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STUDIES IN CERN HISTORY

THE DIFFICULT DECISION, TAKEN IN THE 1960S, TO CONSTRUCT A 3-400GEV PROTON SYNCHROTRON IN EUROPE

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**GENEVA
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In Volume 2 of the History of CERN we published a study on the decision, finally taken by the Council in 1965, to construct the Intersecting Storage Rings, a technically sophisticated machine which was fought for, above all, by the engineers. The preparatory studies and controversies we described there lasted for nearly a decade, and included the prehistory of the machine with which this chapter is concerned.¹

In that volume, we sketched the method which we considered best suited to the study of decisions on very large equipment for high-energy physics. It was derived from two research traditions which have both proved very fruitful and have been extended into new fields of investigation. The first is that pursued by political scientists who have been working, since the 1960s, on the complexity of the political or military decision-making processes. Allison's study, published in 1971 on the functioning of the American government machinery during the Cuban missile crisis is one of the best examples of this genre. The second tradition is that of British sociologists of science who, in the 1970s and 1980s, revitalised the study of how scientific knowledge is produced. One of their most important tools for doing so was to concentrate on scientific controversies at the frontier of knowledge.²

What emerges from both approaches, and is particularly pertinent for us, is the injunction to follow events as they "actually unfold", to analyse their sequence as "locally" as possible, and to avoid at all costs comforting anachronisms which over-rationalise human actions. One is to describe in detail the behaviour of individuals and of groups, to explore the situations in which they find themselves and which they help to define. One must not hide the messiness of the world, one must not simplify the intricacy of reasons and motivations nor impose too much *a posteriori* coherence on the account.

At each stage of the historical process which is being analysed it is important to try to identify the chief protagonists and their reciprocal relationships, to describe the issues at stake as perceived by each of them, and to pick out those who, at any given time, are able to impose the "rules of the game". In this way one can follow the

¹ *History of CERN*, vol II, chapter 12.

² References to the former traditions are to be found in the introductory pages of chapter 12 in the *History of CERN*, vol II. This tradition is itself part of a broader current which calls attention to the importance of organisations and makes extensive use of the notion of limited rationality introduced by Herbert Simon. For the second tradition see, for example, Collins (1985), Rudwick (1985), Shapin and Schaffer (1985) and Pestre (1989).

constant shift of interests and alliances, one can see how the process evolves, and how the "choice" takes shape. Within this logic the ultimate result, that which we still call "the decision", is seen as the final operative moment in a temporal sequence of events, and it emerges as partly "unexpected" rather than as the realisation of an ever-present and controlling "objective" or goal.

It is thus important not to treat such processes as point-like decisions in which an optimal-rational choice could be made from an exhaustive list of well-studied and defined possibilities. The decisions on very large equipment in complex settings (like CERN) should not be approached as if they were logical choices made at *one* moment by *one* group of people who successively

- define its objectives unambiguously,
- consider all the means which could satisfy them,
- make, as a result, the only necessary choice.

On the contrary, it is essential to remember

- that decisions of this kind are spread over long periods of time, that they are the final outcome of a series of micro-decisions which progressively reduce the field of possibilities and the freedom of the actors, rather than being one choice made at a given moment;

- that the micro-decisions taken by the actors are often (and perhaps always) taken on the basis of alternatives which are limited in number, unequal in quality, and perceived in the light of the context of the time. In brief, the information at the disposal of the actors is locally evaluated and is never exhaustive nor systematic;

- that the actors are not necessarily the same at the beginning and at the end of the process, and that they have their own criteria of what is the right way of handling things. In other words, there is not one rationality which dominates the whole process, but several, each peculiar to a group and to a time period, and often in conflict with one another.

Speaking very generally, the history we are going to recount here — that of the 300 GeV decision — seems particularly "chaotic", and subject to quasi-Brownian zig-zags. In this case the partisans of the project, noteworthy for their extraordinary tenacity, had to contend with open opposition and with indifference, had to deal with demands whose simultaneous satisfaction seemed hardly possible, and had to manage

economic and political situations which were constantly changing and which differed sharply between member states. To return to the themes we have just adumbrated we can say that here the temporal dimension is more important than ever, that specifically local actions and compromises were dominant, and that no one could ever have more than a partial control on the evolution of the whole process. The element of contingency was ever present in each microdecision, and objections and refusals arose from different, unexpected and changing quarters.

1. The situation in 1965, when the decision on the ISR was taken

By way of introduction, and somewhat abstractly, we could say that the Council and the CERN management had three problems to solve if they were to sell the 300 GeV project to member states' governments with a reasonable chance of success. The first was to offer a precise technical description of the machine that they wanted. Around 1965 CERN's Director General had such a solution to offer, a solution that had been first spelt out in a report published at the end of 1964 after three years of work. This choice for a classical strong focusing synchrotron of 300 GeV was contested by nobody: the elite of the European high-energy physics community, the physicists and engineers at CERN, and the national delegates to the Council were all apparently quite happy with it.³

The second problem that the CERN management had to deal with was the redrafting of the organisation's convention. The reason was that, at the time, more or less everyone thought that the 300 GeV machine would require the building of a new laboratory. The original text which had been drawn up for a single laboratory in Geneva had then to be modified. Two ways of doing this could be considered. The first involved creating a new organisation with its own Council to supervise the 300 GeV centre as the existing Council watched over the Geneva laboratory. In this case it would be necessary to draft a new text and to have it ratified by the member states' parliaments. The alternative was to modify the existing convention to allow for a single organisation, and to have an unchanged CERN Council supervise the two laboratories. The Council, quite sure of itself, appealed to efficiency, simplicity, and coherence in the management of European high-energy physics, and only seriously considered the second alternative.⁴

³ References in the *History of CERN*, vol II, chapter 12, section 12.6.

⁴ *The future constitution of CERN*, Draft, 30/10/64, letter Hampton to members of the Steering Committee, 11/3/65, note of the President of Council's Steering Committee, 26/3/65 (DG20894).

The third problem, and the one that seemed to many to be the only difficult one to resolve, concerned the site of the future laboratory. At issue were questions of national prestige and the belief, widely spread at the time, that economic advantages were to be had from having large items of research equipment on one's soil (through industrial contracts, technological fall-outs and so on). One index among others of the importance attached by governments to this is the large number of site proposals made in 1964 and 1965. Nearly all countries offered a site, the countries with federal structures (like Italy or Germany) proposing several alternatives.⁵

In March 1965, with the decision to finance the ISR apparently assured at governmental level, the Council President proposed that a Steering Committee be set up to look into the matter of the other accelerator proposed by the European physics community, the 300 GeV machine. According to current estimates two or three more years would be needed to get the member states to agree to fund this machine.⁶ A year earlier the bulk of the European physicists had strongly criticised this estimate. Since the 300 GeV synchrotron was for them the only interesting accelerator, and since they did not want CERN to risk having governments refuse it on the grounds that they had just funded the ISR, the physicists had proposed that member states be asked either to fund both machines simultaneously, or to drop the ISR programme altogether. In spring 1964, and after consultation with the Council, Victor Weisskopf had decided to disregard this opposition and had chosen to "sell" the ISR to the member states *before* initiating the procedure for funding the 300 GeV.⁷

Throughout 1965 the Steering Committee set up to deal with the 300 GeV machine looked into the problems of the convention and of the site. It seems, however, that its members' main concerns remained elsewhere. The financing of the PS improvement programme (elaborated by European physicists to ensure that their machine remained competitive with Brookhaven's AGS) and that of the ISR (just then in its final phase) were of paramount importance.

⁵ The different offers for a site (some of them published) can be found in file DG20895. A similar situation arose in the United States. Most regions of the country were keen to host the American 200 GeV machine.

⁶ Letter CERN/10.455, signed Bannier, President of the Council, 2/12/65.

⁷ *History of CERN*, vol II, chapter 12, section 12.6.

The decision to build the ISR, taken after long and intense lobbying, had immediate effects on the 300 GeV programme. As the physicists had feared, it suddenly became difficult even to find the extremely modest sums of money required to enable a working group to continue its study of the 300 GeV project. At that point, it was Germany which emerged as the most recalcitrant member state. In December its delegates announced to the Council that they were not prepared to vote the finance needed for the additional studies. The short-term consequences were negligible, however, as the Council, in its usual fashion, found a way around this minor obstacle and so had the working group funded.⁸

By contrast the long-term effects of the German position raised considerable concern — and the CERN lobby decided to embark on what one may call a policy of revival. In every decision-making process there are always periods of inertia, one of the ways most frequently used by administrators who do not want to refuse head-on a project being to try to wear out its protagonists. To revitalise a project its champions must therefore periodically refloat their ideas, they have to find new paths, new arguments which permit them to make their requests again. The first quarter of 1966 was dedicated to preparing the ground for this kind of renewal of interest.

This policy involved action on three fronts. First, the Council and the CERN management tried to constitute the European physics community as a group of independent experts. The aim was to offer to member states an "independent" estimate of Europe's requirements in high-energy physics and on the need for the new machine. This part of the policy of revival was set in motion by the Director General and by Edoardo Amaldi, and it took the form of the reactivation, in the first quarter of 1966, of ECFA, the European Committee for Future Accelerators created by Weisskopf in 1963. Meetings of ECFA attended both by young physicists and by the hallowed establishment of European physics thus took place throughout 1966.⁹

The second front to cover was to start individually lobbying delegates from the most reluctant member states, or wherever any danger to the project might

⁸ References in notes 4 and 6. For other examples of how the Council dealt with such obstructions, and for a partial analysis see *History of CERN, vol II*, chapter 7.

