

The scanning and measuring table preparing for the analysis of photographs from Gargamelle. This 'pilot model' has been built to finalize details of design before tables are manufactured in industry for several European Universities and for CERN.

Gargamelle Construction delay

Delivery of the chamber body for the huge heavy liquid bubble chamber, Gargamelle, is now scheduled for the end of June 1969. This has moved back the date foreseen for the start of physics with the chamber at CERN. (A description of the chamber appeared in CERN COURIER vol. 8, page 95.)

At a meeting on 18 February between representatives of CERN and of the Commissariat à l'Energie Atomique, who are financing construction of the chamber at the Saclay Laboratory in France, the possibility of bringing components directly to CERN for testing from now on was investigated.

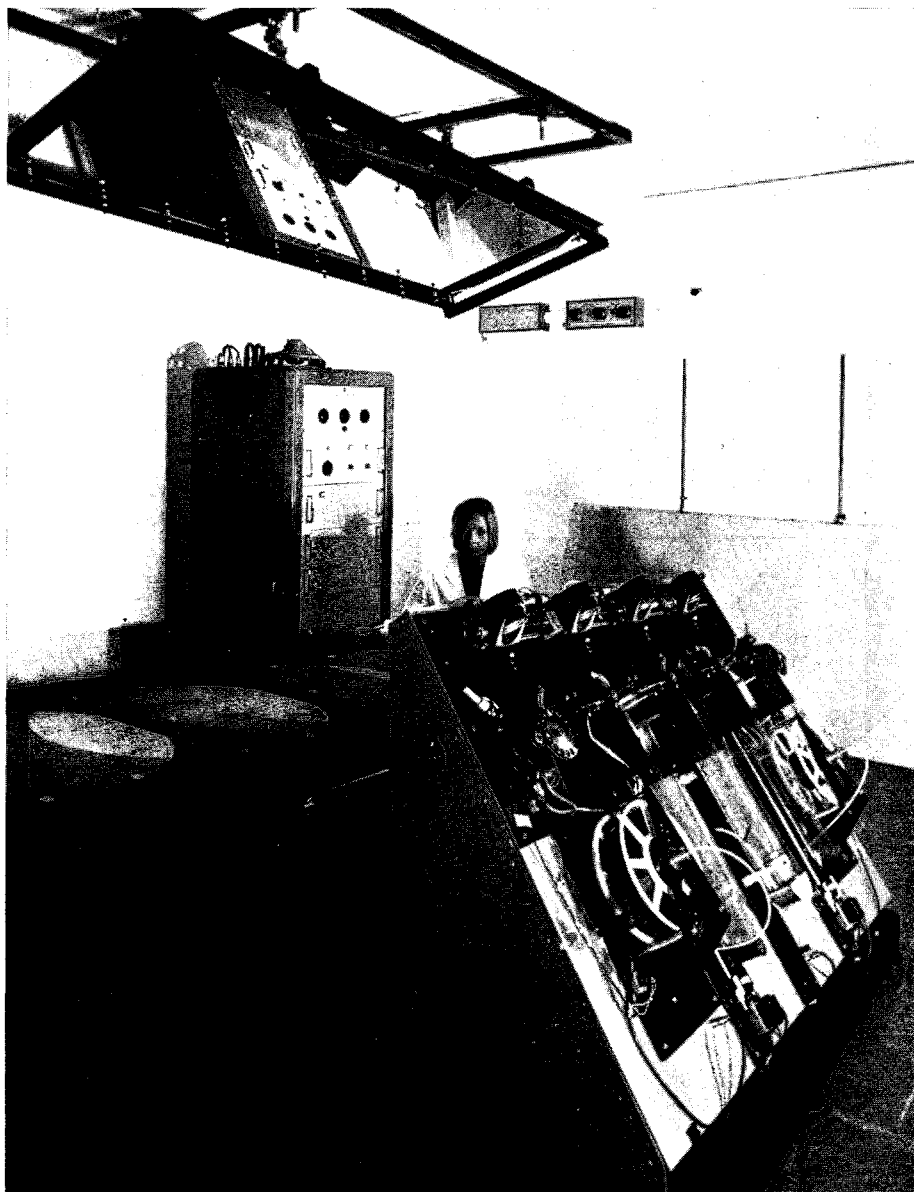
Tests have been successfully completed on the chamber magnet (already installed at CERN), the optics, the heating and regulation system, the system for transfer and distillation of liquids, and on some of the control electronics. Other tests on components such as the camera and data box, and the compressor are under way. Several 'Gargamelle Users Meetings' have been held and discussion of the initial physics programme is well advanced.

