recommendations. He will no longer be its chairman when the Kuratorium comes to consider the future of DKFZ on 21 June because, from 1 May responsibility for the centre will be shifted as part of a reshuffle of responsibilities in the ministry. It is likely that the new chairman will be Dr Güentsch.

Professor Hans Neurath, now back in the University of Washington, Seattle, also welcomes the report, describing it as "excellent, clear and succinct".

Reaction to the report at DKFZ is hard to gauge, but inevitably mixed.

Only after the 21 June meeting of the Kuratorium will it be known which of the commission's proposals will be adopted. One problem is that since Professor Neurath's resignation, DKFZ has been without a real director, although Professor Otto Westphal was appointed acting director from 1 March until the end of 1982. Another is that there is almost certain to be strong resistance to many of the proposals from within the centre. And it does not help that the politicization of the centre's difficulties comes at a time when the German government has matters of far greater importance on its plate — survival for example.

Thus, whereas the commission recommends that proper peer review of DKFZ starts without delay, with at least three institutes to be reviewed by the end of the year, there is a good chance that the peers will need topcoats rather than safari suits by the time they descend upon Heidelberg. **Peter Newmark**

Europe's nuclear power

Border incidents

Brussels

A bizarre mixture of Molotov cocktails and red and yellow balloons was released at a demonstration on 27 March when Belgian environmentalists protested at the continuing construction of four French nuclear power stations at Chooz, close to the Belgian border. Protests against the Chooz reactors are now a regular part of Belgian life. Some weeks ago, the Belgian Embassy in Paris was occupied by two Belgian senators belonging to the environmental party, and demonstrations on the border are now promised on the last Saturday of each month.

While there is no sign that the protests will influence the French government's determination to press ahead with the four 1,300 MW reactors to be built on the Meuse at Chooz, they may affect the Belgian government's willingness to participate in the project. Given the prospect that Belgium will have to rely on nuclear power for half of its electricity production by 1985, the government must either sanction the nuclear power construction in Belgian or join in the Chooz project.

For a time, the government sought to obtain electricity and to counter the protests by linking participation at Chooz with the stipulation that the French reactors should be built to Belgian safety standards. This suggestion has, however, been rejected by the French on the grounds that construction costs would be increased.

The issue has thus been invested with national pride. The Belgian government is being told, most vociferously by the Flemish-speaking population near the border, that it has allowed itself to be bullied by its larger neighbour. France, on the other hand, cannot admit that its own safety standards for reactors are inadequate simply because the Belgian standards are more stringent. France has also declined to reveal details of the reactors to be built at Chooz beginning in December, and to reveal plans for the discharge of some low-level waste into the Meuse.

There is a chance that the European Commission may be able to help. The revision of Article 37 of the Euratom Treaty soon to be adopted would require France to seek approval for its plans for radioactive waste disposal six months before construction at Chooz begins. So far, however, there is no sign that France is prepared to let the commission interfere or to engage in consultations with Belgium.

The Belgian government is in any case itself divided over the country's energy plans. The energy minister, Mr Etienne Knoops, is anxious that Belgium should have more nuclear power stations and keen on participation at Chooz. He is opposed by the science and budget minister, Mr Philip Maystadt, who wants the decision on Chooz put off until the parliamentary debate arranged for the end of May — after the 16 April deadline for a decision on participation will have passed.

In the end, Maystadt's arguments are likely to prevail. Belgian utility companies argue that it would be more sensible to invest in a Belgian project than in Chooz, especially because it is now estimated that Belgium will need to build thirteen 1,300 MW reactors by the year 2020. In any case, the cost of electricity from the Chooz plant quoted by the French is unpalatably high. **Jasper Becker**

●Environmentalists are also on the move in France — on foot, in fact, between the site of the near-complete French fast breeder reactor, Superphénix, in the south of France, to Paris, where they hope to meet President Mitterrand on 18 April to protest against fast breeder development. A hundred demonstrators gathered on Sunday near Superphénix in the march, which has begun peacefully. This is in marked contrast to the rocket attack on Superphénix last summer, and the violent demonstrations of 1977 in which one demonstrator died. Brice Lalond, national secretary of the French Friends of the Earth, addressed the marchers. "Nothing has changed since 10 May", he said, referring to the election of Mitterrand as President of France and his socialist government. **Robert Walgate**

United States astronomy

High priorities

Apparently unabashed by the austerity now rife in Washington, the long-awaited Field report on astronomy and astrophysics in the 1980s will include a $1,900 million (at 1980 prices) shopping-list, mostly for new equipment. A draft of the report (to be published next month) says that these plans would require that the astronomy budget of the National Science Foundation (NSF) in the 1980s should be 30 per cent greater in real terms than in the 1970s.