⁹ SPC/217/Draft, 1/3/66, CERN/ECFA 66/1A, 3/2/66, letter Grégory to Trumpy, 25/2/66 (DG20780), CERN/ECFA 66/2, 2/5/66, CERN/ECFA 66/7, 16/9/66 (DG20782). On the claim that ECFA was "an independent organism composed of member states physicists nominated by national authorities", and "who were thus entirely free to express opinions which were not necessarily those of CERN" see Amaldi, Council, minutes, 15-16/6/66, 15, or Grégory, *id.*, 18 (quotations are our translation from the French official minutes).

surface. There were thus discussions about the best way to tie German interests more closely with the 300 GeV project (the Director General, for example, asked Amaldi if he could not perhaps nominate a German physicist as ECFA's Vice-Chairman), and close contact was maintained with Perrin and with Teillac to ensure that the French 45 GeV accelerator project did not interfere with the CERN machine. In this country, traditionally in favour of joint projects, a group of physicists was emerging who felt that national interests should not always be sacrificed to collective ventures — particularly when their British and German colleagues appeared to have no such scruples. Indeed new machines were being commissioned in these two member states, some claimed, so that both countries were less than enthusiastic about the 300 GeV project — and France risked losing on both fronts, nationally and at the European level.¹⁰

Finally, it was felt necessary to define a global strategy, to fix the order in which the various questions had to be tackled. It was, for example, desirable to settle the site at the last moment to avoid any member state using blackmail of the kind: we will not participate since our site was not chosen. The CERN lobby thus decided to begin by drafting the new convention. And the question of the site was reduced simply to paying systematic visits to the different places proposed by the European countries.

2. Revival, slippages caused by the American decision, and sudden halt, 1966-1967

2.1 *Drafting the new convention*

The meetings of the Council and of the Committee of Council in June and July 1966 adopted a timescale for the steps to be taken in the medium term in the member states. The first thing to be done was to redraft the convention. Having agreed that the only way to proceed was to have a single organisation managing the two laboratories, the Council invited the CERN management to formalise the results of its debates as quickly as possible so that the changes to be made to the convention could be circulated by the end of the summer. It was made clear that modifications to the original text, adopted in 1953, should be kept to a strict minimum. CERN's existing

¹⁰ Letters Weisskopf to Amaldi, 22/12/65 (DG20780), Grégory to Blanc-Lapierre, 20/1/66, Van Hove to Grégory, 28/2/66, *Confidential note* from Van Hove, 28/2/66 (DG20785).

convention had worked satisfactorily and the Council wanted as little fuss as possible created around this issue.¹¹

On 9 September 1966 the Council President sent a formal letter to the European member states of CERN. After describing the present state of the 300 GeV project, the President asked governments for two things. Firstly, to agree at the Council session in December on the idea of keeping one single organisation managing two laboratories. Secondly, to take a first look at the proposed amendments with a view to agreeing on a final text in 1967.¹²

In December 1966 no delegation was opposed to the principle of having one single organisation, and the Council took this as a sign that it could continue its work along the envisaged lines. It discussed again the articles and the amendments of the text at its session in June 1967 and set up a Drafting Committee under the Council President to finalise the text. This committee of four met in Stockholm in June, it asked a group of legal experts to consider its work in August, and it presented the text of the new convention to Council delegates during an extraordinary Council session held in September. The final text was adopted by the Council at its meeting in December 1967 by nine votes in favour and none against, though there were five abstentions (Germany, Spain, and the Scandinavian countries). A resolution was also passed inviting the member states to adopt these amendments — which meant, in most cases, a procedure of parliamentary ratification.¹³

The key point to remember about this new convention is that it remained very close to the spirit of its predecessor, which was analysed in detail in volume I of the *History of CERN*. In particular it kept the principle of having several programmes running in parallel, each member state choosing the programmes in which it wished to participate. This had proved an essential element in CERN's functioning since it prevented one or two recalcitrant states from blocking a new initiative which they disliked. This allowed, for example, the 300 GeV project to be launched even if some member states did not want to contribute to it.

¹¹ Council, minutes, 15-16/6/66, letters Hampton to Committee of Council members, 15/8/66 (DG20787), Hine to Bannier, 24/8/66 (DG20892).

¹² Letter CERN/10978, Bannier to Ministers, 9/9/66 (DG20892).

¹³ Council, minutes, 14-15/12/66, 14-15/6/67, 21-22/9/67, 13-14/12/67, letter Grégory to Funke, President of Council, 21/8/67 (DG20894).

Only one of the "traditional" procedures for the functioning of the Council was changed in the new draft, that of the budget vote. The text accepted in 1953 very liberally required that a simple majority suffice to have a budget adopted. That proposed in 1967 raised the threshold to two-thirds. This was a concession to member states' governments. It is nevertheless remarkable that no right of veto was introduced — since unanimity was not required — and this despite more restrictive procedures adopted in the early 1960s in ELDO and in ESRO.¹⁴

2.2. *The choice of the site*

As we mentioned earlier almost all of those involved in the 300 GeV negotiations assumed that the accelerator would be built at a site other than Geneva. Two kinds of "reasons" lay behind their conviction. Firstly it was thought that the machine would be built on the surface (and not in an underground tunnel), mainly to save money and to facilitate the use and maintenance of the equipment. This effectively excluded the existing CERN site. A machine of 2.4km diameter could not easily be built there as the site was too narrow (it was bounded by the Franco-Swiss border, for example), too heavily populated, and had several topographical and geological disadvantages. The possibility of using the 28 GeV as an injector for the 300 GeV was considered at ECFA meetings in March 1966, but it was also discarded on the grounds that the scheme would seriously perturb the work at the PS during the years of construction without offering substantial economies in the construction costs.¹⁵

Another (and perhaps more important) reason for rejecting the CERN site was a cluster of more or less tacit but shared assumptions. To begin with, the future of CERN as a laboratory was guaranteed by the construction of the ISR, so that the 300 GeV could be built somewhere else without risk to the centre at Geneva. Then it was thought to be politically more astute not to concentrate all of Europe's resources in one place, and that a different site would be diplomatically preferable. Finally it was felt to be only correct that a region other than that around Geneva should benefit from the technological spin-offs which these big centres were supposed to generate. In brief the establishment of a new laboratory seemed the ideal solution from every point of view.¹⁶

¹⁴ *Revision of the CERN Convention*, CERN/716/Rev. 5, 24/11/67.

¹⁵ ECFA/66/2, 2/5/66, 13.

¹⁶ On reading an earlier version of this text John Krige justifiably remarked that many CERN engineers probably saw in a new laboratory additional possibilities for top management posts.

This does not mean that no one ever defended the Geneva site. For example, Colin Ramm, the head of one of CERN's divisions, did so repeatedly from 1961 onwards but he remained isolated. (He tried in fact to convince his colleagues that such a solution was materially possible, something often denied.) Geological samples were also taken in the Geneva area and ECFA considered the matter in its sessions in 1966, as we have said. All the same, there was little enthusiasm for the Geneva solution, interest in it never really rose — and the "results" of every study or sample only tended to confirm what everyone knew in advance: That it was better to install the 300 GeV machine somewhere else.¹⁷

The specifications for the choice of a new site were given to the member states in June 1964. They concerned both the topography and the nature of the ground ("Strict requirements on stability, size and flatness have been imposed"), and "the necessary supplies and services which would have to be provided" (amount and cost of electricity, for example). During the following twelve months 22 offers were received from nine member states, a sure sign of the interest of governments in the scheme. The 300 GeV Steering Committee then drew up a set of guidelines for the decision. First, each country was only to submit one offer (the number of proposals was thus reduced to ten). A "purely factual" report which did not try "to assess the relative merits of individual sites" (our emphasis) was then to be prepared. Thirdly, the Council was to define "the machinery to be used for the process of site selection before the comprehensive report was issued". Finally an intergovernmental meeting was to be arranged to make the final choice.¹⁸

The inescapably political character of the decision began to emerge in June 1966 after the debates in the Committee of Council and the SPC. As CERN's Director of Applied Physics put it, even if one or two sites "could be definitely put lower technically", "there would still be left a large number among which technical pros and cons could easily be outweighed by economic, political or other factors". This

¹⁷ *History of CERN, vol II*, chapter 12, section 12.3. As an example, add Amaldi, Council, minutes, 15-16/6/66, 16, who stated that "the Working Group [of the ECFA] estimated that owing to the improper nature of the ground at Meyrin, it would be extremely difficult and costly to build a 300 GeV machine".

¹⁸ ECFA/66/2, 2/5/66, 6 for the first quote; *Status of the Project...*, report printed by CERN dated July 1966, 18 for the second. The others are taken from the *Note of the discussion which took place at the President of Council's Steering Committee [...]*, 26/3/65 et 9/7/65 (DG20894). Italy maintained two sites, which explains the figure ten for nine countries. Note that holding an intergovernmental conference was only proposed as a possibility.

emerged clearly at the end of the spring: despite the cautious remarks made at the CC meeting by the CERN group asked to study the sites, the member states whose proposals were found less satisfactory reacted strongly (notably Britain). To reassure them the Council accepted the idea that each country nominate one or two experts in geology or soil mechanics. Their task was to facilitate contacts between the Council and the member states' governments, and all relevant files would be put at their disposal. The newly appointed experts met for the first time with the CERN group in Geneva in October 1966.¹⁹

This arrangement did not serve to dispel the misgivings, on the contrary. Three months later, in December 1966, the Council President proposed that a restricted committee be set up. It would comprise three people whose authority was beyond doubt and who would be selected from each of the countries which had not offered a site. Re baptised the Site Evaluation Panel, it first met in February 1967, and was composed of J. Bannier for The Netherlands, J.K Bøggild for Denmark, and A. Chavanne for Switzerland. All three men were very influential Council members. (Bannier, for example, was the immediate past President of the Council.) The Site Evaluation Panel was officially instructed to consider "the most suitable way of submitting the [final] report" to the member states. Its function though was above all to guarantee the impartiality of any assessment and to convince a priori suspicious governments.²⁰

At the December Council session the President also suggested a set of rules for taking the final vote on the site. The procedure was to remain internal to the Council to avoid the terrifying prospect of having nine member states each defending its own site at an intergovernmental conference and so paralysing progress. There were to be two steps. Firstly, a choice would be made to reduce the number of sites to three. This would be settled by a simple majority vote of the Council delegates, each delegation being called on to list the three sites it preferred. Thereafter, and once the member states participating in the 300 GeV programme were known, the choice between the three would be made by taking a second vote.²¹

¹⁹ Quotes from letter Hine to Bannier, 5/6/66. Add Council, minutes, 15-16/6/66, CC/662/Draft, 16/9/66, letter Hine to Committee of Council Members, 8/8/66, note for the First Meeting of the National Experts, 20/10/66 (DG20894).