Gargamelle photo analysis

A scanning and measuring table for the analysis of photographs taken in Gargamelle has been developed by the Nuclear Physics Apparatus Division at CERN (who financed its construction) in collaboration with University College, London.

The photograph shows a 'pilot model' which will help determine the specification for the final version (called 'Gemini') of which a number will be produced by outside industry. The construction of the tables was put out to tender at the end of January and replies have been requested for 10 March. This should make it possible to have the first machines delivered at the end of 1969.

The table is 'combined-function', being used not only for scanning the photographs, but also for measuring them. The measurements will be done on-line with a CDC 3100 computer, using the experience gained with the present NPA on-line system.



CERN/PI 298.1.69

The design of the table is governed by the unique optical system of Gargamelle, which has two parallel rows of four wide-angle lenses (110°) as described in CERN COURIER, vol. 8, page 96.

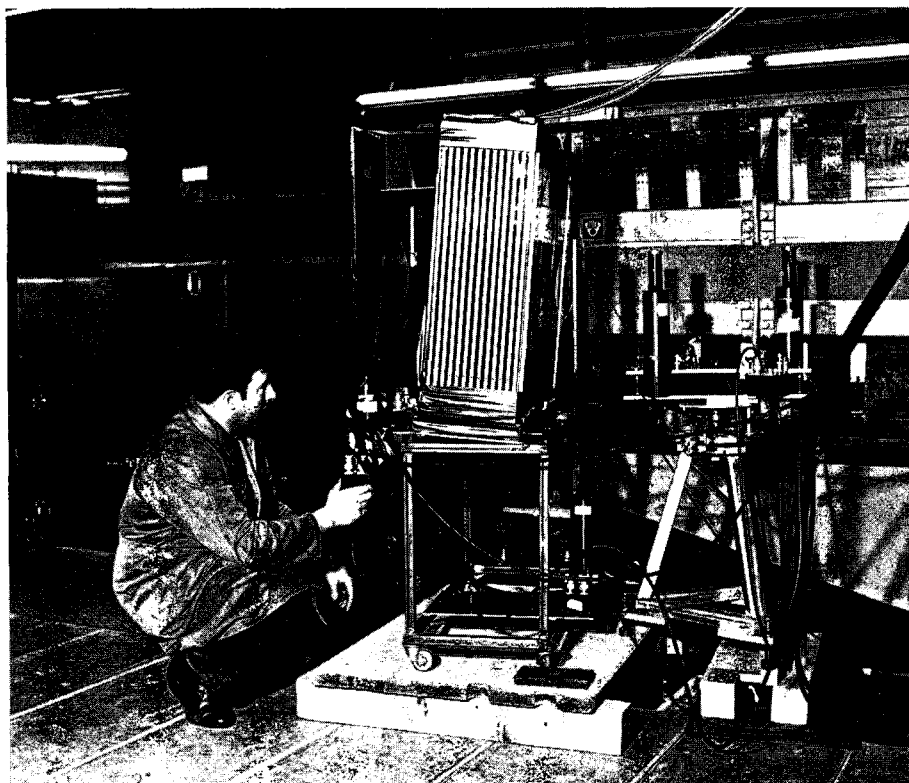
Two films are used, one for each row of four lenses. Each film passes in succession the four lenses in one row, and a special film-feed mechanism allows the whole area of the film to be used. The eight views can then be projected simultaneously onto the table. Each film is

70 mm x 300 mm and can record about 800 photographs.

