

LEP inauguration

As briefly mentioned in the previous issue (page 1), 13 November saw the culmination at CERN of weeks of intricate planning to put together a fitting formal inauguration of LEP, CERN's 27-kilometre electron-positron collider. The day was to witness an event worthy of the many years of assiduous endeavour to bring into being the world's largest scientific machine, a prime example of international collaboration and the portent of a new era in fundamental research.

From early that morning, CERN had seen many unaccustomed visitors – bomb squads, riot police, marksmen..., the full panoply of security that attends top level delegations. For among the 1500 guests at the inauguration ceremony were Heads of State and Government and Ministers from CERN's fourteen Member States, together with representatives from the growing community of countries further afield involved in CERN's research programme.

Scene of the ceremony was the soccer-pitch size SM18 hall, built as an assembly shop for major LEP components, including its thousands of magnets, prior to their descent into the tunnel for final installation. For 13 November, SM18 had been decked out in full finery, hinting at the spectacle to come.

A fleet of buses ferried the guests, their CERN hosts and more than 200 press and media representatives from their assembly points to SM 18, where while waiting for the ceremony to begin they could follow the arrival of the VIP contingents outside via wide-screen TV coverage, beamed also live across Switzerland and exported via Eurovision.

After being greeted by CERN Director General Carlo Rubbia and Council President Josef Rembser



French President François Mitterrand on arrival at the LEP Inauguration Ceremony, after being greeted by CERN Director General Carlo Rubbia (left) and Council President Josef Rembser.

and introduced to prominent CERN personalities, the guests of honour admired a specially-mounted LEP exhibition, where much of the expertise and technology now hidden in the tunnel fifty metres below could be displayed and explained.

Shortly after eleven o'clock, the final convoy drew up. Two cars and eleven motorcycle outriders preceding a heavy black Citroen carrying the French tricolor, with ten lesser vehicles and an ambulance in its wake, announced the arrival of the large national delegation led by President François Mitterrand.

With the Member State principal representatives – Austrian Minister of Science and Research Erhard Busek, Belgian Secretary of State for Scientific Policy Pierre Chevalier, Danish Minister of Education and Research Bertel Haarder, Federal German Minister for Research and

Technology Heinz Riesenhuber, French President François Mitterrand, Greek Ambassador Euripide Kerkinos, Vice-President of the Italian Council of Ministers Claudio Martelli, Princess Margriet of the Netherlands, Crown Prince Harald of Norway, Portuguese Secretary of State for Research and Technology Sucena Paiva, Spanish Minister for Education and Science Javier Solana Madariaga, King Carl XVI Gustaf of Sweden, President of the Swiss Confederation Jean-Pascal Delamuraz, and UK Secretary of State for Education and Science John MacGregor – on the rostrum, Carlo Rubbia, speaking in French, welcomed the guests before going on to review CERN's achievements.

'Today European physicists have developed the most sophisticated instruments for research and CERN has become a centre of excellence of international importance

On the inauguration podium, left to right, Princess Margriet of the Netherlands, President Jean-Pascal Delamuraz of Switzerland, King Carl XVI Gustaf of Sweden, CERN Director General Carlo Rubbia, President Mitterrand of France, Crown Prince Harald of Norway, Vice President of the Italian Council of Ministers Claudio Martelli.



which has enabled Europe to resume its proper place, worthy of its traditions, in the exchange of international scientific knowledge,' he averred.

Going on to outline the development of CERN's research aims, Rubbia stressed the 'dynamism of innovative ideas' which have complemented technical achievements. When thinking turned to colliders as the main research tool, 'two complementary paths were open....CERN wisely took the decision to pursue both, successively.'

One path, the SPS proton-anti-proton collider, led to the discovery of the W and Z bosons in 1983. 'Once the existence of intermediate bosons had been proved, the parallel path – LEP – assumed its full significance,' he affirmed.

Turning from physics to CERN's role in the world, the Director General accented the growing popularity of CERN as a world research centre, particularly for young physicists, and introduced a short video sequence highlighting both the youth and national diversity of CERN's science.