²⁰ Council, minutes, 14-15/12/66, quotes page 40; Site Evaluation Panel, 1st meeting, SEC/1, 3/2/67.

²¹ Council, minutes, 14-15/12/66, 40.

The Site Evaluation Panel got down to work in spring 1967. It quickly adopted a more "technocratic" line which distanced it from the diplomatic caution current until then. By this we mean that it defined its task more ambitiously, aiming to collect and to order the data so as "to lead to a grading of sites in order of merit, or at least to the production of a short list of the best sites from which a choice can safely be made by Governments without further detailed justification and argument" (our emphasis). To do this the panel first identified the several factors shaping the choice. In the autumn they suggested grouping together "those relating to the construction and development of the Laboratory on the site", "those relating to the technical operation of the laboratory" and "those affecting the willingness of people to come and to work in the Laboratory and the way in which families can live there"²².

These broad categories established, the Panel then defined "a way of grading each individual factor which will allow for rejection of a site failing to reach an acceptable minimum, and which will give a site a bonus for better performance". Regarding "the flatness of the site", for example, it thought to take "the total volume of rock to be excavated as a score", this being normalised once all the sites had been visited. Finally, "the resulting scores for each factor" were to be "combined in a rational way [...] and the resulting total or totals used to provide an over-all ranking". Using the scheme in conjunction with the three broad categories just mentioned, the Site Evaluation Panel, in a report published in December 1967, assessed the nine sites in competition. It concluded in fact that no site was the best in all three sections simultaneously (a happy result, and one that was probably politically unavoidable). Only two sites obtained the best mark in two categories however (those in France and in Italy), and one site, that in Greece, was at the bottom of the list three times.²³

The Panel recommended that the Council treat its findings with all necessary prudence. Indeed this exercise in classification was extremely dangerous. In the Council in September 1967 the new President G.W. Funke — whose role called for a mastery of diplomacy — stressed that "the meaning which Mr Bannier gives to the word "evaluation" requires some clarification, since each of the thirteen member states will have its own views on the criteria to be applied for the choice of a site" (our emphasis). The Italian delegate, for his part, again stressed that while the Panel's

²² Memorandum Hine to Director-General, 5/6/67 (DG20894), from which the first quote is taken; CERN/761, 4/12/67, 3 for the others.

²³ The first quote is taken from Hine's report cited in the previous note. The report was submitted in December (CERN/761).

report would undoubtedly be useful, "it was the Member States who would decide [in the last resort]". Finally, in the December Council meeting, after having been showered with praise and the usual thanks, the final report of the Site Evaluation Panel was noted without any discussion whatsoever — which was tantamount to "burying" it. This happened because a new and major problem had been raised by Germany, in the face of which the report was a political obstacle rather than a help.²⁴

Before discussing the main features of the German delegation's position at the December Council session, it seems useful to stop briefly to consider how the site question was handled at CERN. Very schematically we can say that it oscillated between two poles. On the hand, it was recognised that such a choice was above all a political affair to be treated as such since the member states were convinced that a matter of strategic interest was at stake. On the other hand, there was the idea that it was possible to draw up rules and to define more "objective" criteria which would enable the sites to be ranked and the choice made on "rational" grounds. The first, pragmatic approach saw the solution to the problem lying in diplomacy, the second placed its faith in experts. The first accepted that, whether one liked it or not, any objective judgement could always be disputed by the member states if they chose to do so, while the second was based on the hope that a certain amount of goodwill was available to be tapped and that a minimum of rationality could be imposed on the choice.

The senior CERN management and members of the Council had one main concern throughout these negotiations — that the first pattern of behaviour would too obviously dominate the process. This would effectively place them at the mercy of the member states' governments and make them vulnerable to the wishes of national administrations — a situation that the management and the Council had consciously manoeuvred to avoid for fifteen years. Hence they preferred to push the alternative approach to its limits. For one thing it was more in keeping, they felt, with the nature of the place. The vitality and efficiency of CERN, they believed, derived from the fact that, unlike other European scientific centres, it had never been used as a political football in interstate rivalries. For another the scientific community "spontaneously" tended to think that technical solutions could be found and that political considerations were nothing other than perturbations which muddled the otherwise clear waters. The policy followed by the leading CERN engineers and the Site Evaluation Panel consisted thus in trying to impose a technical rationality on the debate, in trying to make the decision a choice between numbers arrived at by

²⁴ Council, minutes, 21-22/9/67, quotes on pp 52 and 53.

experts, in trying to reduce to the minimum the direct intervention of the member states by keeping the debate in the "depoliticised" context of the Council. In short their aim was to try to classify the sites according to (their) neutral criteria and to stop the issue falling prey to the give and take, and blackmail of political horsetrading.²⁵

2.3 The brutal setback of November and December 1967. The resolution passed by the German Atomic Energy Advisory Committee

In parallel with the debates on the convention and the future site of the laboratory, the Council sought to obtain member state finance for the 300 GeV project. To this end in May 1967 the CERN management published the final results of its scientific, technical and budgetary studies undertaken since the project had been revived in 1966.

Three reports were produced. The first was an addendum of some 100 pages to the 1964 "Design Study of a 300 GeV Proton Synchrotron" which gave a technical description of the machine. Then there was a three-volume, 750-page report entitled "Study of the Uses of a 300 GeV Proton Synchrotron". These described the experimental programme of the future machine as envisaged by the physicists at the time. The volumes dealt with detection techniques as well as the layout of experimental halls and the beam transport systems. Finally there was a general report from ECFA which was presented to the Council by Edoardo Amaldi at its June 1967 session. Reviewing the studies made during 1963 and 1964, these reports claimed that the initial choices made were still valid, and that "the 300 GeV accelerator, as presently conceived, should do what is asked of it and that the experimental layouts envisaged are wellsuited to its efficient exploitation".²⁶

If these reports were published more or less simultaneously in May 1967 it was because it was thought that a decision would be possible in the months to come. This assumption was reinforced by Belgium's official statement, in July, of its wish to

²⁵ The fact that the Site Evaluation Panel itself was a committee of experts should not be ignored either. Its members tended in fact to make more "technical" moves than they had done before their nomination. For example, Mr Bannier became less 'political' once he chaired the Panel than he had been whilst presiding the Council. In other words, the institutional logic has to be taken into consideration. The sense in which we use 'depoliticised' is made clear in the concluding chapter of *History of CERN, vol I*. On the limits of the idea that CERN was rarely a factor in the quarrels between states, see *History of CERN, vol II*, chapter 7.

²⁶ Respectively, CERN/702, 30/5/67, CERN/ECFA 67/16, 30/5/67 and CERN/700. Amaldi's presentation is reproduced in extenso in Council, 14-15/6/67, minutes, 10-15, quote 11.

participate in the project, by an expression of similar sentiments by Austria and by France in the autumn, and by the fact that Mr Francis himself told the Council in June that "the United Kingdom hoped to be in a position to take a decision in December, if not before". The British position, we should add, was probably linked to the tour of European capitals then being undertaken by the new Labour Prime Minister Harold Wilson with a view to the UK joining the European Community²⁷.

There was also a second, conjunctural but strategic reason, for this acceleration of the pace. After intense battles the site of the competing American project had been chosen (the laboratory was to be built near Chicago), the funds for the project had been guaranteed in the spring, and Robert Wilson had been nominated as the director. In short Europe risked once more being left behind in the competition with the USA if a similar decision was not soon taken in favour of the 300 GeV European project.

During the summer of 1967, however, the appointment of Wilson had effects other than simply creating anxiety. No sooner had he taken up the job than the director of the new American laboratory reviewed all the existing designs for the accelerator and proposed a series of radical technical modifications. These, he claimed, would lead to a superior machine (i.e. an increase in its operating energy) at a reduced cost. Naturally the news quickly spread to Europe and after returning from a trip to the United States, Amaldi and Jentschke explained how impressed they were by the highly-energetic Bob Wilson.²⁸

The sudden brake on the 300 GeV project arrived from Germany at the end of November. Justifying their doubts by appealing to the new concepts suggested by Wilson, the German Atomic Energy Advisory Committee insisted that CERN radically redesign its machine. In a two-page text which it released after its meeting on 14 November the committee stated "that the decision to build [the European 300 GeV] accelerator should not be taken under pressure of time and should take into account all aspects of the project". More specifically it asked (according to the "translation" made by the Director General) whether "modern techniques [were] used in the present CERN design" (mentioning for example "superconducting magnets" and "beam handling [techniques] by computer"), and to what extent "an advanced

²⁷ The letters of agreement sent by the Belgian (4 July) and Austrian (4 October) governments are in file DG20892; Council, minutes, 15-16/6/67, quote page 33.

²⁸ Council, minutes, 21-22/9/67, 47-48.

design and close cost calculation may [not] help to cut construction costs of the accelerator". Suggesting that the machine's conception was obsolete, that it incorporated outdated techniques, and that its cost was excessive and unjustifiable, the Atomic Energy Advisory Committee proposed that the accelerator be rethought. In short its text effectively put a stop to any hopes that a decision could be taken in December.²⁹

The immediate reaction in CERN and in ECFA was to reject firmly the criticisms of the German committee. They took the objections made to the CERN design one by one and tried to show that they were ill-informed and unjustified. Regarding the costs, for example, they remarked that new American figures could appear to be low to the unwary, but that in reality they overlooked expenditures which would be necessary, and which had already been included in CERN's estimates. "Owing to the peculiarities of the US accounting system", said the Director General, "considerable extra sums will be spent on development, experimental equipment and operating costs during the construction period". In any event the difference between the cost of the two schemes, which had quite different specifications anyway, was of the order of 15% at most.³⁰

As for the technical design of the European machine, CERN tried "to show that the European builders were so well aware of the alleged "recent developments" [those proposed by Wilson] that they had already incorporated some of them several years before". According to Grégory and Amaldi "the techniques of orbit correction [through "pick-up stations, correction devices and computer"] is now standard practice on the CERN PS". The separate function magnets (as proposed by Wilson for the US machine), they added, were already being used at CERN's electron storage ring CESAR, as well as at Frascati and at Orsay. Only one real concession was made regarding these magnets. In the December Council meeting Amaldi admitted that it might be a good idea again to consider using them for Europe's 300 GeV project.³¹

²⁹ The quotes are taken from the *Resolution passed by the German Atomic Energy Advisory Committee on 14 November 1967*, except the second one which is Grégory's interpretation of it in *Comments by the Director-General on the questions from the German Atomic Energy Advisory Committee*, 13/12/67 (DG20787). The Germans also raised the question of long-term collaboration with the USA and the USSR and that of the financial consequences of the geological differences between the sites.