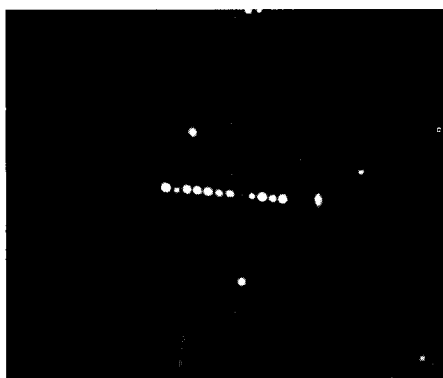
On the scanning and measuring table, eight objectives (one for each view) are connected together, by a system of rods which serves two purposes: 1) the eight views can be moved together while keeping the distances between them constant (each view can, therefore, be brought directly in front of the operator); 2) the views can be partially or completely superimposed in such a way that the centre-to-centre distances between adjacent views

The spark chamber positioned next to the proton synchrotron to look at the 'background' radiation. A high energy beam is allowed to coast in the machine and the spark chamber records particles produced by interactions between the beam and residual gas in the vacuum chamber. From this, the background to be expected at the ISR can be deduced — an important piece of information before the detectors for ISR experiments are built.

Below are two photographs taken of the spark chamber. On the left: a high energy particle from beam-gas interactions. On the right: one high energy particle and a low energy particle (easily scattered by the foils in the chamber) probably from induced radio-activity in the accelerator components.



CERN/PI 86.2.69



remain equal. The images can be moved only in the longitudinal direction with an accuracy which allows the images of the same point on several views to be superimposed to within 1 mm.

There are two assemblies of four projectors juxtaposed in the Gemini, so that the two films (from the two rows of four cameras) can be projected onto the table.

Measurement will be made directly in the image plane and not, as with the IEP, by moving the film. This means that a high-quality optical system is required.



Two possible measuring systems have been considered: in the first, measurement is made in bipolar coordinates; in the second (already marketed under the name of 'D-Mac Pencil Follower') measurement is made in Cartesian coordinates.

Orders for the Gemini will be placed by CERN (four), University College, London (three) and Aachen (two). Further orders will probably come from Bergen and Brussels. There are three other projects to develop scanning and measurement tables for Gargamelle now on hand, at

Orsay, at the Ecole Polytechnique de Paris and the Institute of Physics of the University of Milan.

It will be possible to use most of the components of Gemini for the scanning and measuring tables of Mirabelle, the hydrogen bubble chamber which is being built at Saclay for Serpukhov. Some modifications will be needed because Mirabelle has three rows of three cameras and has inverted images.

Looking at the background

A short experiment on the proton synchrotron, in a series by B.D. Hyams, V. Agoritsas and M. Bott-Bodenhausen, was concluded in the first week of February. It used the PS to investigate what might be expected from 'background' radiation in the intersecting storage rings. Such radiation is expected to come predominantly from collisions between the beam particles and residual gas molecules. For some experiments this will simulate beam-beam collisions and in general it will give strong signals or tracks, complicating the analysis of beam-beam interactions.

Knowing the design figures for the ISR beam intensities and for the pressure in the vacuum chamber, it is possible to calculate the background that can be expected. However, before large amounts of money are invested in detection systems for the ISR, it is important to check these figures in a practical test under as near realistic conditions as possible.

An optical spark chamber was set up close to the beam pipe of the PS. Protons were accelerated to 22 GeV, and the beam was then allowed to coast at constant energy (at the magnet pulse flat-top) simulating a stored beam in the ISR. During 100 ms of the flat-top the spark chambers could be triggered by particles produced in collisions with residual gas molecules in the pipe (no targets or extraction systems were being used).