The report has been prepared by the Astronomy Survey Committee under the chairmanship of the director of the Harvard-Smithsonian Center for Astrophysics, George Field. The committee was set up in 1978 by the National Academy of Sciences (NAS) to assign priorities to a wide range of astronomical projects based on the ground or in Earth orbit, but excluding planetary missions and deep-space probes.

Field report recommendations

	Decade cost (1980 $ million)	
Major new programmes, in order of priority		
1. Advanced X-ray Astronomy Facility (AXAF)	500	
2. Very Long Base-line (VLB) Array	50	
3. New Technology Telescope (NTT)	100	
4. Large Deployable Reflector in Space	300	
		950
Modest new programmes, in rough order of priority		
1. Augmentation of Explorer satellite programme	200	
2. Far UV spectrograph in space	150	
3. Space VLB antenna	60	
4. Optical/IR telescopes (2.5 m)	20	
5. Advanced Solar Observatory in space	200	
6. Cosmic ray experiments	100	
7. Search for Extraterrestrial Intelligence	20	
		750
Small new programmes		
10 m submillimetre-wave radio antenna	4	
Other important programmes		
Spatial interferometer for mid-IR	3	
High precision optical astrometry programme	3	
Temporary programme to maintain astronomical expertise at universities	10	
		20
Total expenditure over decade on new project		1,720
Total expenditure on "prerequisites" (theory, data analysis, etc.)		190
Grand total		**$1,910 million**

In its review of astronomical problems and the best ways of tackling them, the report assumes the existence of such shuttle-dependent projects as the Space Telescope, the Gamma-Ray Observatory, the Shuttle Infrared Telescope Facility, the Solar Optical Telescope and the ground-based 25-metre millimetre-wave radio-telescope, all but the last of which appear to have survived in the US Administration's budget for 1983.

For the 1980s, the committee recommends that the highest priorities should be given to the Advanced X-ray Astrophysics Facility (AXAF) satellite, a Very Long Baseline (VLB) array of radiotelescopes, a

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giant New Technology Telescope (NTT) in the 15-metre class and a 10-metre sub-millimetre-wave antenna. All these devices would contribute to the solution of the astronomical problems highlighted in the report — the large-scale structure of the Universe, the evolution of galaxies, violent events (such as supernovae and processes in active galaxies and quasars), the formation of stars and planets and solar and stellar activity.

In the committee's view, AXAF is a must at a cost of $500 million. The VLB has beaten the 15-metre telescope into second place because it would require considerably less preliminary development and would have by far the best angular resolution of all techniques — 0.3 milliarc seconds — possibly allowing the resolution of the nuclei of active galaxies and quasars at radio wavelengths. But because of the tremendous potential light-gathering power of the 15-metre telescope, an order of magnitude larger than present telescopes, the committee puts that on as high a level of scientific desirability as any other project examined.

The committee also urges increased support for what it calls prerequisites — instrument design (including a request for declassification of certain infrared detectors), theory, data analysis, computing facilities and laboratory astrophysics. To handle the data from AXAF, the committee recommends that a special institute be set up in support of the satellite, analogous with the Space Telescope Institute. As a consequence of its recommendations, the committee sees the need for an increase in personnel at all levels.

In his foreword to the report, Herbert Friedman, chairman of the Mathematical and Physical Sciences Assembly of NAS, stresses the need for an increase in the relative contribution of ground-based astronomy and, consequently, the NSF contribution. He also says that the technology of new developments in astronomy is dependent on but will also contribute to areas of science and to industrial and military applications.

In the present climate, it is hard to see the astronomers having many major desires fulfilled. Of the major recommendations of the influential Greenstein report, the 1972 predecessor of the Field report, only one — the VLA radiotelescope — was implemented in the less austere 1970s, for example. The Field committee emphasizes, however, that the level of expenditure it requests is equivalent in real terms to that which followed the Greenstein report. Moreover, Dr Friedman points out that they are hoping "that the purposes of the present fiscal policies will be achieved in a reasonably short period and that a healthier base of federal scientific support will then be restored". But if the Greenstein report can be viewed as a precedent, X-ray astronomers have struck lucky. **Philip Campbell**

High-energy physics

Tunnel vision

A legal obstacle to the construction of LEP, a European particle accelerator which should put European physics in the 1990s well ahead of the United States, has been removed. But the shouting is not yet over.