Looking to the future, with major

projects being groomed in the US, the Soviet Union and Japan, Rubbia pointed to CERN's plan to capitalize on the LEP tunnel by installing a second, complementary, ring – LHC (December 1989, page 1).

'CERN's success must now be built on and decisions taken to consolidate it in the future and to blaze a trail for future successes,' he concluded.

King Carl XVI Gustaf of Sweden, speaking in English, looked to

LEP's initial scientific discoveries, with the number of quark-lepton families now limited to three. 'But I am quite sure that (physicists) will not consider the limited number of quark-lepton families as a serious constraint on the future development of elementary particle physics,' he commented.

The King was also able to recall with pleasure his contact with CERN physicists through his role in presenting Nobel Prizes.

After the talent of its researchers and the power of its machines, CERN's success also lies in its role in creating a framework for European collaboration, concluded the King. 'Europe as a political idea can perhaps mean many different things, but Europe in terms of scientific endeavour is today a very real community.'

Jean-Pascal Delamuraz, President of the Swiss Confederation, emphasized the indefatigable march forward of science, catalysed by the spark of creative instinct and imagination which fires discovery. 'This teamwork, this explosion of



The buffet lunch for 1700 guests.

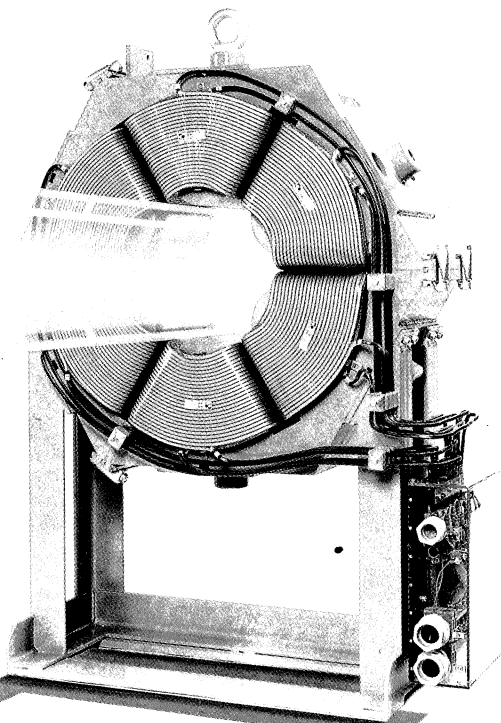
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Among the guests: left to right- Alan Astbury representing Canada, Giorgio Salvini of Rome, Giacomo Morpurgo of Genoa, and CERN pioneer Edoardo Amaldi, visiting the Laboratory for the final time before his death on 5 December (see page 27).



so many imaginations,....' illustrates Europe's ability to play a dynamic role without losing the richness and diversity of its cultures. 'Scientists have always known how to look beyond frontiers,' he continued. As a symbol of European unity 'CERN is at the same time the oldest and the most lively...'

The technological prowess which makes scientific projects like LEP possible, 'should be encouraged and supported by large-scale initiatives, open to participation by all nations,' he said.

French President François Mitterrand recalled the day just more than six years ago, 13 September 1983, when together with Swiss President at the time Pierre Aubert he had formally initiated LEP construction.

'Paradoxically, this collider buried a hundred metres underground constitutes a remarkable observatory of the Universe,' he declared, reflecting the growing links with between particle physics and astrophysics which have confirmed the 'brilliant intuition' that the microscopic structure of matter and the

evolution of the cosmos were intimately related.

Enumerating the various problems facing humanity today, 'one asks sometimes if fundamental research in general, and CERN in particular, is not a luxury.....' the President asked rhetorically. 'There is no progress in biology without progress in chemistry and in physics, in chemistry without physics,....' he affirmed, going on to list some of the important spinoff benefits (X rays, lasers, superconductivity, transistors,....).