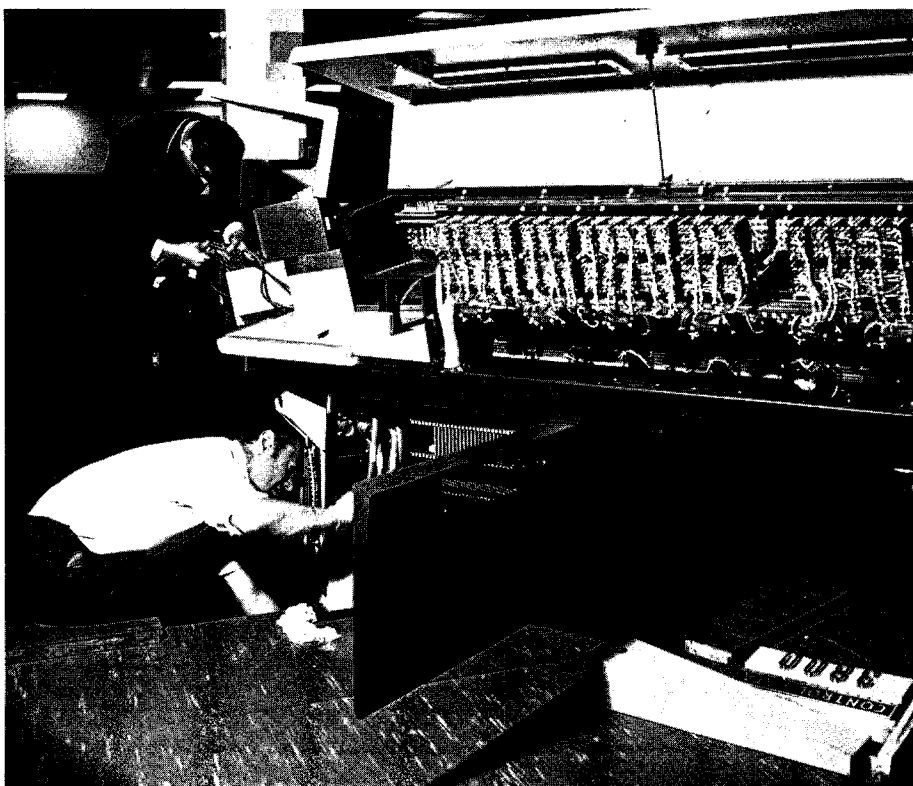
The pressure in the PS was 2×10^{-6} torr and the beam intensity was 2×10^{11} circulating protons. Taking the design conditions in the ISR as a pressure of 10^{-11} torr and an intensity of 4×10^{14} particles in each beam, the results of the experiment can be translated into figures

1. Mr. Willy Spühler, head of the Federal Political Department signing the Agreement establishing the European Molecular Biology Conference on behalf of the Swiss government. Switzerland played an important part in bringing this Agreement to the point of signature at CERN on 13 February.

2. The CDC 3800 computer being dismantled for transport to Geneva University.



1. CERN/IP 127.2.69



2. CERN/IP 321.1.69

3. The elegant new control room, built by Sprecher and Schuh (Switzerland), of the enlarged power house. From this room, the distribution of general services such as electricity, compressed air, cooling water, etc. throughout the CERN site is controlled. The map of the site on the left is a general alarm panel which can show the location and nature of faults (from a clock which has stopped to an outbreak of fire). The units of the power house itself are also monitored here. The control room came into service in January.

for the ISR. Calculating the mass of gas traversed and the difference in intensity, the operating conditions for the experiment were about 50 times worse than can be expected at the ISR. Otherwise conditions were comparable — the energy, beam size and magnet structure were similar to the ISR.

The results were close to the calculated figures and one brief way of expressing them is as follows :

If the ISR operating conditions are as mentioned above, then, taking the sensitive time of the spark chambers as $2 \mu s$ each time they are triggered, a $1 m^2$ spark chamber placed next to the beam pipe can expect to record one particle track due to background from the ISR about once in every three pictures.

