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VOLUME 32 4 MAY 1992

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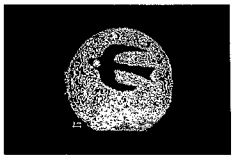

Cover photograph:
A tiny ear-ring illuminated by non-uniform X-rays shows the promising two-dimensional resolution of the microstrip gas chamber technique, now being pushed hard for the next generation of proton collider experiments (see page 6 - Photo Ronaldo Bellazzini)

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Technopolis Thoiry

Geneva Moves With The Times

Geneva has been closely linked to science from the time it hosted crucial discussions on links between such diverse phenomena as light, chemical reactions and magnetism. Indeed, the city became the home of one of Europe's first major experimental facilities — a giant electrochemical pile designed to test Ampere's theories. This was built by de Saussure two decades after a visit by Volta to demonstrate a more famous, but much smaller, pile on his way to impress Napoleon.

An International Role

Geneva's role in providing a testbed for unified theories of matter continues to this day at CERN where the LEP collider probes nature at the 10^{-18} metre scale by colliding electrons and positrons circulating inside a high vacuum beam pipe buried up to 100 metres below the Swiss and French countryside in a 27 kilometre circular tunnel.

CERN was conceived by scientists and politicians in the late-1940's as a step on the road to post-war reconciliation *via* a major collaboration on the neutral ground of pure research in a region with a long history of internationalism. With a staff of 3000 and a budget of some 900 million Swiss francs to provide facilities for scientists from 300 institutes, CERN welcomes 6200 visitors each year.

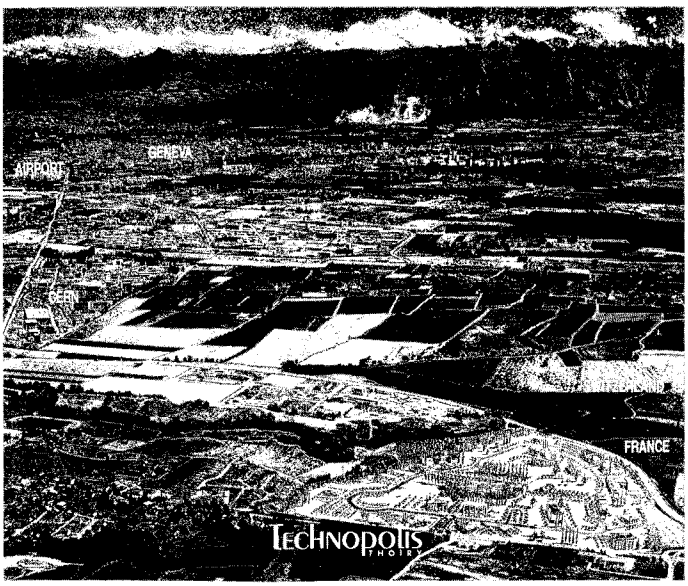
The Technopole Interface

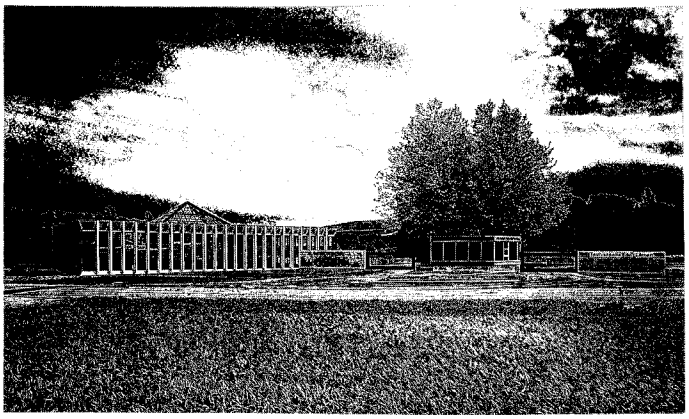
Geneva continues to adapt its role as we move towards the 21st Century. Science parks represent one development and there are now about 300 in the industrialized world. In offering a homogeneous blend of activities and facilities, they generally aim to enhance synergies in an increasingly competitive world.

Unique among the science park concept is the Technopole approach where an outer circle of commercial, governmental and institutional interests come together to promote an inner core of activities providing interfaces between science, technology, new businesses, and higher education. Each Technopolis thus comprises a homogeneous blend of facilities and ancilliary services.