³⁰ *Comments by the Director-General on the questions from the German Atomic Energy Advisory Committee*, 13/12/67 (DG20787).

³¹ The first quote is from Amaldi, Council, minutes, 13-14/12/67, 68, and the second from Grégory, same reference as in the previous note.

This debate obviously stopped the Council taking any decision on the European accelerator in December. Certain delegates were plainly irritated, even frustrated. Perrin, for example, said that he was "most disturbed" by this new *contre-temps*, and let it be known that he was not particularly impressed by the arguments advanced by the German committee. After all, he pointed out, it is only after the money has been voted and the director appointed that a new push is given to a project and the design finalised. Before this time the project can only be sketched in broad outline. He went on to remind the delegates that the strong focusing principle was only discovered after the money had been obtained for the 28 GeV PS in 1952/53, that this did not hinder its immediate integration into new plans for the machine, and that it was the nomination of Wilson himself that had introduced a new dynamic into the American process. It was surely necessary to stop dithering about, said Perrin, to make the funds for Europe's machine available as a matter of urgency, and to nominate the project director as soon as possible. After that the definite design could be settled taking into account all the new ideas, to the satisfaction of everyone.³²

3. 1968, the year of paradoxes

The hopes of the protagonists of the 300 GeV programme were twice dashed in the space of the twelve months which separated the Council meetings of December 1967 and December 1968. In the closing days of 1967 it was the German authorities who seemed to want to block or at least to put a brake on the decision-making process, and general gloom prevailed at Geneva. The arguments used by the Atomic Energy Advisory Committee against the European project were technico-scientific. This was altogether novel in the history of CERN. Traditionally, member states opposed projects on the grounds of financial considerations. In fact the German delegation, by questioning CERN's technical excellence and the official view of the physics community as expressed through ECFA, had violated a major taboo. They had broken the tacit convention not to discuss publicly one's disagreements with technical choices put forward for the Geneva laboratory. By cutting across the normal channels which enabled the European scientific community to speak with one voice, and in so doing by showing that the experts were not in agreement, the German Atomic Energy Advisory Committee gave member states' governments a new means of opposing the requests made by CERN and by the Council.

³² Council, minutes, 13-14/12/67, 69-70.

The main activity at CERN early in 1968 was thus to try to close the breach, to try to restore the confidence of the member states, and to reconstitute ECFA (and the CERN Scientific Policy Committee) as the single expert groups whose views were not challengeable. After two or three months of discussion, and with all parties making the requisite concessions, the operation appeared to be achieving its objectives: in the spring, the Germans aligned themselves with CERN's arguments. At this point yet another thunderbolt struck from a sky that had seemed to be clearing. At the June 1968 Council meeting the British delegation reported that its government had refused to participate in the project. As Britain contributed about a quarter of CERN's budget, and often determined the vote of a certain number of countries (notably the Scandinavians), the project obviously had to be profoundly revised. In particular its budget would have to be reduced, as the countries who were going to participate in the programme certainly did not want to see their contribution increased. Let us explore these points in greater detail.

3.1 *Rebuilding confidence during the spring, and reorienting the project after the British refusal*

On 8 and 9 February 1968 a general meeting of ECFA was held at CERN in the presence of Robert Wilson. The questions asked by the German Atomic Energy Advisory Committee were on everybody's mind. Four days later the SPC in its turn met and agreed on an official resolution to be submitted to the Council. It stressed again that the differences between the two projects were far from being as important as some had been led to believe, and it reaffirmed the SPC's conviction that "the technical studies and the present estimates" for the European 300 GeV constituted "an altogether satisfactory base on which to take [Council] decisions". The SPC recommended however that a Steering Committee be set up to assist the Director-General. Its task would be to keep an eye on new developments likely to appear in accelerator technology, and to address the extremely urgent question of the nomination of a project director. This Committee, comprised of six persons outside CERN, including Wolfgang Paul from Bonn, and three insiders, met on 15 March. It called for a new series of technical studies, particularly on the "magnet design, with the aim of making a magnet model of a Wilson type³³".

³³ SPC/256, 30/4/68; letter Funke, President of Council, to delegates, 19/2/68, from which the first quote is taken, CERN/773, 15/2/68, Steering Group Meeting, 15/3, 3/4, 15/5,..., quote meeting of 15/3. Going back on the first reaction of the Director-General, it was now stated that the costs of the two projects corresponded very exactly; see for example Council, minutes, 14/3/68, 17.

At the extraordinary Council session of March 1968 the criticisms raised in November were no longer a major issue — at least officially. The German and the British delegations (who had supported the German request in December) stated that they had the impression that the replies given were "complete, clear and entirely satisfactory", to use Brian Flower's formulation. Once again, then, attention was focussed on the task of getting governments to declare their intention to participate in the 300 GeV programme³⁴.

The overriding impression given at the Council was that most of the small countries would not take a position until the four large ones had reached an agreement, and that there were still some hesitations amongst the latter. The inclination to oppose the project in Germany was attributed to Heisenberg, von Weizsäcker and Maier-Leibnitz "who propagate the idea that high-energy physics is so costly that one can no longer afford duplication". Since the Wilson machine was already under construction, they claimed, one ought not therefore to finance the European 300 GeV machine. In Italy, on the other hand, the high-energy physicists strongly backed the project, the rest of the scientific community did not overtly oppose it — but one had to wait for the formation of a new government. As for the British, there were the fears arising from their financial difficulties and, above all, from their reactions to the veto, announced by General de Gaulle, against the entry of Great Britain into the Common Market.³⁵

As we have already said the British response was negative and undoubtedly due to monetary and political considerations. It was announced to the June Council session by Professor Flowers. The British delegate, however, took an altogether unusual position in declaring publicly, but in his personal capacity, that he regretted the decision made by his government. The Science Research Council, he said, had made the 300 GeV a top priority, and he hoped that the project would start despite the decision taken in his country. At the same time British physicists would continue their efforts to persuade the government that their country should join the project at a later date. And since Wolfgang Paul declared that the German delegation regretted the British decision — "all the more so since [his delegation] hoped to be in a position to give a positive reply" towards the autumn — the climate at the meeting, although somewhat troubled, was not altogether discouraging. The chairman of the SPC, for

³⁴ Council, minutes, 14/3/68, pp. 16-19.

³⁵ For Germany, letters Citron to Grégory, 9/4/68 (DG20894), Jentschke to Grégory, 3/7/68 (DG20892); for Italy, Steering Group Meeting, 15/5/68, 1, *Motion sur le 300 GeV*, INFN Council of Management, 25/6/68 (DG20892).

his part, declared that a small study group had already thought through the consequences of one country not participating in the project and he announced that the Committee would present, in September, a programme with its budget reduced by 20-30%. It had been assumed, he pointed out, that "the nominal energy and intensity of the machine should remain the same" so that the reductions would need to be made in the experimental areas or by spreading the time to construct the machine over a longer period.³⁶

Despite these positive signs it was important to prevent all risk of contagion (according to certain sources the British government was pursuing diplomatic initiatives to have the Germans refuse to sustain the project³⁷), and not to lose the momentum acquired since March. It was thus essential that France did not waver — even though it was in the midst of the major social crisis of May 1968. Lobbying also got under way again in Germany and in Italy, with tried and trusted friends being contacted once more. Positive results were rapidly achieved, and around August and September these two countries agreed to participate in the 300 GeV programme.³⁸

In September, then, everyone was once again very optimistic, and the nomination of a director for the 300 GeV programme appeared to be the most pressing step to be taken. At its meeting in October 1968 ECFA agreed "that a scientifically meaningful [300 GeV] programme can be realized within 75% annual expenditure compared to the one originally foreseen", "that a number of [technical] alternatives exist which [...] can be kept within the same financial limit and are [...] scientifically valid" but that the definite choices could only be taken by the future director. "For this reason", the report proposed, "ECFA urges that the nomination of the Director General of the new Laboratory should be taken as soon as possible"³⁹.

Towards the middle of November and after a number of rapid consultations the Committee of Council and the Scientific Policy Committee unanimously chose John Adams for the task. Adams was of course the constructor of the 28 GeV PS at

³⁶ Council, minutes, 19-20/6/68, from which the quotes are taken.

³⁷ On the subject of British diplomatic pressure that the Germans "[do] not insist on the project of the 300 GeV machine", see letters Gentner to C. F. Powell, 22/7/68 and Van Hove to Grégory, 30/7/68 (DG20893).

³⁸ For France, letter Grégory to Aigrain, 21/6/68 (DG20787), for Germany, letters Grégory to Bannier, 12/7/68, Hine to Grégory and Hampton, 15/8/68, Stoltenberg to Funke, 4/9/68 (DG20892). For Italy, letter G. Smoquina to Grégory, 12/8/68 (DG20892).

³⁹ ECFA 68/9, 11/6/69 (DG20781).

