

44th Session of CERN Council

The Council met at CERN on 8 October under the Presidency of Professor E. Amaldi

This special session of the CERN Council was called to prepare the way for decisions by the governments of the twelve Member States on the proposed 300 GeV accelerator. It is hoped that the decisions can be taken in December of this year.

The governments are now being asked to pronounce on the new proposal (described in some detail in the April, May and June issues of CERN COURIER) which involves construction of the accelerator alongside the existing Laboratory near Geneva. Before this is possible, the project as now conceived has to be laid on the table in a formal way in a 'programme definition'. This legal document was before Council for approval after which the delegates could carry it away to their respective governments. In addition, the Council received further information on aspects of the new proposal which it is important for the governments to take into consideration in their decisions, namely the conditions under which the new Laboratory site is likely to be made available and the impact of the construction of the 300 GeV accelerator on the programme of exploitation which was foreseen for the facilities of the existing Laboratory.

Programme definition

The CERN Convention requires that the Council approves certain programmes of activities and in so doing defines the programmes concerned. 'The Programme for the Construction and Bringing into Operation of the CERN 300 GeV Laboratory' in its previous form (when the Laboratory was to be at another site) was approved in June 1969 and was then reproduced in full in CERN COURIER. We therefore pick out here just the main features of the new programme definition.

The Laboratory is to include a proton accelerator for energies of about 300 GeV. The accelerator intensity is to be at least 10^{12} protons per second.

The Laboratory is to be built on an extension of the present CERN site and in this circumstance the present 28 GeV accelerator will be used as the injector of the 300 GeV machine and the existing West Hall will be used as the initial experimental area. Research will start at 300 GeV or an intermediate energy level in the

West Hall during the sixth year of the programme. A North experimental area will be constructed to come into operation at the 300 GeV energy level eight years after the start of the programme.

Superconducting magnets could be used for part of the bending magnets of the accelerator, if they become practical and economic in the course of the programme, thus raising the energy to 400 GeV. A decision on this option will be required about three years after the programme starts. The energy could eventually be raised towards 1000 GeV by replacing all the iron-cored magnets by superconducting magnets but this is outside the timescale and budget figures of the programme now being put forward.

Member States joining the programme will do so for a minimum initial period which will extend to the bringing into operation of the 300 GeV machine or eight years after the start whichever is the sooner. During the period the total cost will not exceed 1150 million Swiss francs at 1970 prices divided as follows:

Year	1	2	3	4	5	6	7	8
Cost (MSF)	30	105	165	180	175	165	165	165

Annual budgets will not exceed these estimated figures (adjusted for cost variation) by more than 15%. If the option of superconducting magnets to be used for part of the accelerator would cost more than can be accommodated in these budget figures a new vote of approval by Council would be needed.

The programme will begin on the date the Council appoints a Director General and votes a budget. Within the following year the Council will receive for approval:

- a master plan showing the proposed layout of the installations on the site;
- detailed specifications and estimated costs of the proton synchrotron, its buildings and supplies;
- approximate specifications of the experimental equipment, its buildings and supplies which will be constructed during the programme, together with the financial provisions to be allocated for these installations;
- an estimate of the running costs of the new accelerator when the present

West Hall is being used as its initial experimental area;

- an estimate of the annual budgets of the programme including the 300 GeV accelerator when the North area comes into operation.

Close collaboration in the implementation of the different programmes of CERN shall be ensured and the Council will examine proposed arrangements for this collaboration as soon as possible. The arrangements will include the creation of consultative scientific committees and will provide for the optimum use by the new programme of existing technical and administrative services. The Director General is required to report periodically to Council on the value and distribution of contracts arising from the programme. In view of the fact that those contracts concerning advanced technological equipment and services have an important effect on industries in Member States, such contracts shall be awarded in conformity with the Financial Rules of CERN whilst being reasonably well distributed amongst the Member States participating in the programme.

The programme definition, as outlined above, was approved unanimously by the Council. Such approval does not, of course, commit any Member States to participate. Decisions on participation will be made known at the December Council meeting.