The Geneva region's Technopolis is situated just across the Franco-Swiss border from the main CERN campus. The 27 hectare green field site on the outskirts of the village of Thoiry is therefore ideally located to interface with the international physics community. Being only five kilometres by road from Geneva's international airport and main line station is an invaluable advantage.

Looking across the main CERN campus to Geneva from Technopolis Thoiry, outlined as an artist's image.





The Opus One building at Technopolis Thoiry.

Focussing on Applied Physics

LHC, CERN's next major collider, proposed for the LEP tunnel, follows on from past achievements in calling for state-of-the-art superconducting magnets, advanced materials, sophisticated vacuum and cryogenic systems, high power electronics, and a wide range of computer-based facilities to serve all aspects of the machine — from resource management to the imaging of particle collisions in its mega-detectors.

Technopolis aims to allow industry and institutes to participate in, and contribute to, the rich scientific and technical environment by serving as a closeknit interactive base for specialist organizations. In addition to enjoying a convenient window on CERN's extensive sub-contracted requirements, they will be able to arrange collaboration on a formal basis. Technopolis is also working to establish an Institute to provide an interface in applied physics between teaching and research staffs, postgraduates and high calibre technicians coming from industry and R. and D. centres.

A Superb Environment

Robert Hinterberger, Director of a Technopolis Thoiry based computer software company, places great importance on the "perfect working environment". This will continue to be preserved in a balanced development comprising space reserved for accomodation, technical and commercial companies, the technological institute, small scale R. and D. units, and hotels and conference services.

By the same token, while Mr. Benier, the Mayor of Thoiry, is "obviously interested in promoting employment opportunities" he is "also concerned that we preserve the quality of our local environment". Hence recent agreements for a national park in the Jura mountains behind Thoiry, consolidation of road access from Switzerland through to the French motorway system, a cultural centre, a second international school, and the imminent construction of a major world-class shopping centre.

CES PRESENTS:

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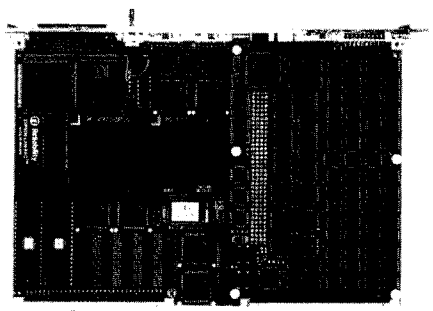

FIC 8234

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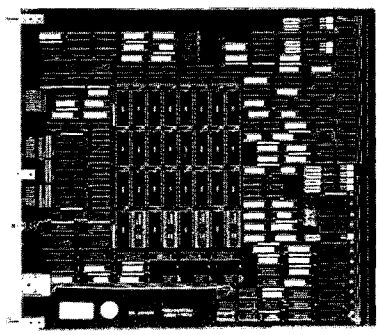

FVSBI 9210

A unique complete OS-9 system package has been designed by CES to make the user unaware of the twin engine architecture as one processor runs OS-9 in the same environment as in the FIC 8232 based workstations.

In case of the FIC 8234A/25/1, the two processors are running in parallel, one performing the front-end task, typically handling the block mover operations, while the other one distributes the reduced data to other elements through the VIC bus, Ethernet or SCSI.

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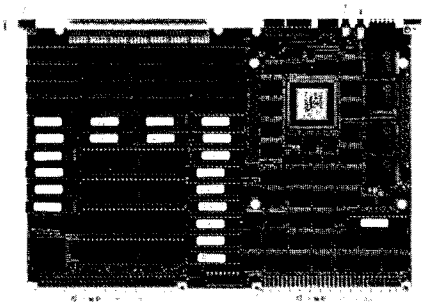

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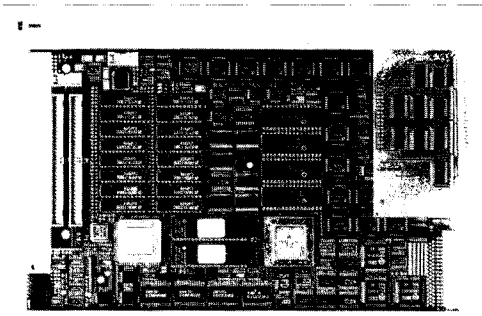

VCC 2117

The transparent VME to CAMAC interface: the VCC 2117. It features an embedded CAMAC list processor with simple memory mapped VIC addressing. It includes a combination of 3 units into 1 (CCA2 back-end, FIC 8232 on-board processor (optional), VIC 8250 front-end).

