several pointers around, and none of them is promising.

Thus although the Carter Administration recommended significant increases for high energy physics both in its original budget request in January and in the revised request in April, the Senate Budget Committee has proposed reductions in the whole of the science budget to make room for extra defence spending.

The equivalent committee in the House of Representatives has not been so harsh. But, like that in the Senate, it is suggesting that first priority within the science budget be given to the space shuttle; and has pinpointed high-energy physics as one area that might accomodate a 'pause in funding'.

More specific proposals have been made by the House Science and Technology Committee, which has recommended a high-energy physics budget for next year of $6 million less then the President's revised request of $354 million.

This cut could be absorbed relatively easily. Proposals from the House Appropriations Committee are expected to be more damaging. No decision has yet been made but it is widely reported that the whole of the energy research budget — including high-energy physics — should be kept at its current level for next year, with no increase to allow for inflation.

The implication of such a proposal, if accepted by Congress, would be to wipe out the 10 per cent increase which had been expected by the high-energy physics community.

The prospect of no growth for the energy research budget has already prompted a letter from Dr Frank Press, Director of the Office of Science and Technology Policy, to the chairman of the Appropriations Committee emphasising the importance that the Administration attaches to the support of basic science.

But in a generally confused budget year, it remains unclear which direction Congress is likely to take. All that is certain is that the bleak outlook will be hanging heavily over physicists meeting this week in Woods Hole, Massachusetts, to chart a strategy for US high-energy physics over the next decade. **David Dickson**

Astronomy

Britain bids for big time

BRITISH optical and radio astronomers have decided to bid for £15.5 million-worth of new telescopes — a 4.2 m optical collector and a 15 m millimetre-wave radio dish — to be constructed at the Roque de los Muchachos Observatory site on La Palma, in the Canary Islands. The request effectively mortgages all major capital spending by the Science Research Council's Astronomy, Space and Radio Board until the middle of the decade.

The proposal is now before the Advisory Board for the Research Councils as part of the SRC's 'forward look', and is within previously agreed guidelines for SRC expenditure. However, because the cost is more than £200,000, the proposal also has to be approved separately by the Secretary of State for Education and Science. A decision is expected within a month. The Netherlands is also involved; the National Research Council (ZWO) is considering a 20 per cent participation in the new instruments.

The 4.2 m light collector is designed to provide high resolution imaging of distant faint sources, comparable with that of the Hale telescope at Mt Palomar, but with considerably better seeing — the best, in fact, in the northern hemisphere. Combined with the UK Infrared Telescope (UKIRT) on Mauna Kea, Hawaii, and the complementary 1 m and Isaac Newton 2.5 m telescopes already destined for La Palma, the 4.2 m would double the amount of guaranteed telescope time available throughout the world to UK optical astronomers.

This estimate takes account of the Roque de los Muchachos agreement, which allocates 20 per cent of the observing time on the telescopes to Spain and 5 per cent to collaborations among other users of the observatory. These are at present Denmark and Sweden; but a site has already been reserved for a French 90 cm solar telescope, and there is a possibility that Italy will join with its own 3.5 m telescope.

The Italian move stems from its recent proposal to join the European Southern Observatory in January 1981, alongside Germany, the Netherlands and Sweden, at ESO's La Silla site in Chile. Part of the price of admission — which is still under negotiation — would be to provide a 3.5 m blank to provide a second major ESO light gatherer (a 3.6 m telescope is already in place), and Italian astronomers are considering splitting a large blank into two halves, one for La Silla and one for La Palma. However, their proposal depends on gaining Italian parliamentary support, which is often slow in coming.

The millimetre-wave radio telescope faces greater competition. The United States has had an 11m instrument reaching down to 2 mm wavelength in place at Kitt Peak for a decade; and France and Germany are constructing a similar dish, and a millimetric interferometer, within the Institut pour Radioastronomie Millimetrique (IRAM) whose headquarters are in Grenoble.

The United Kingdom rejected participation in IRAM because it involved setting up a new and expensive administration, because European salaries would have to be paid, and because it was against the SRC's policy of disengagement from large autonomous research centres.