'Fundamental research,....complex and difficult, constitutes I believe one of humanity's most exalting adventures. It shows that when men of all races and cultures unite to fulfil their furthest ambitions, nothing is impossible,' he concluded.

Following the speeches, Emilio Picasso, Leader of the LEP Project since its approval by CERN Council in 1981 and with this onerous duty creditably discharged, offered the Director General the 'electronic key' – a diskette of computer code – to LEP.

Carlo Rubbia then invited each of

the 14 Member State representatives to sign a declaration – 'This day, November 13 1989, in their presence and signatures the representatives of the 14 Member States of CERN have opened up the era of scientific experimentation with the LEP collider', the document and subsequent signatures being relayed to the giant screen above, to the discreet accompaniment of a wind ensemble under the direction of Luigi di Filippi.

The lights dimmed as the final item on the agenda was triggered. 'Electrons-Positrons', with music by French physicist and composer Jean-Claude Risset and animation by Richard Beaudemont, brought to life the ring of screens around the arena.

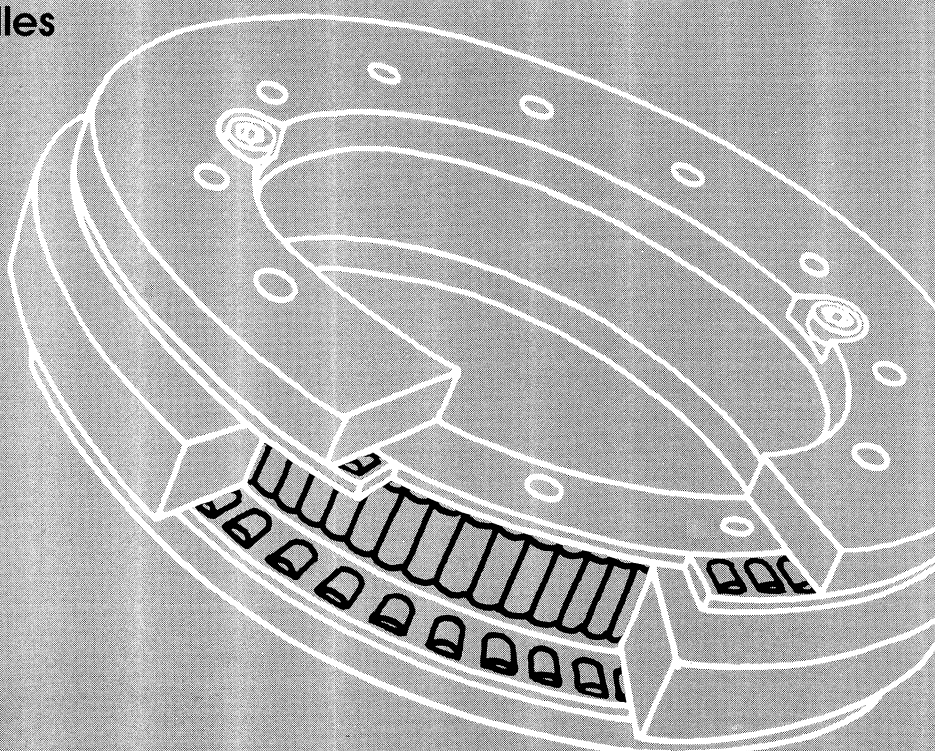
The public portion of the ceremony complete, the guests of honour broke into four contingents, each visiting one of the four LEP experiments, before coming together again for lunch at one of the CERN restaurants, catered by a team under the direction of French master chef Georges Blanc.

Away from the public eye and the TV cameras, but no less important for that, were the toasts and messages at the lunch. Carlo Rubbia paid tribute to his predecessor as Director General, Herwig Schopper, who from 1981 to 1988 oversaw the planning and preparations for LEP. 'Thanks to his constancy, drive and imagination,... we can be here today to celebrate the completion of a work which to the greatest extent was his own,' declared Rubbia.