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WOS 8703	FIC 8234A/25/1	Single 68040 + DSK 8133/F/48
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Evian debut

CERN Director General Carlo Rubbia (right) concludes the Evian 'Towards the LHC Experimental Programme' meeting. Left is the meeting's organizing committee chairman Gunter Flügge of Aachen.

(Photo CERN HI 30.3.92)

With approval of CERN's LHC proton collider for the 27 kilometre LEP tunnel aimed for the end of 1993, work pushes ahead to have all components of the plan in place for next year.

This follows the decision of CERN Council in December of a two-step procedure towards project approval. In December, Council voted unanimously that the LHC is the 'right machine for the advance of the subject and the future of CERN'. The next phase of LHC approval includes outlining its experimental programme, with an assessment of user interest, with its goals and priorities.

As reported in the April issue (page 1), the LHC experimental programme began to take shape when initial ideas (Expressions of Interest) for LHC experiments made their stage debut at Evian-les-Bains on the shores of Lake Geneva, some 50 kilometres from CERN. More than 600 members of the potential LHC user community met at Evian from 5-8 March for the special 'Towards the LHC Experimental Programme' meeting.

Introducing the event, Organizing Committee Gunter Flügge of Aachen traced the previous history of major international get-togethers and other milestones which have delineated LHC progress: from the 1984 Lausanne workshop where the LHC idea was launched, through the valuable 1987 recommendations of the CERN Long Range Planning Committee under the chairmanship of Carlo Rubbia, to the 1989 Barcelona meeting on Instrumentation Technology and the 1990 Aachen workshop to study the physics objectives.

Wrapping up at Evian, CERN Director General Carlo Rubbia proposed an ongoing schedule for the selection of LHC experiments, with Letters of Intent to be submitted after the summer for selection at the end of the year. The selected experiments would then proceed with a full Design Report.

The Evian presentations reflected the wide spread of LHC physics opportunities, with special setups and beams complementing the main thrust of proton-proton and heavy ion collisions.

(The LHC protons would also open up the possibility of electron-proton collisions. However any experimental programme would require input from both the machine and the physics side of the HERA electron-proton collider now beginning operations at the DESY Laboratory in Hamburg.)

The LHC experimental programme is full of challenges. As well as the ingenuity needed to exploit all its physics possibilities and the sheer size of the main detectors, experiments will have to cope with collision rates more than a thousand times those of existing detectors and have to withstand intense levels of radiation.

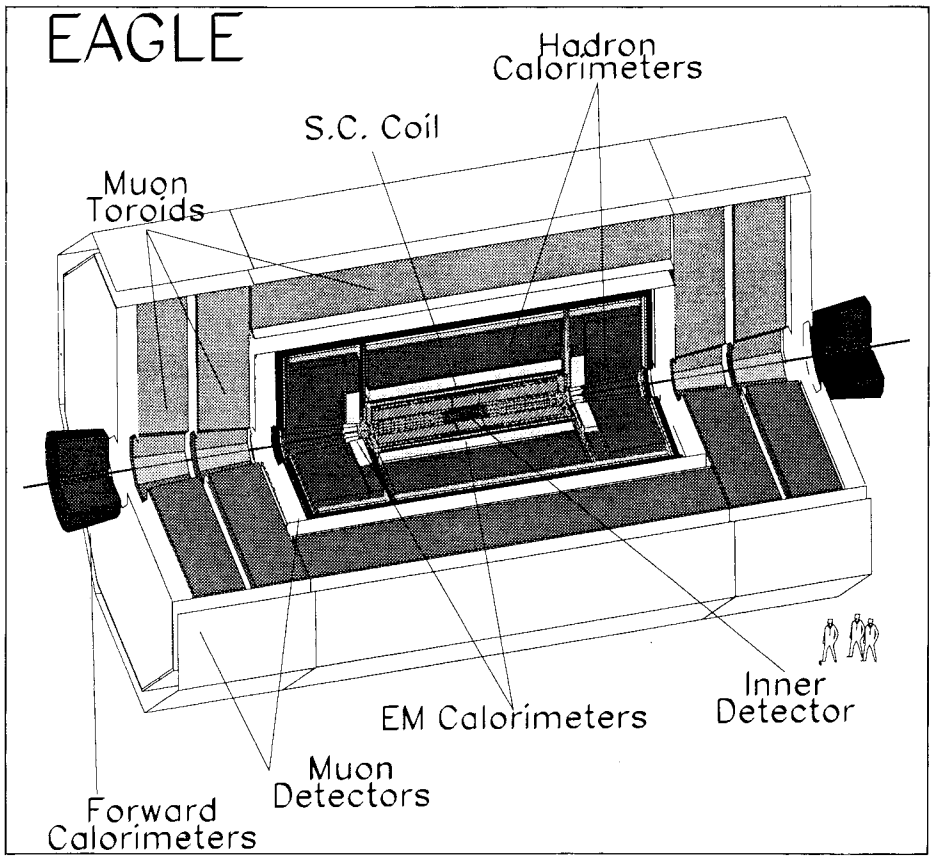
Anticipating this, two years ago a special Detector Research and Development Committee (DRDC) was set up at CERN to coordinate the new technology developments for LHC physics.