The proposed millimetre radiotelescope would be complementary to the infrared telescope at Mauna Kea, where the seeing is as good as at La Palma. The infrared telescope, which can operate at most wavelengths between the near-visible and 1.5 mm (with the help of helium-cooled bolometers) cannot provide detailed spectral information. The proposed radiotelescope, using tuned-crystal detectors, will on the other hand be able to provide the profiles of molecular emission

Existing major international optical telescopes

Diameter (m)	nationality of operator	location
6.00	USSR	Mt Semirodriki
5.08	USA	Mt Palomar (Hale)
5.00	USA	Las Campanas, Chile
4.50 (6×1.8)	US (multimirror)	Mt Hopkins, Arizona
4.22	UK (infrared)	Hawaii
4.01	USA	Kitt Peak
4.01	USA	Cerro Tololo, Chile
3.94	Anglo-Australian	Siding Spring
3.66	ESO	La Silla, Chile
3.66	Franco-Canadian	Hawaii
3.05	USA	Mt Hamilton (Lick)
2.72	USA	Ford Davis, Texas (McDonald)
2.64	USSR	Crimea
2.60	USSR	Armenia
2.59	UK (Isaac Newton)	La Palma, Canaries
2.57	USA	Mt Wilson
2.54	USA	Las Campanas, Chile
2.29	USA	Kitt Peak
2.24	USA	Hawaii
2.20	W. Germany	Calar Alto, Spain
2.15	USA	Kitt Peak
2.15	Argentina	San Juan, Argentina
2.08	USA	Fort Davis, Texas (McDonald)
2.00	USSR	Chemakha

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lines at wavelengths greater than 0.8 mm. It will also provide Britain's radioastronomers — whose long lead in radiointerferometry has been broken by the construction of the US Very Large Array — with access to at least one world class instrument.

Robert Walgate

Ariane

Half way to the Devil

EUROPEAN hopes of commercial competition with the delayed American space shuttle have been called into question by the failure on 23 May of the second launch test of Ariane, the European three-stage 1,750 kg payload launcher. The European Space Agency, responsible for Ariane, has always held that two successful flights in the four-flight test series (the next tests are due in November this year and February 1981) would be counted a success; but what matters is whether potential clients will take the same view. They will no doubt now be on their guard.

The rocket fell into the sea less than 10 km from its launch site in Kourou, French Guyana. It now lies in muddy waters some 7 to 10 metres deep between Kourou and the former French penal colony, Devil's Island. Two ships are searching for it, one with sonar and the other with drag-nets. If the rocket is found, it should be recoverable.

The fuel tanks were destroyed by an automatic device, but the propulsion bay — the collection of four combustion chambers where the critical fault occurred — is expected to be intact. It may prove crucial in determining the cause of the accident.

Preliminary analysis of telemetric data has revealed that one of the four first stage engines began to 'flicker' 4.4 sec after ignition, 1.1 sec after lift-off. The pressure in its combustion chamber oscillated at 1,000 Hz with an amplitude of 4 bars about its design pressure of 54 bars, and the exhaust gases turned yellow, indicating inefficient oxidation of the fuel. By 6 seconds the fault appeared to have corrected itself.

At 28 seconds the fault recurred for an instant, and then the temperature began to rise steadily in the propulsion bay from 24°C to 56°C. At 64 seconds the temperature jumped to 100°C and the combustion chamber pressure dropped to 10 bar. Ariane started to roll. By 104 sec the roll had reached 10 rpm, and two other engines lost pressure; the third followed at 108 sec. The self-destruct systems then decided that Ariane had had enough, and blew out the fuel tanks.