CERN in the 1950s, and now in charge of basic and industrial research for the British Atomic Energy Authority (which included the laboratories of Harwell and of Culham). Asked to take over immediately the direction of the 300 GeV programme within the framework of CERN, it was understood that Adams would become the Director General of Laboratory II as soon as it was officially set up, and that he would remain there throughout the construction phase of the accelerator.⁴⁰

3.2 *The site question in 1968 and at the December Council meeting*

As we have already mentioned, in December 1967 the report of the Site Evaluation Panel was submitted to the Council. The Council took note of it without debating its contents, asking member states to comment on it if they chose. Within two months all governments — except that of France whose site emerged as the best one in the report — sent their criticisms to the Director-General. Overall the tone was critical and indicative of a refusal to accept the conclusions. On 23 February, for example, the Belgian delegation commented ironically on the techniques which the Panel had used. It wrote that "to give a value simultaneously to the topography, to the uniformity of the terrain, to the hardness and resistance of the ground, [...], to the geographical location, to the social consequences of the climate or of the housing possibilities or of the attraction of the region, etc. ..., and to sum all these figures to arrive at a final value, necessarily implies an important subjective component". While recognizing that the "wise men" who had drafted the text "had a number of remarkable qualities", the Belgian delegation declared that it could not consider their report as constituting an evaluation in the strict sense of the term, "a judgment or an arbitration", but rather as a simple "document providing information"⁴¹.

Twenty days later it was, for example, Austria's turn to reject radically the report. Austria's criticisms ranged from the refusal of the conclusions reached by the expert geologist appointed by CERN, the Norwegian Bjerrum, to the rejection of the cocktail of criteria used for the assessment. According to the Austrian delegation, the most important criteria had changed during the course of the study and yet they had been treated as if they were static. It did not take account for example of the

⁴⁰ Letters Grégory to Members of Committee of Council, 2/12/68, Funke to Adams, 23/12/68 (DG20896); see also the correspondence between Weisskopf and Grégory and between Adams and Grégory in file DG20896.

⁴¹ Letter Willems to Director-General, 23/2/68 (DG20787).

improvements which could be made to the site notably in social and cultural terms from now until it was brought into use.⁴²

In March 1968 a prudent Council thus invited the member states to take note of the comments received and to bear them in mind when making their own assessment. All discussion of particular conclusions was avoided. Instead, the Council devoted its attention to the ballot procedure to be adopted for the final selection. Concerning the principle of having the choice made by states via two successive votes organised by the Council, it decided in favour of two public ballots.⁴³

From this time on it seems as though everyone understood very clearly that the question was very delicate, that there was no way of avoiding horsetrading between the states, that the final choice was clearly going to be at least as difficult as that in the United States. In October the Council therefore decided that "no new study was really necessary to enable the governments of member states to take a decision on the site". All the same, the Council could not but allow those states who were not satisfied with the report of the Site Evaluation Panel to ask for, or to carry out themselves, new expert studies. As the report was now public the Council necessarily had to communicate to all other governments new information which was sent to it by any of the concerned parties.⁴⁴

In December it was once again the question of how to organise the decision which was on everyone's mind. To simplify enormously, one can say that three questions constantly interfered with the debate making it extremely chaotic and disorganised. Firstly, should balloting start before a state had had an opportunity to improve the image of its site unjustly "blackened" by previous reports? Secondly, was it possible to choose a site before the list of member states participating in the 300 GeV programme was definitely fixed? — the advantage claimed for such a procedure being that the Director of Laboratory II could thus make an immediate start on the definitive study of the machine. Finally, what sites had the right to compete with each other and what delegations would be authorised to vote? — a major stumbling block being those countries that had offered a site but had not yet indicated their definite wish to take part in the programme. The debate was long and concluded without any clear agreement being reached. It is true, all the same, that a new variable had just

⁴² Letter of the *Délégation Permanente de l'Autriche* to Grégory, 13/3/68 (DG20787).

⁴³ Council, minutes, 14/3/68.

⁴⁴ Council, minutes, 2-3/10/68.

been introduced by the Council — the nomination of John Adams as project director — and that it was up to him, in his way, to come to grips with the problem as a whole.⁴⁵

3.3 *On the growing autonomy of the member states vis-à-vis CERN and its Council*

The episodes which we have just described illustrate one crucial point. This is that, during the negotiations around the 300 GeV project, the traditional relationships between the member states and the Geneva laboratory began to be dramatically changed. The nature of this relation until the mid-1960s was analysed in detail in Volume II of the History of CERN. The major conclusion reached there was that, for a number of conjunctural historical reasons, the CERN Council at the time was rather the spokesman of the laboratory and of the European physics community before member state governments than what it was legally supposed to be: a committee comprising member states' representatives whose task it was to control the organisation in their governments' names.

We used three main arguments to justify this claim. Firstly, we showed that the "representatives" of governments in the Council held their positions for a surprisingly, not to say abnormally, long time. It was the "founding fathers" of CERN who were in key posts for almost twenty years. This enabled them to keep national administrations at arm's length and to defend before their governments the *enfant prodige* that was CERN. We also showed how the Council functioned as a highly structured pressure group, whose key members organised all decisions as they wanted them, in close consultation with the scientific management of CERN. At the core of this group, and without being exhaustive one finds Bannier for the Netherlands, Willems for Belgium, Funke for Sweden, Amaldi for Italy, Perrin for France and, to a somewhat lesser extent, Schulte-Mermann for Germany and Adams for the United Kingdom. Finally, we analysed in some detail certain events in the life of the organisation, events during which certain states — in fact the United Kingdom — tried to break this hermetically closed structure. The British government, for example, once tried to bypass the Council by subjecting it to instructions arrived at in direct negotiations between the relevant ministers in member states — but it had to capitulate to the resistance and the power of what we have called the CERN lobby.⁴⁶

⁴⁵ Council, minutes, 18-19/12/68.

⁴⁶ *History of CERN*, vol II, chapter 7.

From 1967 onwards the tone changed. Clearly, the state apparatuses became more weighty, the most effective of these being without doubt that of the Federal Republic of Germany. In contrast to what we find with France and with Italy, where the "traditional" situation persisted — Amaldi and Perrin along with Grégory and Puppi, still elaborated and controlled rather well the French and Italian positions — the German delegates to the Council found it increasingly difficult to anticipate the line which they would have to defend. This change came through the German Atomic Energy Advisory Committee, a committee which comprised not only people from academia (among which high-energy physicists were in a minority) but also industrialists and administrators. In 1967, the demands of the committee were three: minimise and better control expenditure, enforce what had then become the European rule of just return (i.e., spend in any country that proportion of the budget which it contributes), and ensure that industry has a direct role in the conception and construction of major equipment. The aim then was to reduce somewhat the autonomy of the "CERN system" and to bring it more closely in line with the current norm (as prevailing in ELDO or ESRO for example), it was to give back all their power to the state bureaucracies which would now have a kind of right of veto, it was to reinsert CERN into the industrial context and to make it more useful socially.

Several changes in the political and economic situations facilitated the expression of these new tendencies. Firstly, there were the growing economic difficulties, almost structural in the case of Great Britain, more differentiated for other European countries, difficulties which militated for stricter controls on all non-productive expenditures. Then there were the social and political conflicts which had broken out in the developed countries — of which the protests against the Vietnam war and the revolt of students in the spring of 1968 were two indices — and which often turned into a criticism of science, of its authoritarian attitudes, and of its compromises. Finally, there was the fact that physics, and high-energy physics in particular, was no longer regarded as being the most important scientific discipline in society. In the case of Germany, we should add the more general wish to have the new balance of forces which had been gradually set in place between European states recognised, and to put a stop to attitudes of exclusion or of condescension towards the country defeated in the previous war. We see this determination on the part of the German delegation in its crusade to have German recognised as the third official language of the Council, and regarding the site of the future laboratory: in 1967 and 1968 Germany appears as really determined to have its site of Drensteinfurt chosen.

During these years, however, the success of these new tendencies remained somewhat meagre. It is true that the Atomic Energy Advisory Committee blocked the decision-making process in December 1967. On the other hand it withdrew most of its criticisms in February 1968 and accepted unanimously to recommend to its government that Germany participate in the 300 GeV programme. And although the insistence on industrial linkages and on the principle of just return were reaffirmed by the Committee in its new resolution, these were not preconditions nor even strongly insisted upon. By contrast they were central in the agreement between CERN, France and Germany, which was reached at the same time, to construct a big European bubble chamber. In this contract German was recognised as being a language on an equal footing with English and with French, just return was admitted more or less explicitly for contracts on Germany's insistence, and industry was invited to participate in the construction of the superconducting magnet.⁴⁷

It was also the first time that the British government carried out its threat to withdraw from a project. That said, we have also mentioned the very firm attitude of the British delegate, who publicly regretted the choice made by his country and exhorted other countries not to take it into account. This was hardly an uncontroversial gesture, yet it was not sanctioned in any way by a government which tried, on the contrary and in public, to soften the blow caused by its refusal. In conclusion then certainly a real change in the atmosphere but a change still in the first phases of its development. While the CERN system had certainly been more seriously attacked than ever before, it was still largely in place.

4. Adams's first attempt to revive the project and the setback in January 1970

The newly nominated Project Director, John Adams, first exposed his ideas during a Committee of Council meeting in January 1969. A month later he submitted to the SPC and to the CC a new document. In the traditional CERN manner the happy few met the night before over dinner. Present on this occasion were Amaldi and Smoquina for Italy, Gentner and Haunschild for Germany, Kummer for Austria, Martin for France (Perrin could not come), Willems for Belgium, Chavanne for Switzerland, as well as Funke, the Council President, Grégory, Adams and Hampton, CERN's

⁴⁷ For the BEBC, see report CHS-36.