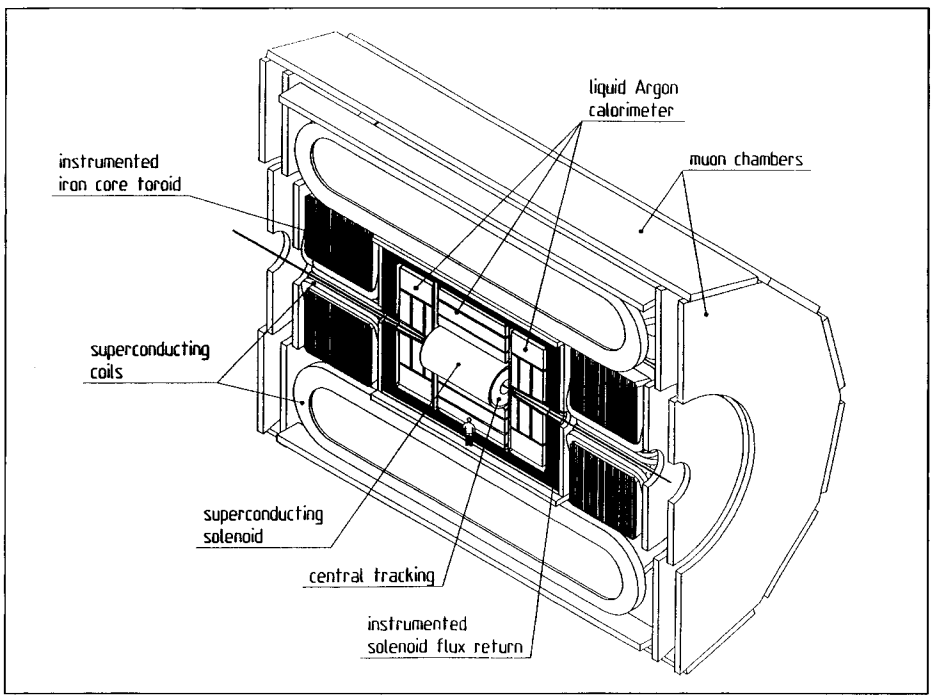
This programme, organized like a traditional CERN Experiments Committee, has now approved over 20 projects, involving almost a thousand physicists from all areas of the potential LHC user community. As well as benefiting from the knowledge and enthusiasm of the participating specialists, the progress of these projects is being closely followed by the DRDC. This programme was described at Evian by DRDC Chairman Enzo Iarocci of Frascati. The emerging plans for experiments benefit from this ongoing programme, which pushes ahead while plans for experiments are drawn up.

This degree of careful planning in the face of challenging technology mirrors the research and development work in another LHC frontier field - powerful superconducting magnets (see accompanying story).

Faced with a lot of user interest, Karsten Eggert of CERN conjectured on possible LHC experimental sce-

27 metres long, the EAGLE experiment for LHC would use an inner superconducting coil around the central tracker and normal conducting outer muon toroids.





narios, with their implications both for LHC running and cohabitation of underground caverns. In many cases machine characteristics are closely linked with the experimental setups, requiring close interaction between experimental groups and machine specialists.

Although LHC beams could in principle collide at eight points, simultaneous use of three beam intersections would be optimal from the machine performance point of view.