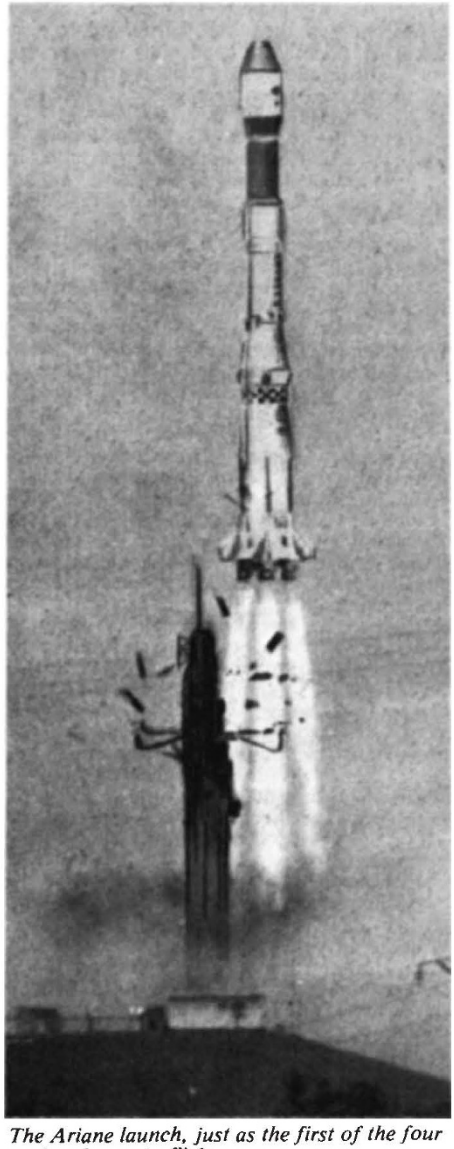
A similar loss of pressure was detected just after ignition of the Ariane engines on the first launch test in November 1979; but this loss was detected soon enough to abort the launch. At a subsequent attempt, lift-off and launch were successful, and the earlier fault was put down to instrument error. There may now be doubts about whether this was the case.

The Ariane first stage engines are derived from those of an earlier French rocket, 'Diamant' — and this rocket also experienced catastrophic losses of power during its development. However, 44 ground tests of the Ariane four-engine assembly showed power loss only once.

The fault probably traces back to a fluid or chemical instability in the injector, the 'carburettor' that injects fuel and oxidant into the combustion chamber; and the question arises whether the instability is triggered by a mechanical fault in the injector, or is simply an inherent instability due to a design error. If the latter, a further series of ground tests will be necessary before Ariane's third test flight, and the money available for those tests is limited.

Another possibility being considered by Ariane engineers is that the geometry of the exhaust deflectors at the launch pad led to an acoustic effect which in turn induced the instability. The deflector geometry is completely different at Kourou from the geometry adopted in the ground-based tests.

Robert Walgate



The Ariane launch, just as the first of the four engines began to flicker.

Pesticides

EEC directive disputed

THE long-standing argument over the basis for environmental standards between some European governments and the European Commission now appears to have spread to the consumers' associations. Thus last week (27 May) the Consumers' Association, the London-based consumer group, published a criticism of the draft directive on the regulation of pesticides in foodstuffs originally promulgated in 1976.

The CA's argument is based on a comparative study carried out in the past three years in West Germany and the UK. The nub of the issue, according to the report "Pesticide Residues and Food" (Consumers' Association, 14 Buckingham Street, London WC2) is whether the regulation of pesticides in the human diet is best accomplished by fixing maximum concentrations of permissible pesticide residues in foodstuffs appearing on the domestic market.

The EEC directive proposes that there should be maximum permitted levels of certain pesticides (particularly the organocholorines) in foodstuffs, and that it should be the responsibility of national governments to sample foodstuffs regularly, analysing them for their pesticide content. This is for practical purposes the system now in operation in West Germany.

By contrast, the British system is based on a voluntary scheme for the approval (by the Ministry of Agriculture, Fisheries and Food on the recommendation of an expert Advisory Committee) of pesticides offered for sale in the United Kingdom and on estimates of what foods people eat. The CA joins with other critics of the system in urging that the approval scheme should be made statutory, but otherwise comes to the conclusion that this scheme has adequately served its purpose of keeping pesticide concentrations in human blood and tissues within acceptable limits.

One of the CA's chief arguments in favour of the British system of control is that the German system is much more expensive. But the report, while recognising that harmonisation of environmental standards is necessary in the interests of European free trade, argues that it would be inequitable that all members of the EEC should have to adopt the most stringent (and cumbersome) of the control procedures now in force.

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