

## Fermilab director resigns over funding

IN an effort to stabilise the funding of high energy physics (HEP), the US Department of Energy has decided to recommend that the HEP budget should be kept at a constant value of \$300 million (in 1979 prices) over the next few years.

According to the department, this sum—which breaks down into \$200 million for operating costs, \$40 million for equipment, and \$60 million for construction—will guarantee an active HEP programme based on three national centres, the Brookhaven National Laboratory on Long Island, the Fermi National Accelerator Laboratory in Illinois, and the Stanford Linear Accelerator Center (SLAC) in California.

However, although the department's proposed commitment is considerably higher than two years ago, when the HEP budget dropped to about \$240 million after reaching a peak of about \$500 million (both in 1979 prices) in 1970, it is still less than many scientists would like. And in protest at the department's decision not to speed up the construction of the energy doubler at Fermilab, Dr Robert Wilson, director of the laboratory, has carried out a threat made two months ago and submitted his resignation.

The Department of Energy's decision to keep HEP funding constant at a level slightly higher than the \$290 million proposed for fiscal year 1979 was taken after long and detailed discussion with the high energy physics community, in particular over the construction of the 400 GeV proton-proton colliding beam facility (ISABELLE) at Brookhaven which the department has proposed should start in 1979.

"Before agreeing to support ISABELLE, I asked what would make sense in terms of a long-term high energy physics programme?", Dr John Deutch, director of the department's Office of Energy Research, said last week. "I was not prepared to support the construction of a major new facility unless it was in the context of a balanced and aggressive high energy physics programme." Dr Deutch said that the decision to maintain a constant budget in real terms over the next few years was consistent with the consensus of the high energy physics community over the type of support that was required, and that it would provide some stability for future planning. A similar scheme was also being developed for funding nuclear physics.

The decision was welcomed by Dr Sidney Drell, deputy director and chairman of the department's High Energy Physics Advisory Panel (HEPAP), who pointed out that ever since the Ramsey report of the early

1960s, physicists have been asking for a stable basis for long-range planning. "Stable funding expectations will be very useful to us in terms of allocating resources, particularly in view of the fact that major HEP instruments can take seven years or so to build", he said. He added that the general level of funding was only "the minimum viable level" compatible with a three-centre programme, and there would still be many opportunities lost for good physics. According to Dr Drell, the proposed funding levels represent a 25% drop in operating funds for HEP facilities from their peak at the end of the 1960s.

Dr Wilson's decision to resign as director of Fermilab is a result of his failure to persuade the Department of Energy to bring forward the construction of the energy doubler, which by adding a second ring of superconducting magnets will eventually enable Fermilab both to save power costs and to reach energies of 1,000 GeV or more. Although the department is proposing to allocate \$10 million towards construction of the doubler in the fiscal year 1979, Dr Wilson had asked for

\$35 million, which would have been sufficient to complete the project during the year.

In his letter of resignation to the Universities Research Association, which runs Fermilab, Dr Wilson said that current restrictions of funding meant that the laboratory was operating at about half its potential capacity, a predicament that was particularly serious in view of the relatively high funding enjoyed by the European Centre for Nuclear Research (CERN) in Geneva, which recently brought its own 400 GeV accelerator into successful operation.

"Our scheme to leapfrog CERN's financial advantage by increasing the Fermilab proton energy to 1,000 GeV through the application of superconductivity has been confounded by indecisive and subminimal support," Dr Wilson said. He added that he had felt he was unable to continue to give the impression that he could responsibly direct Fermilab without a substantial increase in funding.

Although Dr Wilson is resigning as director, he has said that he intends to remain at Fermilab to work on the energy doubler project.

David Dickson

## Salyut-6 used for weightlessness experiments

THE long sojourn of cosmonauts Yuri Romanenko and Georgii Grechko aboard Salyut-6 represents far more than an attempt to recapture the space endurance record. Soviet space planning has always been based on the idea of permanent orbital stations, indeed, Tsiolkovskii, "the father of Soviet cosmonautics" envisaged such stations as a *sine qua non* to manned lunar or interplanetary flight. The rumours which followed the Soyuz-11 disaster, which attributed the cosmonaut's deaths to the effect of prolonged weightlessness, were traumatic to space planners and amateur enthusiasts alike, and although subsequent investigations proved that the tragedy was in fact caused by a defective seal and consequent depressurisation, research into the physiology of weightlessness is a major concern to the Soviet manned space programme.

Unfortunately, weightlessness research is something which must largely be carried out *in situ*, and there is little scope for ground-level simulation. A 'hydro-weightlessness' tank is used to train cosmonauts for the difficult mechanical operations of station maintenance. Poland, as part of its contribution to the *Interkosmos* project, is said to be working on the biomedical effects of weightlessness, and an interesting experiment was recently



"You did say any kind of moral support, comrade!"

completed in Leningrad where for six months 18 volunteers lay "in a very inconvenient posture, with their feet several degrees higher than their heads", able to wash, shave, eat, and read, but "only allowed to turn from side to side, without rising even a little".

That experiment, which was presumably intended to simulate space-flight demineralisation, proved, according to its scientific director, Professor Leonid Kakurin, to be a great success.



Once the volunteers resumed ordinary life, their physiology quickly returned to normal, so that, according to Kakurin "space flight is not limited to six months. The human organism has genuinely unlimited possibilities".