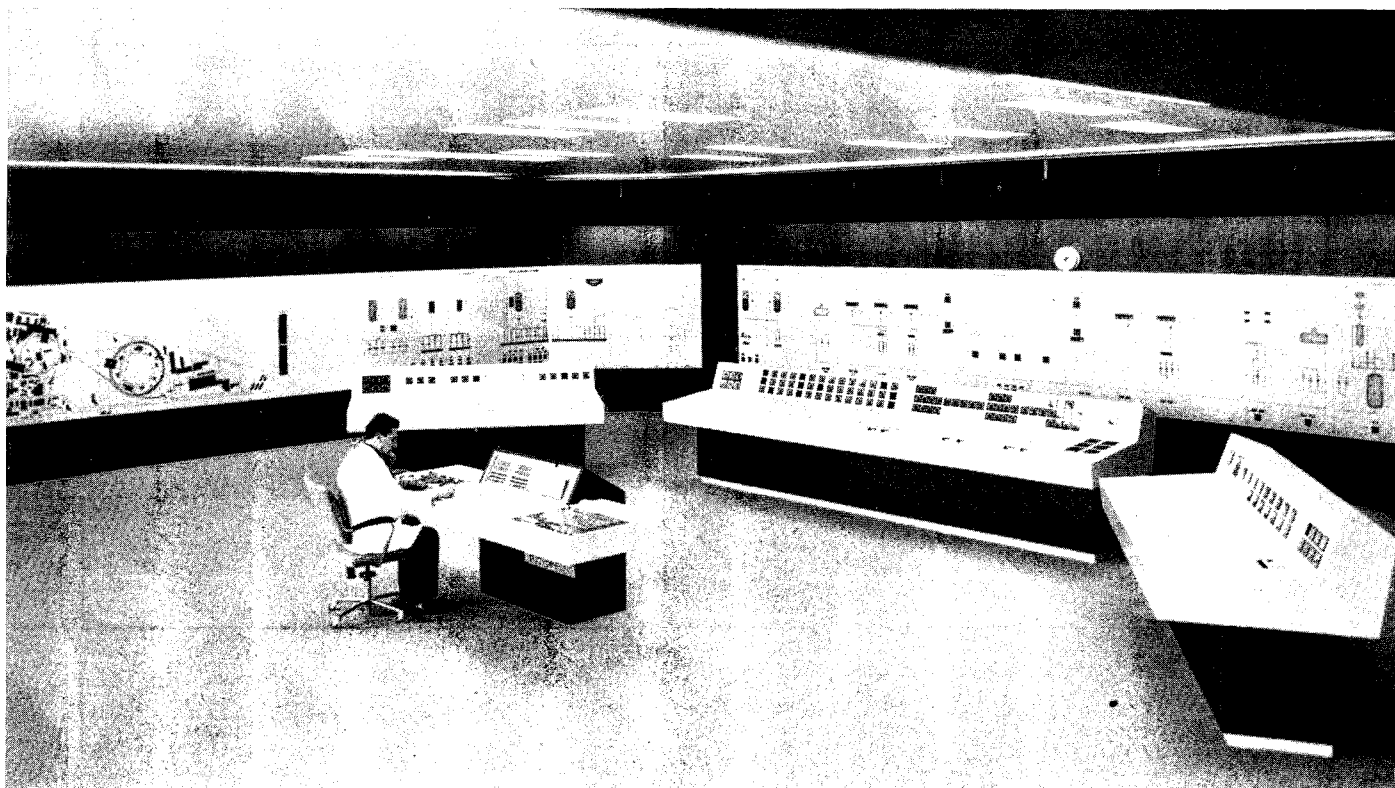
A similar investigation using only counters was carried out in 1965. It showed that, as expected, the background is strongly directional — that the particles from beam-gas collisions emerge predominantly tangential to the circulating beam direction. The recent experiment with spark chambers was able to detect particles of a much wider range of energies. It was possible to see very low energy particles almost certainly coming from induced radio-activity in the accelerator components.

