carry out just that type of "precompetitive research" which members of the Common Market feel should be the principal target of the EEC's joint research policy. Indeed, the EEC Commission itself is considering becoming a major partner in any group that funds—and thus directs—the project, acting as a surrogate for smaller European countries who might want to send research workers to the facility, but not to become full contributing members themselves.

As far as Britain is concerned, the extent of the Science and Engineering Research Council's involvement is likely to depend partly, at least in the short-term, on the extent to which it can secure in return support from other European nations for some of its own facilities, in particular the spallation neutron source currently under construction at the Rutherford Appleton Laboratory. However, a report prepared earlier this year by a committee of the research council on the scientific need for the synchrotron facility revealed what one official describes as a "very strong case" for the machine. "We think it is an important project, and one in which we would wish to participate," says another official. "Certainly if we did not, it would put British scientists at a disadvantage in the 1990's."

Agreement is expected on a package deal involving the synchrotron facility and an advanced wind tunnel.

Given the general convergence of scientific and political enthusiasm, the one major question still to be decided is where the facility is to be built. When the European Science Foundation first endorsed the proposal to build a European machine in 1980, it received six offers to act as host. Britain proposed a site at the Daresbury Laboratory adjacent to its new synchrotron radiation facility; the Danish National Research Council proposed a site at Risø, outside Copenhagen; France put forward Strasbourg; and Italy proposed Trieste. In addition, a nongovernment-backed offer was received from the University of Dortmund in West Germany. And last year a further request to be considered as a possible site came from the Institut Laue-Langevin (ILL) in Grenoble, France, the high flux neutron reactor jointly run by France, Germany, and Britain.

The proposals from Daresbury and Risø, although officially still in the running, are generally discounted because neither Britain nor Denmark is expected to be one of the principal contributors to the initial costs of the facility, even though Denmark has offered to put up $30 million.

Trieste has been considered a stronger possibility, largely because the Italian government, keen to develop the region as a focus for high-technology industries, has promised to cover a high proportion of the initial capital costs. Despite much enthusiasm in Trieste, however, it is generally accepted that, if France and Germany are to be the two main sponsors of the synchrotron facility, then practical politics dictates that it should be located in one of these two countries.

In Germany the choice of site has become rapidly more complex as the chances have risen of the nation becoming host. In addition to the original proposal from Dortmund, other formal proposals have also been made by the German/French border town of Saarbrucken and the nuclear center at Jülich, which was to have been the site of Germany's spallation neutron source.

Two other possible locations have also entered discussions. One would be to place the facility at the Deutsches Elektronen Synchrotron in Hamburg, where a considerable amount of research using synchrotron radiation is already carried out. The other would be to build a new center in the Munich region, which is rapidly becoming the country's most important center for high technology and offers an attractive environment for foreign scientists.

In France, there are two rival candidates, Strasbourg—the official French candidate—and ILL at Grenoble. Strasbourg has what some feel to be the disadvantage of a research tradition oriented more toward medicine and the life sciences than the physical sciences. But its location on the border makes it more accessible than Grenoble, particularly from Germany. Furthermore, the French government may well decide that locating a new, high-technology laboratory in the city could help provide an economic boost for the whole region.

Brian Fender, director of the ILL, claims that there would be several advantages in placing the facility in Grenoble. One is the academic experience that exists both in the University of Grenoble, one of the top physics universities in France, and at ILL itself. A second advantage, he suggests, is the possibility for interaction between future synchrotron users and those carrying out experiments with the neutron beam.

Such arguments have proved convincing to Britain's Science and Engineering Research Council, which is said to have unofficially indicated its enthusiasm for the ILL bid. However, with deeper political and regional rivalries at stake, the French government, if it has to decide between the two, is unlikely to let the choice remain a straightforward scientific or economic one.—**DAVID DICKSON**