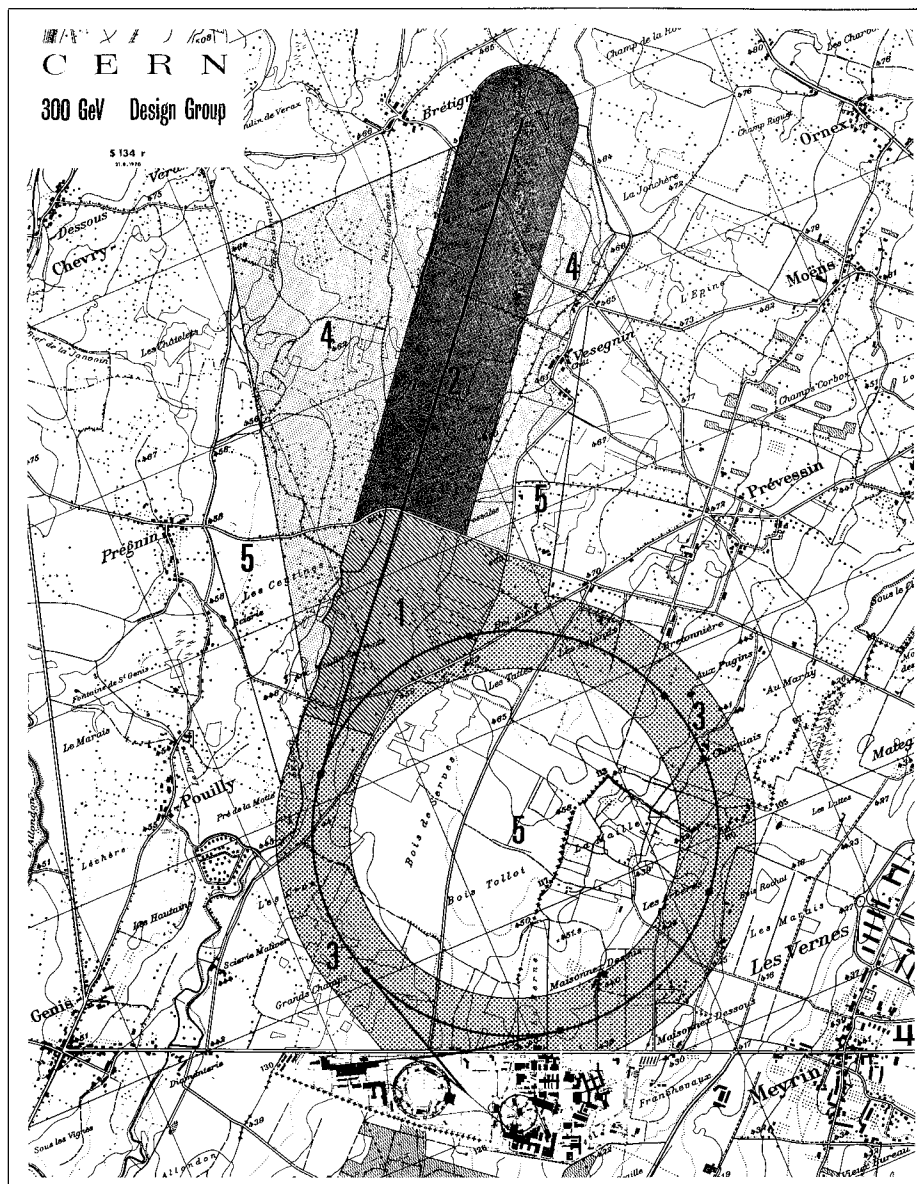
Interim report on the site

At the June Council meeting CERN was authorized to pursue the study of the proposed site for the 300 GeV Laboratory. This included both a study of the site itself from the point of view of its geo-technical appropriateness to receive the accelerator and further consultation with the French and Swiss authorities (the site lies about $\frac{7}{8}$ in France and $\frac{1}{8}$ in Switzerland) concerning the conditions under which the site could be made available.