Of the eight possible beam intersection points, four (even-numbered) are already occupied by LEP experiments. Of the remaining four odd-numbered points, one is reserved for beam cleaning to minimize potentially troublesome beam halo, and a second will be the site of the beam dump to dispose of circulating particles at the end of a run. This leaves Points 1 and 7 as new experimental areas for major proton-proton studies.

For big new LHC proton-proton detectors, three Expressions of Interest were tabled - ASCOT, using large superconducting air core toroids on the outside (spokesman Friedrich Dydak of CERN, but presented at Evian by Peter Norton of the UK Rutherford Appleton Laboratory); CMS preferring a powerful superconducting solenoid (spokesman Michel Della Negra of CERN); and EAGLE, with non-superconducting outer muon toroids but a superconducting inner solenoid for inner momentum measurements (spokesman Peter Jenni of CERN).

An initial description of these three plans was included in last month's report, but many detector options are

ASCOT, 30 metres long and weighing 10,500 tonnes, would use an inner solenoid and outer toroids, both superconducting.

being held open to await developments from the DRDC programme.

At Evian, Sam Ting tabled an Expression of Interest using portions of his L3 LEP detector for LHC operation. In particular, the 10,000 tonne apparatus would have to be lifted 1.2 metres from its existing position in line with the LEP beams to the LHC protons above. The experiment has made contact with specialists with experience in moving North Sea oil rigs.

As well as colliding proton beams, the LHC would also handle ions, and the Evian programme included three initial ideas for detectors to study this kind of physics, one using a new dedicated detector, one based on the Delphi detector from LEP, and a third exploiting the CMS scheme to be proposed primarily for proton-proton running.

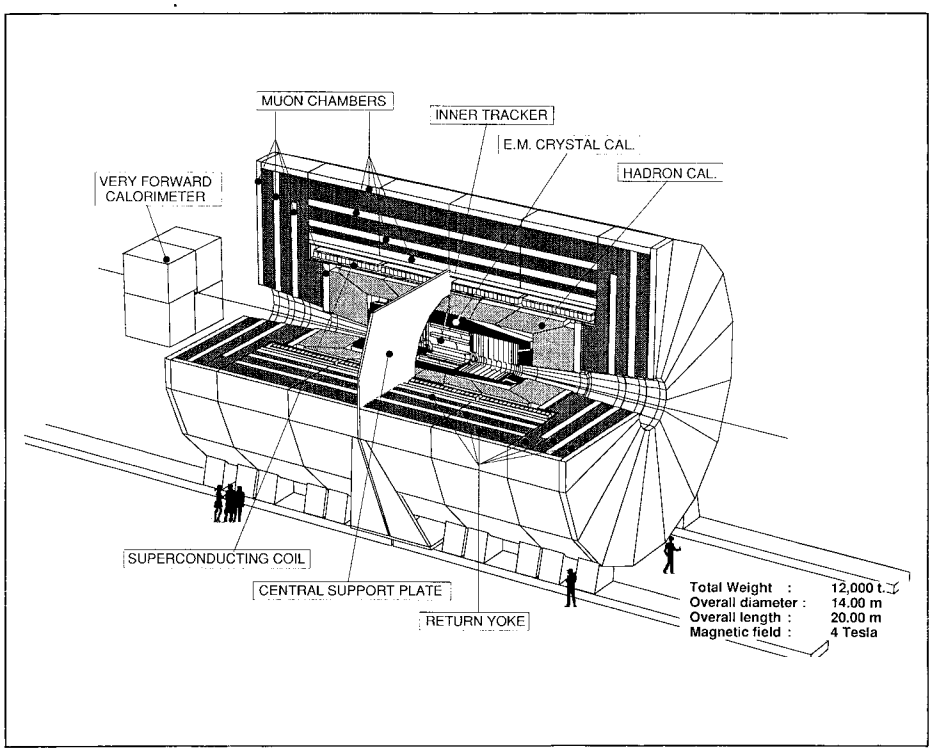
High energy proton collisions are a copious source of B particles, and this physics is seen as another potentially very profitable LHC research avenue, particularly for the important new window it opens on the ever-mysterious phenomenon of CP violation. So far, CP violation has only been studied with neutral kaons, but B particles will open a new CP violation arena.

Three B physics experiments were presented at Evian, one using colliding beams, one using an extracted beam, and a third using a gas jet target. Another LHC physics thrust is for neutrino beams, where two schemes were presented.