Director of Administration. John Adams's proposals were thus discussed and an overall plan of attack was elaborated.⁴⁸

4.1 *Adams's way of posing the problem*

The question of the technical choices to be made and of the comparison with Wilson's machine remained an ever-present concern in member states' administrations, so the Committee of Council firstly recommended to Adams that he draft a policy document which discussed these in detail. This document of more than 40 pages long was ready in May, and it shows what was and what would be Adams's philosophy as Director of the 300 GeV project. To a first approximation we might say that it was pragmatic, that it confronted problems head-on, that it was open-minded, and that it sought to avoid easy and hasty decisions. Indeed the logic of the report is worth spelling out as it throws considerable light on Adams's personality.⁴⁹

As the decision-making process had been going for a long time Adams began his text by summarising all that had taken place since the beginning of the 1960s. He ended this part of his exposé by presenting the research done in 1968 by the Steering Committee on accelerating techniques at 300 GeV (seven working groups had studied this question⁵⁰). In the second part of the report Adams tackled the question of the design study published in 1964 by CERN — the point of comparison being of course Wilson's new ideas. In this section, and contrary to what many of his colleagues had done, Adams chose not to defend systematically the proposals made by the European engineers, but to explain their approach, to illustrate the choices they had made, and to show that their results could not simply be dismissed with a wave of the hand.

The conception of an accelerator begins by the choice of the type of magnet, John Adams reminded his readers. "The closed H-type magnet or window-frame magnet [...] now proposed for the NAL design, was considered [at CERN at the beginning of the 60s]", he explained but it was "discarded on the grounds of greater construction cost, limited access to the vacuum chamber and greater risk of radiation damage to the coils". According to Adams the recent studies undertaken in the United

⁴⁸ Letters Grégory to members of the CC, 23/1/69, Adams to Grégory, 27/1/69, 10/2/69, 11/2/69 (DG20894).

⁴⁹ CERN/869, 30/5/69.

⁵⁰ Working Groups on window-frame magnets, power supply, booster and RF systems, close orbit control, high-efficiency ejection, controls and collective ion acceleration (CERN/870, 28/5/69).

States and at CERN did not raise any doubts about the validity of this conclusion. On the other hand, he pointed out, the choice of a new objective could lead one to another conclusion. If one's goal was for example to increase the energy of the machine stepwise, as did Wilson, then the use of H-type magnets could be of some advantage. All the same Adams recommended prudence since the costs of maintenance and of use were often inversely proportional to those of construction. The gain made here thus risked being "at the cost of more expensive operating conditions".

For the magnets chosen, continued Adams, it was the size of the vacuum chamber and the radius of the accelerator that were to be fixed, and therefrom the majority of the machine's parameters. Taking a pedagogic approach, he explained why "aperture requirements together with the average radius determine so much of the cost" and how the choice here was essentially a matter of judgment in the light of two contradictory requirements. "Overoptimism [...] may lead to attractive capital cost reductions for the initial installation", Adams wrote, but as a result one risked compromising flexibility and the future development of the machine. Going into considerably more detail than one would expect for a report whose primary function was political, Adams showed how the design made in 1964 arrived at its proposals for the vacuum chamber, drawing attention to where assumptions were made and choices taken. In short, he did not present the decisions which were made as the only ones possible and preferred to re-open the black box. This allowed him to nuance the evidence favouring Robert Wilson's choice, to show where he had taken risks and where he had seemed to be rather conservative, to show in fact that the final choice was still an open question. In sum, Adams led his readers to see that the 1964 report did not in any way err on the side of conservatism — which was not to say that one should not consider with great attention the latest technical report from NAL.

The systematic analysis of the work done by the Americans was undertaken in the third part of the report. It dealt with new technologies for accelerators "which proved of some attraction to nuclear physicists and to the sponsors of the project". The questions touched on here included the application of cybernetics to accelerator control, superconducting coils, and electron ring accelerators. Adams's view, notably on the last two points, was that these techniques would not be feasible in the short term, and that they would be better exploited in the next generation of machines. These conclusions were reinforced strongly by the main scientific members of the Council at its June session. Thus Wilkinson reminded those present that, according to British experts, "the development of superconducting magnets appropriate for this

type of project would probably take from 5 to 10 years", that "the application to accelerators of the principle of electron rings would only be possible at a date which could not now be foreseen" and that the costs of these projects were "as uncertain as their time scales"⁵¹.

Whatever was done, Adams concluded, the final design could only be definitely fixed after the team of accelerator builders had been recruited. This required that the programme be officially accepted and that its budget be voted. For the moment Adams only chose to set up a Machine Advisory Committee comprising CERN engineers and European experts whose role was to keep in touch with all technical questions.

4.2 *The new 300 GeV programme and the decision-making procedure foreseen by Adams*

The attitude adopted by John Adams during these first months of 1969 contrasted sharply to that adopted at CERN during the preceding years. Not only did Adams seem more open and less quick to justify systematically CERN choices, but he was also ready to admit that not everything was financially possible and that CERN and particle physicists were not necessarily entitled to everything that they wanted. Reassuring and very professional, his proposals were received with warmth, at least if one is to judge by the atmosphere which prevailed at the June Council meeting.

It was nevertheless evident that the most delicate issue, that of actually proceeding with the project, was still not settled. Happily for Adams all the elements required for a favourable decision seemed to be in place. The competing American programme was advancing rapidly, the parliamentary ratifications of the new convention were well under way, six member states who contributed nearly three quarters of CERN's budget had declared their intention of participating in the new programme — and Adams was the uncontested director of the project and his methods of working had been well accepted! The next step was thus to test successively all the links in the chain and to arrive at a final decision at an extraordinary Council meeting to be held in October.⁵²

⁵¹ The quotes from the four previous paragraphs are taken from CERN/869, 30/5/69. Add Council, minutes, 19-20/6/69, 15.

⁵² Letters Adams to Committee of Council Members, 24/4/69 (DG20894), Adams to Willems, 24/4/69 (JBA22729).

The first step was taken at the Council in June 1969. On this occasion Adams foresaw that the Council would accept "the programme definition document [...] as a proper description of the 300 GeV programme". This decision pertained to a "programme which member states are invited to join and will be asked to approve in October". In this programme, reduced to take account of the (temporary?) withdrawal of the British, the initial energy of the accelerator was fixed at 200 GeV, to be increased to 300 GeV in a second phase. A single experimental zone was foreseen, though the possibility of constructing a second was not excluded. Finally, the cost was reduced from 1776 MSF to 1335 MSF (at 1967 prices). The construction period was estimated to be at most eight years, to be reduced if more money was available. The first year would be devoted to the recruitment of personnel and to the final definition of the design.⁵³

The second step, unofficial in terms of CERN's rules, was however the most important. Between June and October "those Member States who intend to participate in the Programme would arrange amongst themselves high level meetings, possibly involving Ministers, to discuss and agree which of the present sites [...] is acceptable to them" (our emphasis). Once this potentially explosive question of the site was resolved between the countries who were participating in the programme, it would be advisable for them to obtain the support of the others, for example at a meeting of the Committee of Council. At this moment the definite text of the programme definition could be drawn up and officially submitted to member states. A brief remark is to be made here on Adams's pragmatism. Having seen what had happened during the previous four years, he openly admitted that a radical break with the rules and "the spirit of CERN" was inevitable in this business. Since governments attached great importance to the question of the site he judged it preferable to recognise the fact and to leave them to take the decision between themselves. It was just too bad that that went against CERN's principles and the balloting procedures defined by the Council.⁵⁴

The official acceptance of the programme, the third and last step, would take place at the extraordinary Council meeting in October. "The Programme Definition document would then be put to the vote in Council", Adams wrote, the two-thirds majority required by the Convention to create a new programme being certainly

⁵³ Letter Adams to Committee of Council Members, 24/4/69 (DG20894), CERN/871 and 873, *Note*, Ministère des Affaires Étrangères (France), 16/7/69 (DG20893).

⁵⁴ Letter Adams to Committee of Council Members, 24/4/69 (DG20894), CERN/874, *Note*, Ministère des Affaires Étrangères (France), 16/7/69 (DG20893).

achieved. The letters of intention from the member states who wished to participate in the construction of the 300 GeV machine would then be officially submitted, the Director-General of the new laboratory would be officially appointed by the member state representatives, and the budget would be voted. The teams could then be recruited and the design reconsidered component by component.⁵⁵

Everything took place as expected at the June Council session in an atmosphere of trust. Sweden was the only country to abstain from the programme proposed by John Adams. On 20 August, in a confidential letter sent to all members of Council, Adams nevertheless expressed his anxiety about the slow progress being made in Germany and in France. Minister Stoltenberg wanted to know what France's intentions were before asking the German cabinet to engage itself definitively, while Paris had fallen prey to post-Gaullism. In particular the new President, Georges Pompidou, and his ministers wanted French participation in the 300 GeV project to be reconsidered in the light of the country's monetary situation, the franc having been devalued on 8 August. Fearing for the negative psychological effects of a Council meeting which could not move ahead, Adams suggested that the session in October should be suspended if phase 2 of his plan — the announcement of the participation of at least six countries and an agreement on the site — had not been achieved by mid-September. In the weeks which followed everyone came round to Adams's position, and the October Council meeting was effectively cancelled.⁵⁶

Around 12 September the French delegates effectively let it be known that the major choices were being taken in their country but that the French decision would not be known until after the interministerial meeting which would be held around 10 November. To add to Adams's bad luck, the German government was to fall in its turn, and before having taken a decision. It seemed difficult to imagine that the new government would have the time to make its choice before the Committee of Council meeting on 13 November. Now it was even the possibility of a final decision at the December Council meeting which seemed to be in doubt! The ship being piloted by

⁵⁵ Letter Adams to Committee of Council Members, 24/4/69 (DG20894), *Note*, Ministère des Affaires Etrangères (France), 16/7/69 (DG20893).

⁵⁶ Council, minutes, 19-20/6/69, letter Adams to Committee of Council Members, 22/8/69.

Adams seemed once again to have been deviated by the demons of inertia lurking in the depths.⁵⁷

4.3 *The German refusal*

In fact the break — for there was going to be a break — was not caused by inertia or by the ups and downs of the political and economic life of the twelve member states, but by the intransigence of the new German government concerning the site.