None of this looks unduly troublesome for the ISR experiments. It may however prove necessary to install some shielding far upstream of the interaction regions on both rings to shield the detectors. This is because the directional background will come predominantly from upstream and there the pressure will not be as low as in the interaction regions.

European Molecular Biology Conference

On 13 February, an agreement was signed at CERN by twelve European countries establishing the European Molecular Biology Conference. This is an important development in European co-operation in the growing field of molecular biology.

The field does not at present call for very large and expensive items of equipment and some countries feel that it is not yet appropriate to set up a central



3.

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Laboratory on the model of CERN. There is however a need to bring together scientists with expertise in the variety of disciplines which are involved in molecular biology. Until such a time as a central Laboratory receives sufficient support the 'Conference', formally established at the February meeting (subject to ratification), goes a good way towards achieving the necessary co-operation.

The Agreement states in Article II: 'The General programme to be carried out under the responsibility of the Conference shall comprise in the first instance: (a) provision for training, teaching and research scholarships;

(b) assistance to universities and other institutions of higher learning that wish to receive visiting professors;

(c) the establishment of study meetings, coordinated with the programmes of universities and other institutions of higher learning and research.

The execution of the General Programme is entrusted by the Conference to EMBO.'

EMBO, the European Molecular Biology Organization, is a private organization centred in Geneva which was set up in 1963 by many leading molecular biologists in Europe. It has already initiated a programme along the lines of Article II of the Agreement and it is now assured of State financial support to sustain and intensify this work. The finance will be provided by participating countries in proportion to their national income.

The countries who signed the Agreement are: Austria, Denmark, Federal Republic of Germany, France, Greece, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom.

Computer to Geneva

A CDC 3800 computer left CERN in February to be re-installed at the University of Geneva. The machine came to CERN in September 1966 as part of the temporary manoeuvres to sustain the computing capacity on the site during the teething-troubles of the CDC 6600. The need for the computer was removed when the CDC 6400 arrived.

At the same time, the Canton of Geneva was interested in acquiring a large computer for use by the University of Geneva and by the cantonal administration. (The computer had a trial run for the administration when it was used in October 1967 to count the votes recorded in the federal elections.)

CERN was able to offer the CDC 3800 on very favourable terms (4.9 million Swiss francs) and an agreement to purchase the computer was signed by the Geneva authorities in April 1968.

A few technical details: The CDC 3800 has a memory of 65 356 words of 48 bits, a capacity of approximately 1 100 000 operations per second and a reading speed of 1 200 punched cards per minute. It has 8 tape decks with a transfer speed of 120 000 characters per second.

CERN will continue to have a small amount of time (120 hours per month) on the computer until the end of 1970.

Concerts at CERN

Following a long-established tradition, CERN is organizing in 1969 a series of concerts to be held in the large auditorium. The concerts are open not only to

CERN staff and their families but to anyone in Geneva. As in previous years, they will involve close collaboration with the Radio Suisse Romande who will record the concerts to be broadcast on the radio.

The concerts will be given by a variety of chamber music groups presenting a variety of compositions. The programme is as follows:

- 31 March The Lasalle String Quartet — works by Purcell, Rosenberg, Haydn and Schubert
- 15 April The Geneva Wind Octet — works by Rosetti, Telemann, Haydn, Fash and Beethoven
- 6 May Lionel Rogg on the harpsichord — works by Bach, Handel and Couperin
- 20 May The Geneva String Quartet with the pianist Denise Duport Cellich and bass M.J. Staempfli — works by Martinu, Martin and Schönberg
- 3 June The Charles Ravier ORTF polyphonic ensemble — programme to be arranged.

Seats may be reserved at a price of 5 francs each concert or 20 francs a season ticket for 5 concerts.

For single tickets, contact the Personnel Association (tel. 41 98 11, extension 2819) and for season tickets, contact Mr. Adam (tel. 41 98 11, extension 2317).