The preliminary results of the site survey were reported in the last issue of CERN COURIER (page 277). It has been found that the quality of the molasse is entirely adequate for the construction of the accelerator being as good as, if not better

A map of the proposed site for the 300 GeV accelerator Laboratory divided into zones where the requirements are different.

1. The area (79 hectares) required for the laboratories, assembly halls, site services, etc. Parts of this area will be required early in the programme and the whole of it within the first five years;
2. The area (150 hectares) required for the new experimental area (North experimental area) which will be required during the last three or four years of the programme;
3. The area (251 hectares) required for the machine itself which will be built about 30 m below ground. In this area there will need to be restriction on building other than that in connection with the accelerator in order to ensure the stability of the machine. Six small buildings on the surface are foreseen but otherwise farming and forestry can continue as at present. The area will be required progressively during the first five years of the programme;
4. The area which may be required after the eight years of the programme for further experimental areas associated with the machine. 60 hectares are categorized as 'required' for the programme and 169 hectares as 'reserved' for the programme;
5. This area (343 hectares) is in three parts which may be needed for long-term developments in association with the machine, in particular the possible addition of intersecting storage rings either inside or outside the 300 accelerator ring. Parts of this area would therefore only be needed in ten or fifteen years' time if storage rings were to be built.



than, that of the molasse on which the present machines are built. In addition the site could accommodate a machine of diameter 2.2 km. Since the greater the diameter the higher the possible ultimate energy of the accelerator, the 2.2 km diameter is the preferred size.

Dr. J.B. Adams, Director of the 300 GeV project, reported that design is now concentrated on a machine of this diameter. Since it is larger than the 1.8 km diameter first proposed, the possible energies at different stages are increased. Thus the possible interim stage where research might begin in the West Hall while only half the ring magnets were in place, would achieve 200 GeV as opposed to 150 GeV. Within the budget for the programme the installation of further magnets would take the energy to 300 GeV. (Increasing the ring diameter will add comparatively little in terms of the increased cost because of boring out a larger circumference but there would be sizeable increased cost in buying the additional magnets to fill the larger circumference.) Filling the ring with conventional iron-cored magnets would

give an energy of 400 GeV. Filling the ring with superconducting magnets would probably give an energy of 1000 GeV.

The site for the Laboratory is shown in the map, divided into zones which would be required at different times and with different constraints on their use both for the programme now proposed and for possible much longer-term developments. Discussions are under way with the French and Swiss authorities with the aim of establishing an offer in principle concerning zones 1 to 4, the terms of such an offer and an agreement on the order and timescales in which the zones would be made available.

It is proposed that the contracts which are in force for the existing Laboratory between CERN and Switzerland, CERN and France, and France and Switzerland should form the basis of similar contracts regarding the new Laboratory. Any modifications could be brought to Council after the start of the programme.

Investigations have also been under way with regard to the two major 'services' the

Laboratory will require — electricity and cooling water. Together with Electricité de France, solutions to the problem of electricity supply have been studied in detail and costed. It is necessary to tap directly from the Eurogrid probably at the nearest point, Génissiat. The cost of laying on the necessary power will depend on the technical solution selected. The cost of the power itself is proposed as that charged to the most favoured national consumer of comparable amounts.

Similar investigations with regard to cooling water have been under way with the relevant Swiss authorities. A satisfactory scheme has been worked out by which cooling water would be pumped from Lac Léman to the site but a solution to the problem of disposal of the water after use has not yet been selected. Again it is proposed that the tariff charged for the cooling water should be that accorded to the most favoured national consumer of comparable amounts.

The new Laboratory would bring almost 1000 additional staff into the Geneva —

Pays de Gex region by the time construction of the accelerator is completed. The necessary housing for this number of people and the availability of schools for their children are two important questions which have been studied.

On the housing side there are already schemes under way in the region of the Laboratory, both in France and Switzerland and the additional CERN staff will represent only a small fraction of the anticipated influx of population.