In December there was a slight improvement in the overall situation. On 11 November France confirmed its participation in the 300 GeV programme, Germany did so a month later, and the Swiss did so on 19 December. At the same time, the German government added, in its press release, a rather menacing phrase, a phrase carefully avoided by the others and which looked very much like blackmail. It was: "Should a decision in favour of Drensteinfurt [the German site] not be reached, the Federal Cabinet will consider this matter again". Cautious, and perhaps just a little bitter, and since anyway the matter could not now be settled except at a very high level, the December Council session discussed only CERN-Meyrin and did not deal with the subject of the 300 GeV machine. It only "took note" of a declaration read by the Council President. In it Funke stated that a last problem remained, that of the site. He had learned, he said, that a ministerial meeting of the six would shortly be held "with the view to facilitate the decision to be taken", adding that he hoped that work on the programme could get under way at the beginning of the following year.⁵⁸

Early in January the Swiss government organised for the 28th and 29th a meeting to be attended by ministers from Austria, Belgium, France, Germany, Italy and Switzerland. Its aim was of course to decide on the site of the future European synchrotron. From 7 January onwards, Adams began to plan the next steps in the campaign. He asked the four countries which had not yet submitted the instruments of ratification for the new Convention, namely Belgium, Italy, the Netherlands and Sweden, to do before the end of the month. In this way, an extraordinary Council session could be held at the end of February and the programme could be launched in

⁵⁷ Internal notes to the French government, François Ortolí to Lucien Malavard, 12/9/69, Schumann to Ortolí, 17/9/69, Grégory to Malavard, 25/9/69 (DG20785), *Summary of the discussions of the Committee of Council meeting*, 15/10/69 (DG20893), letter Adams to Valloton, 16/10/69 (JBA22729).

⁵⁸ The announcements of the various governments are in box DG20892; Council, minutes, 18-19/12/69.

March. On 15 January, the Swiss Département Politique Fédéral officially announced to the press that the conference would take place, while a debate on the question was held the following day in the German federal assembly.⁵⁹

Ten days later the conference was cancelled, "the minister of foreign affairs of the German Federal Republic [having] asked [the Swiss Département Politique Fédéral] that this meeting be postponed to a later date". It is still too early to have access to the archives which would allow us to identify precisely the motives of the various protagonists in this affair, but it seems as though the German government had understood that the site at Drensteinfurt would not be supported at the conference in Geneva. Certainly, deals were being struck behind closed doors. For example in their book published in 1967 Goldsmith and Shaw remark that there was an agreement made between Belgium and France, the latter accepting to support the Belgian site if Brussels agreed to purchase Mirage fighters. Certainly too, Germany wanted everybody to understand clearly that it attached enormous importance to this question. One point is clear, however: member state governments had now profoundly encroached on the traditional prerogatives of the Council. In fact, the latter had effectively been stripped of them.⁶⁰

5. Adams's second scheme for reviving the project: towards a Genevan solution

In a certain sense then everything was lost. A setback at this level, the level of ministers, was not easily overcome. Perhaps some measures could be taken after a few months or years to enable everyone to save face, but, in the short term, the situation was gloomy. All the more so since Robert Wilson was advancing with giant strides on the planes of Illinois, and interest in the European project was declining proportionately. In fact people began to say that one should reconsider from scratch the entire question of Europe's future accelerators. But this was not to take account of the imagination and of the sense of reality of a John Adams, paid to construct this machine, and aware of the shock which this first setback had caused at CERN.

⁵⁹Letters Département Politique Fédéral to Grégory, 6/1/70, Adams to Committee of Council Members, 7/1/70, *Communiqué de presse*, 15/1/70, *Parliamentary Inquiry in the German Federal Assembly on 16 January 1970* (DG20893).

⁶⁰ *Communiqué de presse*, 26/1/70 (DG20893), from which the quote is taken; Goldsmith & Shaw (1977).

5.1 *Adams's new project: build something cheaper at Geneva*

In the weeks following the cancellation of the ministerial conference in Geneva, and while the Machine Advisory Committee continued to work on a classical schema, Adams began to completely change the way of looking at things. On 23 February, in a handwritten note sent to Grégory, he proposed for the first time a radically new solution.⁶¹

The starting point was the impasse on the site and the split between the member states into two groups — the six countries who wanted to participate in the construction of a 300 GeV machine and the others — a split which it was essential to overcome as soon as possible if one did not want to destroy CERN completely. Adams's proposal was to take seriously the feelings of governments confronted with difficult social and economic situations, and to propose to them a single budgetary envelope covering the programme both at Meyrin and for the 300 GeV machine. And to accept that the growth in the joint budget should not exceed 3-5%. This choice would certainly have the unfortunate consequence of reducing the Meyrin budget in order to permit the construction of the new accelerator. On the other hand, it would once more enable all the member states to become involved in future programmes.

What was Adams's concrete proposal? "To build CERN II [the 300 GeV] adjacent to CERN I [Meyrin] using CERN I facilities to reduce the cost of the laboratory budgets and those for preparation for research". Then, to exploit a new idea which had recently appeared in the Machine Advisory Committee, that of the missing magnet. On this scheme one began by placing only some of the magnets symmetrically around the ring while the others, which could be of a different type, would be installed at a later date, so allowing for an increase in the machine energy. Adams's precise proposal was to construct a tunnel 1.5 kms in diameter (instead of the 2.9 kms envisaged in December 1959) and to instal in it at first only half the magnets. In this way, an energy of 150 GeV could be attained at a reasonable cost whatever the future hypothetical possibilities might be.

This proposal had obvious advantages. Firstly, the question of the site was resolved at last, along with the future of the Meyrin laboratory. Then, the final energy of the machine was not irreversibly fixed. It was still an open question and could be adjusted in the light of technical developments in magnet material occurring in the

⁶¹ Note entitled *CERN II*, 23/2/70 (DG20893).

next five to eight years. The energy would be doubled to 300 GeV if the new magnets installed were of the classic type, the additional cost being modest and of the order of 70 MSF. It could be pushed to 500 or 600 GeV if superconducting magnets were available. At the same time if one reduced the budget of CERN I from 330 to 290 MSF per year — a reduction to take place progressively over four years — and if one spread the construction of the new accelerator over eight years — its cost was estimated at 890 MSF for the 150 GeV phase — it was possible, according to Adams, to maintain the overall growth in the budget of the two laboratories at 4%. This, said Adams, "may be acceptable to all member states" and would also put the organisation back on its feet.⁶²

Until mid-March Adams's idea remained confidential and was only discussed by a handful of people who tried to assess its strength and weaknesses. Their main fear was that it would be immediately rejected by the physicists — since the energy of the machine was reduced initially to 150 GeV — a rejection which would inhibit any in-depth study of the scheme. On 19 March the members of the Committee of Council were informed in their turn in a text drafted by Adams marked "Personal and Confidential". It was entitled "An alternative way of achieving the aims of the 300 GeV programme". In this text Adams's new project (called Project B) was compared item by item with the project studied by the Council the previous year (and labelled Project A).⁶³

Adams stressed two things in this text. Firstly, that the accelerator proposed in Project B, which was now 1.8 kms in diameter, could be "accommodated on a site adjacent to CERN-Meyrin, whereas the Project A machine certainly could not". He claimed that for this circumference the ground adjacent to CERN was known to be good — after all, it was the same as that for the PS and for the ISR —, that it was sufficiently flat and that "the boundary of the site does not include any villages, only a few farm buildings". Then he pointed out that the costs of construction would be reduced, firstly by decreasing the size of the accelerator, then "by making it possible to use the facilities of the Meyrin Laboratory during the construction and bringing

⁶² The quotes in the three preceding paragraphs are taken from Adams's note entitled *CERN II*, 23/2/70 and from that entitled *An Alternative Way of Achieving the Aims of the CERN 300 GeV Programme*, to Committee of Council Members, 19/3/70 (DG20893).

⁶³ There are in fact two versions of Project A, and that of December 1969 already differs somewhat from the one presented in June. It takes into account, for example, the concept of the missing magnet and proposes, for the price accepted by the June Council, an accelerator whose energy would amount to 250 GeV in phase I. See the note entitled *An Alternative Way of Achieving the Aims of the CERN 300 GeV Programme*, to Committee of Council Members, 19/3/70 (DG20893).

into operation of the new laboratory". Adams then gave again figures which were close to those mentioned in February: only an additional 750 MSF would be necessary, distributed over eight years. This was roughly half of what Project A required (1431 MSF in 1969 prices).

Two new ideas were put forward during the following three weeks. The first was that the machine should be buried underground in a tunnel about 30 metres below the surface. In this way only a few isolated buildings would be situated on the surface (for example the access points or the buildings containing the ventilation system) and the experimental zone which would only occupy a reduced area could be freely chosen. By burying the machine there would also be a greater latitude for its exact size and so its maximum energy, an advantage which could only satisfy the physicists. The second idea, advanced for the first time on 7 April in a note signed by Adams, proposed to use the CERN 25 GeV synchrotron, the PS built in the 1950s, as an injector for the 300 GeV accelerator. At the time the PS was being rebuilt and improved. Its use as the first stage in acceleration would permit a saving in the cost of construction estimated in May at about 200 MSF. This possibility was studied carefully in April, found to be viable in May, and definitively incorporated in the proposal submitted to the SPC and to the Council.⁶⁴

Now confident in their new project, Adams and Grégory decided to present it to the scientists at CERN and to publish a press release. The official presentation to the physicists was made on 20 April in Geneva by Grégory. On this occasion a new idea was proposed by J.V. Allaby and by C. Rubbia. Wanting to use the machine as quickly as possible at 150 GeV, and seeing an additional way of making an economic saving, the two physicists proposed that the West Experimental Hall (containing the big European bubble chamber and the Omega detector then under construction) should be the first experimental area for the new accelerator. "Thus one is led to conclude", they summarised, "that to start physics at 150 GeV/c one needs basically only to build the main accelerator, an injection system and an ejection system". This ought to have allowed for an appreciable speeding up of the project. For physics at 300 GeV, they added, a more appropriate hall would be necessary.⁶⁵

⁶⁴ Notes entitled *Alternative Ways of Realising the CERN 300 GeV Programme*, 6/4/70, *The Use of the CERN 25 GeV Proton Synchrotron as an Injector for the Project B Machine*, 7/4/70 (JBA22683).

