coveting for some time, and, as befits candidates for offices like these, he had no comment at all to make this week.

There is no doubt that Dr Adams is a good choice, not least because the job will call for all his formidable energies. Dr Adams' career is extraordinary. In 1940, without formal qualifications, he joined the Telecommunications Research Establishment, perhaps the most fruitful and successful government laboratory which has ever been set up in Britain. After the war, he joined the Harwell laboratory of the AEA, where he stayed for eight years. In 1953 he joined CERN, and became Director of the Proton Synchrotron Division in 1954, and Director-General of CERN in 1960. Then he moved on to become Director of the Culham Laboratory of the AEA and, briefly, Controller at the Ministry of Technology. Since 1966 he has been Member of Research for the AEA, and has been instrumental in setting up the Programmes Analysis Unit at Harwell. He has honorary doctorates from the University of Geneva and the University of Birmingham.

When the 300 GeV project is formally under way, Dr Adams' title will be Director-General, but until then it seems likely that he will be appointed a director at CERN. Despite the British refusal to join the project, there now seems very little doubt that it

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will go ahead—the latest country to agree is Switzerland. But the formal decision is not likely to be taken for another year or so. The decision about where the accelerator is to be should be taken in the summer of next year, probably in June. There is still some hope that by the time the formal decision is taken, the British Government will have come round and will agree to support the project, although this must depend on Britain's economic position at the time. It is known that the Treasury is not best pleased by the advice it was provided with in the period before the decision was made—the Foreign Office, for instance, is said to have told the Treasury that if Britain withdrew from the 300 GeV project, other countries would do the same. As is now known, this advice turned out to be distinctly unreliable.

Meanwhile, some British MPs are keeping up the pressure. One of them, Mr Tim Fortescue, has written to Mrs Shirley Williams, Minister of State at the Department of Education and Science, about a parliamentary answer she gave him on December 5. On that occasion, she declared that the Nuclear Physics Board of the SRC had made its recommendation (to support the 300 GeV machine) "on the assumption that the site would be in Britain". Mr Fortescue says that as far as he is aware, the Nuclear Physics Board made no such assumption, and asks Mrs Williams either to let him know on what authority she made her statement, or to take an early opportunity of putting the record straight. The department confirms that the letter has been received, but no reply has yet been sent.

ASTRONOMY

Observing the Stars from Space

THE first of three planned Orbiting Astronomical Observatories (known as OAOs) was successfully launched from Cape Kennedy last week. This is more than two years after the fiasco of the first attempt at launching an OAO, when electric arcing short-circuited the spacecraft's power system. Several improvements have been made to the design and operation of the spacecraft since then.

The principal benefit of having an observatory outside the Earth's atmosphere is that observations can be made in the ultraviolet region of the spectrum, at wavelengths that are almost totally absorbed at the Earth's surface. This first observatory, labelled OAO-2 in recognition of the earlier failure, has an elaborate programme of stellar charting ahead of it; there are two separate observational systems on board, one built by the Smithsonian Astrophysical Observatory at Cambridge, Massachusetts, and designed to study up to 700 stars each day, and the other built by the University of Wisconsin to give detailed information on a few select stars each day. Both sets of equipment operate at ultraviolet wavelengths.

The 4,400 pound observatory has been sent into a circular orbit 474 miles above the Earth's surface in a plane at about 30 degrees to the equatorial plane. It orbits in about 90 minutes. Energy for the batteries is obtained from a set of solar paddles, and the orientation of the spacecraft is measured by light-sensitive trackers which are locked on to specific reference stars. There are six such trackers, which move round as the craft follows its orbit, and NASA has announced that three of the trackers have locked onto reference stars as planned, the other three merely being engaged in tests.

As rays from the Sun cause serious interference with measurements from the stars, the telescopes in both sets of equipment only operate during the part of the orbit—about a third—when the craft is in darkness. The Smithsonian and Wisconsin packages are situated at opposite ends of the vehicle, and view at 180 degrees to each other. Intricate planning and programming have been necessary to ensure that both sets of equipment are making observations at fruitful orientations, as the satellite can only receive information from the ground (and relay it back) for about 10 per cent of the orbit.

The Smithsonian equipment consists of four tele-

scopes which—if OAO-2 survives six months—will chart about 50,000 stars. A life of two years would allow the whole sky to be covered. The key to the apparatus is a special 'Uvicon' television tube, sensitive to ultraviolet radiation, which can store the information received over a period of days; it uses a process called secondary electron conduction. The aim of the whole charting operation is to obtain a map of the sky in terms of broad band criteria; that is, to find the location and rough spectrum of the stars concerned. By contrast, the Wisconsin experiment will perform relatively few narrow band observations. Both sets of apparatus will be particularly useful for observing "hot" stars, which have temperatures up to about 50,000 degrees, and which emit most of their radiation in the ultraviolet region.

