



mediary boson particle which would mediate in weak nuclear interactions. Experiments to try to track down either of these phenomena are riddled with difficulties, however, but Professor O'Neill admitted to a personal prejudice in favour of looking for the intermediary boson.

The ISR were not built solely for world shattering experiments which have only a marginal chance of success. Indeed, Professor O'Neill went so far as to claim that the first millisecond of experimental time on the ISR will unleash as much information as have twenty years of conventional research into cosmic rays—a fact which he stressed should not be allowed to detract from the value of cosmic ray research both past and present. But the two most straightforward experiments for the ISR are elastic proton-proton scattering, which has never yet been carried out at these energies, and the observation of isobar production through counters placed in the forward scattering direction.

As in all physical experiments, the resolution of the apparatus limits the accuracy with which it is meaningful to make any measurements. In a typical isobar experiment, where the mass of a resonance is to be measured, Professor O'Neill showed that the spread of the beam together with other resolution factors imposes a maximum accuracy for measuring momenta of 170 MeV/c in the longitudinal direction and 20 MeV/c in the transverse direction. Several other factors enter the experimental balance sheet, such as the limits on small angle scattering measurements due to the width of the vacuum tubes on the storage rings, or the restriction on magnet positions due to similar geometrical factors. In elastic p-p scattering there is an upper limit on the scattering angle of about 0.1 radians due to the drop-off in cross-section, and these obvious physical and geometrical factors define the feasibility of many of the experiments that are possible in principle. Thus the interest in collecting information from forward scattering is fairly well accepted, and the positions of the forward magnets are already settled. Unfortunately some decisions are not so well defined, and arguments are at present in progress over the design of the 14 kG magnets for the isobar experiments.

Although there are eight intersections on the ISR, only two will be used for experiments. This is largely for economic reasons, because the problems involved in setting up an experimental region in the eight or nine

metres where the protons are in free flight are considerable. Not least among these is the attainment of an ultra-high vacuum of around 10^{-11} torr in the interaction region—physicists are sufficiently agreed on the need for this degree of vacuum to minimize beam-particle collisions that no efforts are being spared to achieve it.

HOUSING

Houses of the Future

SMALL, basic houses of flexible design, in a variety of styles, built for renting or buying, and of a good enough standard to suit the better standards of living ahead, are seen by Lord Llewelyn-Davies, professor of architecture at University College London, as the houses needed in Britain today. At a meeting of the Royal Institution of Chartered Surveyors last Monday, he said that Britain is moving into the age when the average family will have not only two cars but two homes. In thirty years' time, incomes will be three times what they are now, and the average family should then have the freedom to choose the sort of housing they want, as the professional man can today. Although people might have to accept high living densities in some situations (as in the heart of a large city), he felt that on the whole houses should be designed at the density people want. As the standard of living improves, so people tend to want more space both inside and outside—a belief that has obviously influenced him and his partners in their outline plan for the new town of Milton Keynes. Lord Llewelyn-Davies also confirmed his belief in the need for an increase in house building by private enterprise in the future. This would help to "bring houses for sale into the hands of more people".

Not surprisingly, this was also a theme of the second speaker, Mr Ronald Wates, director of Wates Ltd, who predicted a buyer's market of privately owned homes in the seventies and eighties. Mr Wates sees homes of the future as being bigger and better, with central heating and air conditioning systems, and with effective sound insulation. He believes that there is tremendous scope for independent development in new towns, but the "most serious obstacle at present is the Government's system of the location of industry embodied in the Industrial Development Certificate

and the Office Development Certificate". Without reforming this system, he said, there is little chance for free enterprise new towns with the consequent savings in taxpayers' money, the increased supply of housing and the greater amount of experiment to meet public tastes. While Lord Llewelyn-Davies favours fairly low density housing in the future, Mr Wates thinks that housing will be mixed, with both low and high rise buildings to cater for different requirements. He does not think, however, that blocks more than twelve storeys high will be built outside centres of large cities. From his experience, the two home family would not be an important factor in housing in the future.