⁶⁵ Notes entitled *Wider Discussion of Project B*, 7/4/70, *Comments on the Potentialities of Meyrin as a Site for the 300 GeV Accelerator* (Allaby & Rubbia), 24/4/70 (DG28893).

5.2 *The reactions of physicists: let's increase the energy*

Other less imaginative suggestions than these were made during the following weeks. It was however the meeting of ECFA held on 9 May 1970 which was crucial, and it is on this meeting that we must now pause for a while. This was the main forum in which physicists could express their views (physicists understood in the strict sense of the term, as opposed to constructors for example). At this meeting a number of objections were raised which rapidly led to a reorientation of Adams's project.⁶⁶

The overwhelming if not unanimous opinion of the physicists was that an energy of 150 GeV after some 5-8 years was totally unacceptable. Firstly, because the rival American laboratory would have 400 GeV in 1972 and an experimental hall suitable for working at this energy two or three years later. Then because physicists in six countries had already obtained governmental support and financing for a 300 GeV accelerator, and that it would be politically unwise to retreat now. On the other hand, all agreed that Project B "broke the deadlock concerning the choice of a site", and the community supported "the construction of the new laboratory next to Meyrin". ECFA's recommendations were thus "that the energy should not be less than 300 GeV and [...] that the largest radius at the Meyrin site should be chosen" — the idea here being to leave open the possibility of reaching energies of 400 or 500 GeV in a second phase. A third conclusion was that it was important to build the accelerator in six years, and not in eight, a goal which seemed possible if one used the PS as an injector and the West Hall as the first experimental hall. Finally it was suggested, in line with Adams's idea, to decide now for half the magnets, the other half being settled at the last moment. This was obviously done in the hope that superconducting magnets would be available and that one could in this way leapfrog the American laboratory.⁶⁷

At its meeting on 11 and 12 May the SPC adopted the majority of these proposals and drafted a statement for the Council. Here it enthusiastically defended the idea of a project which it named B*, comprising a ring of at least 2 kms in diameter using the missing magnet idea and separate function magnets, and taking the PS as injector. This accelerator, it thought, should be able to reach 300 GeV after five or six years of construction and would use the West Hall as its initial experimental area. A more appropriate experimental zone would be opened in the eighth year. On

⁶⁶ CERN/ECFA/70/6, 2/6/70 (DG20782).

⁶⁷ Quotes taken from CERN/ECFA/70/6, 2/6/70 (DG20782).

the financial side the SPC estimated that the project would have a cost "close to the estimates for Project B" made by Adams in March. At the same time the first contacts were made with the French and Swiss authorities, since the machine would cross the border between the two countries. For their part, the CERN management explained to the elected authorities in the region that the machine would be underground, and would thus have no significant impact on local life.⁶⁸ At its meeting in June the Council accepted warmly the proposal put forward by Adams and supported by the SPC and by ECFA, even if the majority of the countries which had already supported Project A registered their regret that it had been abandoned without any discussion. (This was notably the case for Italy, and to a lesser extent for Belgium and for France.) Sir Brian Flowers, in his turn, spoke of a new "impetus" having been given to the 300 GeV programme and declared that the British physicists were "extremely anxious to take part in the new project".⁶⁹

5.3 *The adoption of a revised Adams project*

From this moment onwards things moved rapidly. Still rather stunned by the events of the previous January, but relieved by the intelligent solution put forward by Adams, the Council delegates, and under their pressure the various state apparatuses, decided to step up the pace.

In brief the Committee of Council met at the end of July and recognised that "there seems to be a general agreement amongst delegates that CERN should in some way or another ask the governments of France and Switzerland whether the site proposed for Project B could be made available to the Organization". This was done unofficially in the subsequent weeks, and a report with positive conclusions was presented to an extraordinary session of the Council called in October.⁷⁰

At the start of September the Committee of Council approved, for presentation to the Council, the new Programme Definition document. The tendency now was to build a machine 2.2 kms in diameter. This radius would permit the Europeans to obtain reasonably quickly, and using classical means, 400 GeV, namely, the energy of the American accelerator. This proposal was maintained in the final document

⁶⁸ SPC/292, 15/6/70, CC/942, 12/5/70, letter Adams to Alline, 26/5/70 (DG20895).

⁶⁹ CERN/967/Draft, 18/9/70.

⁷⁰ Letters Adams to Committee of Council Members, 11/8/70, 24/8/70 (DG20895), CERN/983, 26/11/70.

submitted to the member states in December. In October all the delegations approved the text "for presentation [...] to the Governments of the Member States" and gave their approval for an official request being made to the French and Swiss authorities.⁷¹

The final touch came on 4 December in the aftermath of the Conservative Party coming to power in Great Britain. In reply to a written question submitted to the government in the House of Commons "Mrs Margaret Thatcher, Secretary of State for the Department of Education and Science replied: 'Yes. We have decided that the UK should participate with the other European countries which are members of the European Organisation for Nuclear Research, CERN, in building a 300 GeV accelerator [...]' ". With Britain's participation added to the other six member states which had already confirmed their participation, 80% of the budget was now covered. Nevertheless, everything was not yet definitely settled at the Council meeting in December. Several governments, and notably the British government, insisted that all member states should participate. The session was just suspended until February when the Netherlands, Norway and Sweden in their turn announced their participation. Despite the defections by Denmark and by Greece the project was thus voted, Adams was nominated the Director-General of Laboratory II, and the recruitment of personnel as well as the construction could thus get under way.⁷²

In mid-1973 it was finally decided not to use superconducting magnets, essentially for industrial reasons. Guarantees for constructing reliable magnets of this type in series could not be given. Adams thus proposed to the Council to instal classic magnets in the ring, thus enabling the machine to achieve 400 GeV directly. The Council accepted his proposal.

On 17 June 1976 the superproton synchrotron accelerated protons to 400 GeV for the first time. On 25 October an intensity of 10^{13} protons per pulse was achieved.

⁷¹ SPC/296, 29/10/70, CERN/983, 26/11/70, CERN/1008/Draft, 27/5/71.

⁷² Telex Grégory to Committee of Council and SPC Members, 4/12/70 (from which the quote is taken), letter Thatcher to Amaldi, 4/12/70 (DG20892), CC/993/Draft, 18/12/70, CERN/998/Draft/Extr., 7/1/71 (December Council Session), CC/999/Draft, 19/1/71, CC/1006/Draft, 3/3/71, CERN/1008/Draft, 27/5/71 (February Council Session), letters Adams to Flowers, 15/12/70 (JBA22729), Adams to Weisskopf, 8/1/71 (DG20893).

6. Conclusion

We will conclude this study with a few brief remarks.

Firstly on the unusual length of this decision-making process — it took longer than ten years — and on the fact that in order to succeed, it required the constant permanent presence of an extremely highly motivated group of people. This group had constantly to keep a large number of threads in their hands, had constantly to cope with defections on each and every point, and had never to lose hope. When everything seemed to have been settled in 1967, for example, for the participation by six member states, it was the German Atomic Energy Commission which, suddenly, questioned the scientific foundations of the choices made by CERN and blocked the decision. A year later it was the United Kingdom who announced that it would not participate, this time for more classic reasons, namely political and financial reasons. Finally in January 1970 it was the Federal Republic of Germany which again stopped, in a brutal and apparently irreversible manner, a process which seemed about to succeed. On this occasion it was because its partners did not want to concede that the new laboratory should necessarily be established on German territory.

There were three main reasons behind the enormous difficulties which CERN people had in bringing this affair to a conclusion. Firstly, the social and economic difficulties of the time, and the new demands being made in the field of policy, notably as regards industrial policy. Then there was the gradual loss in the prestige of high-energy physics and its relative decline, coupled with the demands coming from other sectors of scientific research which until then had been all too easily overlooked. Finally, though this point is intrinsically linked to the two preceding ones, the difficulty which the CERN lobby had to maintain the autonomy which it had had and could enjoy in the early 1950s. The traditional space in which the Council's strategic core could manoeuvre had been reduced since particle physics was under attack, since the available resources were less, and above all since the state apparatuses had taken it upon themselves to manage science and technology. Of course the lobby still had considerable room to move, as a comparison with the situation in the domain of space makes all too clear. Nevertheless, it had far less freedom than was the case in the 1950s and the early 1960s when the Council could triumphantly oppose itself to the British wish to control better CERN's expenditure.

Some words on the German attitude during this historic phase are also needed. While during the preceding period of CERN's history it was the United Kingdom, and

to a lesser extent the Scandinavian countries, who most frequently created difficulties for the lobby, this time the dangers came from the Federal Republic of Germany. This is confirmed in the analysis on the decision of BEBC which we give in the following chapter. In their book on the SPS Goldsmith and Shaw advance an explanation for this. They claim that Germany was no longer prepared to be treated any differently to Britain or to France while it was making the most important contribution to the budget. These authors even interpret the episode in January 1970 as a signal intended to illustrate the new determination of this country.

Their observations seem to us to be correct, but perhaps call for an additional remark. One must not forget, in fact, that the German delegation to the Council did not have in its own country the aura which surrounded some members of the other delegations. Perrin for example, even if he had lost some of the autonomy which he had had ten years before, exercised a real influence over the choices made by his government. One should also note that physicists were not in the majority on the national bodies in Germany which were mandated to advise their government on CERN policy. As we have already mentioned industrial circles also played a role in these organisations, a role which they certainly did not have in the case of Italy or France. In France, it is true, we also see a wish in 1970 and 1971 to make scientists more accountable. But the pressure put on them at the time was far less important, and certainly far less systematic, than was the case in Germany.⁷³

Translated by
John Krige

⁷³ Example in letter Grégory to Aigrain, no date (probably September 1970), DG20893.

STUDIES IN CERN HISTORY

This report is intended for inclusion, in modified form, in Volume III of the History of CERN. Volume I was published in 1987, and covered the launching of the European Organization for Nuclear Research. Volume II, concerned with building the laboratory and running it until 1965, was published in 1990. They are available from

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