The next two OAOs are to be launched in 1969 and 1970 respectively, and will contain very high resolution equipment that will require much finer alignment than that aimed at in OAO-2. As a comparison, the Wisconsin telescopes have a resolution of 10 Å, and the second and third observatories are planned to have 2 Å and 1/10 Å respectively.

EDUCATION

Participating Students

WITH the autumn term over, academic staffs around Britain must be feeling that they have got off lightly. The student rebellion that flashed around continental Europe this spring was widely expected to infect the length and breadth of Britain before autumn was out. But nothing very much happened. Skirmishes at Birmingham and Bristol, both on issues that put wide public support behind the students, look like reaching a quick resolution.

Nobody knows how long the calm will continue, but recent moves by both students and staff to reach a fuller *modus vivendi* may serve to pre-empt future hostilities. Two agreements on student participation in student life appeared this term. One, dealing with university students and drafted by the Committee of Vice-Chancellors with the National Union of Students (NUS), appeared two months ago (*Nature*, **220**, 105; 1968). The second appeared last week: drafted by leaders of the local education authorities of England and Wales, again with the NUS, it sets guidelines for student participation by the 170,000 students at colleges of art, education, commerce and technology.

The NUS seemed to be well pleased with the agreement last week. Where student welfare is concerned, it is certainly more definitive than the vice-chancellors' agreement. The local authorities said they were prepared to vest executive power in committees made up equally of staff and student representatives. Procedural matters such as the provision of a casting vote will apparently be decided by local negotiation. The NUS thinks that these committees will have a full set of teeth when it comes to dealing with academic paternalism: now that the legal age of majority is to be 18, the excessive readiness of many college staffs to stand *in loco parentis* over their adult charges is perhaps becoming anachronistic.

On matters of discipline, the agreement recommends that power should be exercised by committees on which staff, governors and students are equally represented, and that there should be a right of appeal to the governing body. In the long term, perhaps the most important issue is curricula and the role of students in establishing them. Feedback from the students is solicited, but the agreement has little to say beyond this. Obviously the last words have not been spoken here, and it is of interest that a group of radical student organizations intends to discuss scientific curricula and course methods at a conference in Manchester in the new year. Scientific curricula have been chosen because scientists and technologists are likely to be greater victims of industrial alienation than their artistic colleagues, yet at the same time science faculties make a smaller contribution to the ranks of student activism than any other.

INDUSTRY

Home Grown Enzymes

SHINY rainbow-coloured catalogues from the American biochemical supply houses are to be seen in every British biological laboratory: nowadays they offer more than a hundred purified enzymes for sale. No British firm approaches this scope; the few British firms that there are act merely as agents and import all their enzymes, mainly from Japan, Germany and Holland. The absence of enzyme manufacturing capacity in Britain is bad both for the balance of payments and for the customer, who often finds that technical information about the enzymes he uses is not available in Britain.

W. and R. Balston Ltd, the firm of papermakers and manufacturers of Whatman filters, hopes to put this right. Jointly with the National Research Development Corporation, it has set up a new company, called Whatman Biochemicals Ltd, in an effort to enter the enzyme market. A completely new factory is to be built at Maidstone at a cost of £500,000, designed for the chromatographic separation of enzymes on a kilogram scale. Whatman Biochemicals hopes that the new plant will come into operation in 1970. Dr Colin Knight, the managing director of the new firm, said last week that he expects microbial fermentation processes will be the mainstay of production at first, but later the firm might make mammalian enzymes as well.

It is at first surprising the NRDC should choose to ally itself with Balston Ltd, a firm whose main trade is papermaking, rather than with, say, one of the drug houses. Presumably it was Balston's long experience in chromatography that made it a desirable partner —the company has been associated with the technique since the first experiments of Martin and Synge with filter paper in 1944. The new company will be closely associated with the biochemical engineering group of University College, London, which is well versed in the problems of scaling up biochemical separations to the industrial level.

Enzymes are scarcely products for the mass market, but the new company is confident that demand for them is going to grow rapidly. Dozens of enzymes are now used in clinical medicine, and dozens more are regular playthings in the laboratory. The quantities involved in Britain are not large, but the company predicts that sizable applications in industry will appear before long. Further in the future, enzymes