MEDICINE

Money for Crippling Diseases

THE National Fund for Research into Crippling Diseases last week announced research grants totalling more than £1 million. Three separate grants together account for three-quarters of the total. A grant of £250,000 is destined for the Institutes of Child Health, Obstetrics and Gynaecology at the Hammersmith Hospital, London. The money will go on a new building which will bring together, under one roof, the departments of obstetrics and paediatrics. At present these departments are dispersed in a collection of wooden huts, and physical separation of the laboratories is hindering some collaborative research projects. Professor P. Tizard, of the Institute of Child Health, pointed out last week that the risk of dying in the week on either side of birth is twice as great as the risk of dying in the whole of later infancy. The new building will house Britain's first research unit devoted to the study of disorders occurring at this most crucial period of life.

Another £250,000 will rehouse the Bland-Sutton Institute of Pathology at the Middlesex Hospital. The institute was originally concerned with the pathology of tumours, but its interests have widened with the years, and recently it has started investigations into multiple and disseminated sclerosis. The third large grant, £170,000, will enable the Royal College of Surgeons to establish a chair of teratology. The college has been studying the relation of various congenital malformations in monkeys to events during pregnancy, apparently with some success. As well as investigating causes, the college is developing new surgical treatments for malformations like cleft palate, club foot and dislocated hip.

The other research grants—64 of them—are destined for a wide variety of projects, from a literature review of the needs of handicapped children to the biochemistry of viral infected cells, and from the neurology of newborn infants with spina bifida to the manufacture of elbow joints out of chrome cobalt alloy.

Lord Harding, the chairman of the National Fund, emphasized last week that the fund's advisory panel is open to requests for support from any quarter. The fund started life in 1952 as the National Fund for Research into Poliomyelitis, but as vaccines brought poliomyelitis under control, the fund extended its scope, and its title, to cover all kinds of crippling diseases, in all their aspects of cause, prevention, treatment and rehabilitation.

Parliament in Britain

Zoological Society

THE Zoological Society of London has been saved from financial difficulties by a special loan from the Bank of England of up to £375,000 which the Government guarantees will be repaid by July 1, 1970. Mr Robert Mellish, Minister of Public Building and Works, explained that the society intends to use the loan only as a last resort, but it would serve to maintain the society's existence while management consultants were called in to put its finances in order. The Government also agreed to defer repayment of a loan made to the society in 1964. (Written answer, February 25.)

Specialist Committee

LAST week the House of Commons approved a proposal to set up a Select Committee on Scottish Affairs, and the Leader of the House, Mr Fred Peart, has recently proposed a new committee on Overseas Aid and Development, as part of the Government's experiment of establishing a system of such committees to check on the administration of Government departments. Mr Peart emphasized that the Committee on Agriculture had been stopped merely because the experimental period initially chosen was over. (Oral answer, February 26.)

Radiobiology

IN reply to a question about the future of the Radiobiology Unit of the Medical Research Council (MRC) at Chilton, Mrs Shirley Williams, Minister of State in the Department of Education and Science, said that, in the light of a report by a special committee appointed by the MRC, the size of the unit would, in the next few years, be gradually reduced by about 50 per cent. After surveying work on radiological protection and fundamental studies in ionizing radiations, the committee concluded that so much experience had been amassed in this and other similar units that adequate standards for protection could now be laid down and this sort of work put lower on the list of priorities. (Written answer, February 26.)

Biological and Chemical Defence

GIVING examples of the development of commercial equipment for biological and chemical defence, Mr John Morris, for the Ministry of Defence, included respirators, protective clothing and decontamination equipment. Butyl rubber gloves for protection against chemical agents, a talcum powder dispenser for decontaminating personal weapons and equipment, and a fire extinguisher for decontaminating vehicles, buildings and terrain had all been commercially evaluated, he said. (Written answer, February 28.)

Nuclear Physics

MRS SHIRLEY WILLIAMS said that the net expenditure by the Rutherford High Energy Laboratory was £7.4 million in 1968-69. The five most expensive projects are the Nimrod accelerator (£2.3 million), high energy counter experiments (£1.5 million), bubble chamber experiments (£0.8 million), computer operation (£0.4 million) and nuclear structure experiments (£0.3 million). The estimated net expenditure by the Daresbury Nuclear Physics Laboratory for 1968-69 is £3.5 million, of which £1.4 million goes on high energy physics, £1.1 million on NINA operation and the rest on computer operation, civil engineering work and applied physics. (Written answer, February 28.)