The schooling problem however is one which already exists and which will only be aggravated further by increasing the number of staff. Schemes are being discussed to set up a European-type school in the neighbourhood of the proposed site which would offer instruction at all levels up to university entrance.

Discussions about such schools have been going on for many years between the Member States and the European academic bodies and the problems are very complex. For example, it is necessary to reach agreement between the European academic bodies on final school diplomas which will be generally acceptable as a qualification for entry to all European universities. It is the intention of CERN to do all in its power to negotiate an agreement on this complex problem as soon as possible through discussions with the two Member States concerned and with the local authorities, in order that a European-type school will be set up for the children of all the staff of CERN.

(Previous comment on this question and on the opportunity which exists to do something in the field of education in Europe whose significance could extend far beyond the solution of the immediate problem can be found in CERN COURIER vol. 8, pages 187 and 234, and vol. 9, page 177.)

The delegates from Italy and the Federal Republic of Germany urged that, in order to take decisions, information on the site and related questions such as those discussed above, should be developed to the same point as that assembled on the previous site offers from Member States. In the previous offers, acquisition of the site and assuring the necessary

'infrastructure' was not expected to introduce any extra cost to CERN.

The questions of housing and schooling were also raised as important matters by Italy and Germany. They insisted that since housing is recognized to be a problem at present, some positive action by CERN, France and Switzerland will be needed. They also urged action on the schooling problem recalling that other countries had offered to set up a European school to cater for the children of CERN staff.

The delegates from France and Switzerland said that formal commitments on the site questions cannot be given until a formal request for the site has been received from CERN. This would follow a favourable vote on the project. Nevertheless, both countries stated that they would welcome such a request and would have a very favourable attitude in tackling the many problems involved. They would continue to act towards CERN in the same spirit of cooperation which has always existed.

Implications for the existing Laboratory

In bringing the 300 GeV accelerator alongside the present Laboratory it has been judged right that some contribution to the cost of the new programme should be made from the budgets which were foreseen for the exploitation of the facilities already existing or nearing completion. This would mean that the additional money, beyond the foreseen budgets, which Member States would have to find for the 300 GeV Laboratory would be less than the 1150 MSF written into the programme definition.

There has been much debate as to where the additional money figure should be set, mainly revolving round the figures of 900 MSF and 750 MSF. The consensus of opinion at the Council session was that to set the figure at 750 MSF involved cuts in the foreseen budgets for the exploitation of the existing facilities which would make too damaging inroads into the research programme and would be unacceptable in view of the considerable investment from the Member States in building up the research facilities. Thus the figure of 900 MSF is the one which is

now being taken in judging the impact on the existing Laboratory.

A total of about 250 MSF during the eight years of construction, would under these conditions, need to be saved out of the foreseen budgets of the Laboratory during the eight years of 300 GeV construction. In addition, it is agreed that the equipping of the West experimental hall for physics in the hundreds of GeV range would fall on the budget of the existing Laboratory. This would mean that something like 40 MSF per year during most of the years of construction would need to be pruned from the budgets which were being planned for the Laboratory. Obviously exploitation could not, in these circumstances, grow to the level originally intended.

The future programme has therefore been carefully examined and a list of possible ways of saving has been drawn up. Some saving can be achieved by cutting minor development work and by delaying the implementation of new techniques. Beyond that, more serious cuts (involving choice among topics such as the development of PS operation, the programme of bubble chamber experiments and electronic experiments, the synchro-cyclotron programme, ISR exploitation, the development of computing and data-handling facilities, restrictions in services and administration) would be needed. It is believed however that it will be possible to sustain a high proportion of the anticipated exploitation by accepting some limitations on performance, variety of programme and flexibility.

It is difficult to be more precise at this stage since the choices cannot reasonably be made in advance of operational experience with the different components of the improvement programme — such as the Booster and the new large bubble chambers. The choices would also be influenced by changes of emphasis in the physics itself. The detail would be worked out when drawing up the annual budgets and would be progressively under the supervision of the Council at the stage of approving these budgets.