LEP — a large electron positron collider — will straddle the French–Swiss border in the plain of Geneva, linking with existing machines at the European Centre for Nuclear Physics, CERN. CERN has won cash and approval for the project from its member states, which include France and Switzerland, but the problem lately has been how to carry the project through local planning procedures in France and Switzerland. French environmentalists had managed by a legal technicality to block construction of an important exploration tunnel, but now the French court of appeal, the *Conseil d'Etat,* has finally ruled that the tunnel can go ahead after all.

This, however, is only a minor victory. The main justification for the tunnel was that it would provide an escape route for both engineers and water if the main LEP ring — which originally led right under the 1,000 m high peak of the Jura mountains — encountered high pressure water in the Jura limestone. But now the LEP ring has been shuffled almost entirely out of the Jura, by tipping it on its side (see figure), so water pressures will be lower. It will also now be possible to intervene from the surface if people are trapped.

However, there are still geological and political problems to solve. Geologically, the 3 km of LEP that will still lie in the Jura limestone lie entirely in the *piémont,* near the boundary with the sandstone of the plain. This rock is likely to be traversed by caverns and faults, and although vertical borings along the new route have revealed nothing serious, uncertainty persists.

Politically, the obstacle may still be the *Association gessienne de protection de la Nature,* the local French environmental organization presided over by M. Jean-Roger Honorat, the mayor of Echenevex. This group blocked the construction of the exploration tunnel, and although CERN has wooed it ever since, it remains suspicious.

The group will play an active part in the French planning process now under way. The French ministry of foreign affairs, with which CERN must deal, now has CERN's final environmental impact statement, and under French planning law will act on CERN's behalf. There is to be a local public inquiry at which anyone in the region may present his views. CERN itself will be represented at the inquiry only if needed to explain technicalities; it has no right to plead. Eventually the results of the inquiry and files of submissions will be returned to Paris for a decision by the *Conseil d'Etat.*

Meanwhile, CERN is about to invite tenders for the construction of the tunnel, which should be in by the autumn. A decision from the *Conseil d'Etat* is not expected before the end of this year but a delay beyond that would mean LEP would not be producing particle collisions by the end of 1987 as planned. **Robert Walgate**

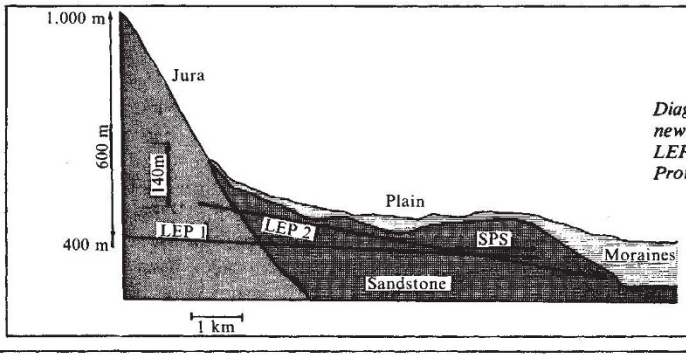

Diagram showing old and new tunnels planned for LEP. SPS is the Super Proton Source tunnel.

New cancer research award

The 1982 Bristol-Myers Award for Distinguished Achievement in Cancer Research has been awarded to Dr Denis Burkitt (of Burkitt's lymphoma) and Dr Michael Epstein (of the Epstein–Barr virus). Their $50,000 award was presented to them in New York this week.

Dr Burkitt was Government Surgeon in Uganda some twenty years ago when he proposed, from epidemiological studies, that an infectious agent caused childhood lymphoma in Africa. Dr Epstein heard Burkitt speak in London

Epstein (left) and Burkitt

in 1961 and within two years had isolated the infectious virus that causes the lymphoma.

Burkitt is now an honorary senior research fellow at St Thomas's Hospital in London. Epstein is professor of pathology at the University of Bristol. And Yvonne Barr, in case you were wondering, is an Australian housewife.

Peter Newmark

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