On board experiments, however, are the only sure way of determining the effects of weightlessness. The biological programme of Salyut-6 includes both human and non-human tests. Certain of the latter seem somewhat esoteric—as, for example the result that tadpoles hatched in space swim in spirals, while earth-hatched tadpoles swim in a more "disorderly" manner. Other Salyut-6 experiments, monitoring the total effect of space rather than weightlessness alone, include the Franco-Soviet Cytos experiments on micro-organism cell division, a genetic investigation using *Drosophila* (banned from Soviet research at the height of Lysenkoism) and the somewhat ominously named "Medusa" experiment which compares the effect of space-flight on biopolymers in and outside the station.

The main source of medical data is, however, the on-board monitoring of cosmonauts. The Salyut-6 tests have included electrocardiograms, encephalograms and rheograph and manometer investigations, used at "rest" and after exercise on the "running track" and "veloenergometer". A special self-contained microanalysis kit was used to enable the cosmonauts to take samples of each other's blood; these were returned to earth by the Soyuz-26 craft.

The possibility of returning specimens in this way has greatly extended the facilities for maintaining the cosmonauts' health and well-being. Similarly the use of unmanned supply rockets will enable any necessary medicines to be taken into orbit. Progress-1 did, in fact, carry a replacement medicine chest—since although the original one had not been broached, it was felt that certain medicaments might have grown stale and lost their efficacy.

The use of replacement crews and supply rockets, however, has far more significance to cosmonaut health than simply that of keeping the life-support systems operative and the supplies recharged. The Salyut-6 planners have laid great emphasis on the physical comfort and psychological well-being of the cosmonauts. Station noise has been reduced by siting the motors "further astern" and installing "quieter switches". A shower has been installed (a triumph of ingenious design) and semi-rigid spacesuits are used for EVA which are said to simulate gravity by directing pressure to the lower parts of the body. The on-board menu includes over 60 named brands of food.

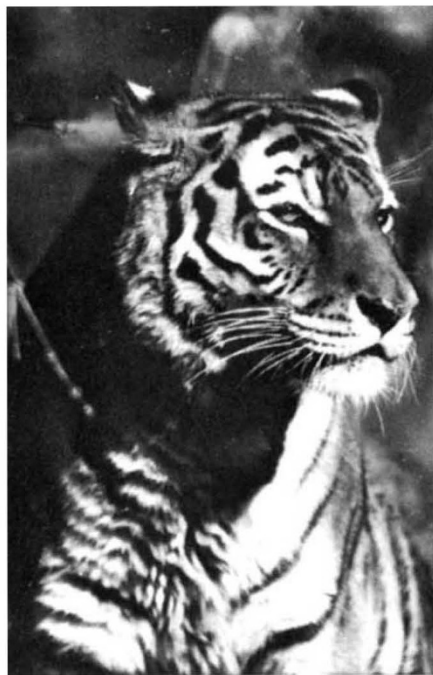
Nevertheless, all is not entirely

happy aboard Salyut-6. The TV set ferried up by Progress-1 was said to be urgently needed, to keep the crew in touch with world events. One cosmonaut mentioned that after 45 days in orbit there was a need for "any kind of moral support"; it was a great boost, he said, to know that the completed experiments returned for processing via Salyut-26 had turned out well. Clearly, one of the main problems of small-crew long-term space-stations is

likely to be that of psychological isolation—a factor which will undoubtedly increase as such stations become a matter of routine rather than headline news. One can only hope that in the future, relieving or supply crews will be less careless than Dzhaniybekov and Makarov, who in the excitement of undocking from the first four-man Salyut-link-up left behind the letters home of Romanenko and Grechko.

Vera Rich

## USSR moves to protect rare animals



Vanishing species: the Amur tiger . . .



and goral

THE Soviet Union is preparing new legislation governing the conservation of rare fauna and restrictions on hunting. The December 1972 Resolution of the Central Committee and Supreme Soviet "on increasing the protection of nature and improving the use of natural resources", placed an emphasis on ecology that had been largely lacking in Soviet official thought, but so far its provisions have proved impossible to implement.

According to N. Eliseev, head of *Glavokhota* (Principal Hunting Trust) of the Russian Soviet Federative Socialist Republic (RSFSR), the poaching of rare and protected species is still rife. The RSFSR is by far the largest of the Union Republics, comprising Russia proper and the major part of Soviet Asia. Eliseev's department is thus responsible for 80% of all fur-bearing animals and 90% of all bird-life in the Soviet Union, including such rare and vanishing species as the Amur

tiger, the goral and the desman (source of musquash).

Hunting is still an important industry (since in much of the Soviet Union fur is a necessary rather than a luxury article) and it is governed by a somewhat complicated system of inspections and licences. But the poachers often manage to circumvent the various controls by making rapid safaris in fast cars and motor boats. Poaching, or at any rate, breaches of the hunting regulations on the part of licensed hunters, are common.

The new laws, says Eliseev, "will intensify the protection of wild animals, birds, fish and other fauna". Presumably this means (though he does not say so) severe penalties for poachers and dishonest hunters. Eliseev, however, stresses the positive approach to conservation, demanding a fundamental change in social attitude: "An end must be put to the consumer attitude towards nature". □