Claudio Martelli, Vice-President of the Italian Council of Ministers, said that Europe must promote the necessary conditions to stay competitive in physics in the 90s, advocating a rigorous long-term study 'at the highest level of political re-



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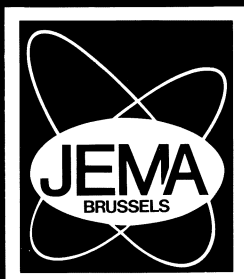
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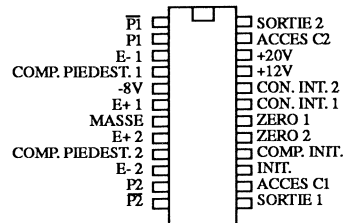
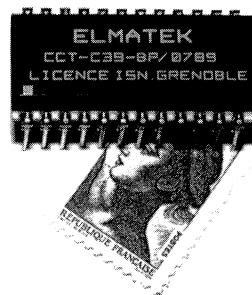
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CERN Host State Presidents – François Mitterrand of France and Jean-Pascal Delamuraz of Switzerland.



sponsibility' to plan CERN's activities, and proposed a special meeting of Member State Ministers, which could take place in Italy to-

wards the end of 1990.

Federal German Minister for Research and Technology Heinz Reisenhuber, speaking for the Member States, said 'we feel our responsibility for the future of this beautiful equipment'.

The extent of the research collaboration at LEP, extending far beyond the community of CERN Member States was underlined in the toasts by Finnish Minister of Education C. Taxell, R.A. Roe (Chairman of the US House of Representatives Committee for Space, Science and Technology), and Soviet Minister for Atomic Energy and Industry V. Konovalov.

Meanwhile other guests had mi-

grated to the back half of the SM18 hall, there to enjoy a buffet lunch including specialties of all 14 CERN Member States, topped with a giant 380-kilo LEP cake, paraded round the hall under a travelling crane before being cut up.

The day, impeccably organized by a committee chaired by Robert Klapisch, went without a hitch. LEP had been switched off at only 6 a.m. that morning and was back in action the next day, taking the showpiece inauguration in its stride. By the end-year shutdown, the four LEP experiments had intercepted 100,000 Z particles.

Around the Laboratories

BROOKHAVEN R&D for RHIC detectors

As Brookhaven prepares for construction of the Relativistic Heavy Ion Collider (RHIC), expected to begin later this year, research and development work for the project is in high gear.

For the past three years the Laboratory has been receiving R&D funds from the US Department of Energy to prepare the way for construction. A detailed conceptual design has emerged and the superconducting magnet designs have been tested in an extensive series of prototypes (September 1987, page 23). These magnets are now being readied for industrial produc-

tion once the President and Congress give the green light, hopefully for fiscal year 1991.

In the meantime preparations for experiments are underway, with a substantial part of the R&D effort being turned to detector development, shared widely among potential RHIC users, as some 17 groups responded to Brookhaven's call for proposals for detector R&D.

After review by a Detector Advisory Committee (P. Braun-Munzinger, Stony Brook; M. Breidenbach, SLAC; M. Gilchriese, SSCL; H. Gutbrod, GSI/CERN; R. Klanner, DESY; B. Mecking, CERN; and L. Schroeder, Berkeley, as Chairman) ten projects were funded, attacking the most pressing issues for detector R&D identified in RHIC workshops. These are the first steps on the long road to the first experiments at the collider – planned to

begin in 1997. A call for proposals for major RHIC detectors should follow this year.

For 1989, detector development funding amounted to about a million dollars. This is expected to increase eventually to about 15 million dollars.

RHIC will collide beams of heavy nuclei at ultra-relativistic energies, subjecting nuclear material to extreme conditions where the familiar structure of neutrons and protons is expected to be fleetingly transformed into a 'plasma' of quarks and gluons.

Recording such events with sufficient sensitivity to pick up signals for new plasma phenomena will require extending known techniques for particle detection. With beam energies up to 100 GeV per nucleon and with ions containing 200 nucleons or more, the total