At Evian, the underlying LHC physics potential with proton beams was introduced by Chris Llewellyn Smith of Oxford and Alvaro de Rujula of CERN, from a conventional and iconoclast viewpoint respectively.

The coming months will see the emergence of all these schemes as formal Letters of Intent, followed soon after by the careful process of experiment selection. Whatever the outcome of this selection, Evian will always be remembered as the stage were these ideas made their public debut.

(LHC magnet report, page 5)



CMS, 20 metres long and weighing 12,000 tonnes, would use an outer 4Tesla superconducting solenoid.

LHC magnets

Preparations for the LHC proton collider to be built in CERN's LEP tunnel continue to make good progress. In particular development work for the high field superconducting magnets to guide the almost 8 TeV proton beams through the 'tight' curve of the 27-kilometre ring are proceeding well, while the magnet designs and lattice configuration are evolving in the light of ongoing experience. At the Evian LHC Experiments meeting, this progress was covered by Giorgio Brianti.

The magnet configuration now foresees more evenly distributed correction coils, and longer bending magnets - three 13.6-metre dipoles rather than four 10-metre ones - per 50-metre half-cell. This means that 'only' 1152 dipoles, rather than 1600, would be needed to fill the ring.

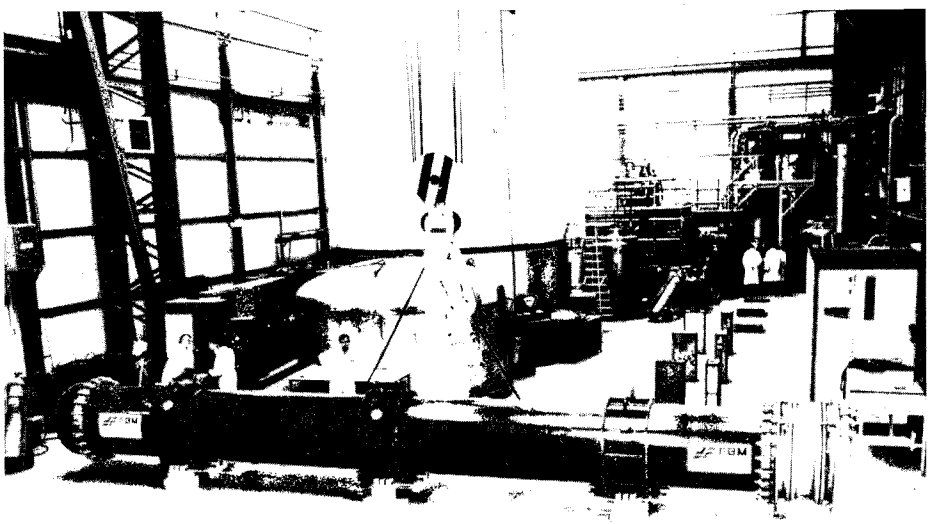
This new configuration gives an increased beam energy of 0.81 TeV per Tesla, rather than 0.77 as in the original 'Pink Book' Design Study, so that the required 7.7 TeV proton beams (15.4 TeV collision energy) can be guided using 9.5 Tesla fields instead of the 10 T originally foreseen. This increases the margin between operating and maximum fields and makes the design more comfortable.

Progress with model and prototype magnets is promising. Short (1-metre) models have attained 10 Tesla or thereabouts, and important progress has been made in understanding where and why quenches occur. A 'full length' (according to the original design) 10-metre prototype has been put through its paces at the French Saclay Laboratory. This dipole has a full LHC configuration, with twin beam apertures inside a single magnetic assembly (the 'two-in-one' design), but to obtain an initial rapid result uses the same coils as the HERA superconducting proton ring at DESY, Hamburg, which have a bore of 75mm instead of the 50mm of the LHC design.

Cooled to 4.4K, these coils behave like those in HERA, but when taken down to the 1.9K levels foreseen for LHC cryogenics, the current increases from 6600 to 9500 A, and after only a few quenches, demonstrating that the two-in-one design does not adversely affect performance. The field reached was 8.3 Tesla.

Five 10-metre dipoles of this design, with real LHC coils, have been ordered. Four of these will be used next year for an above-ground 'string test' of the LHC magnet lattice which is seen as an important milestone.

However to study closely the behaviour in the 10 T region, more one-metre models and ten-metre prototypes are being built to explore other design alternatives, such as separate collars for the two beam channels to reduce mechanical stresses.



The first 10-metre prototype LHC magnet has performed well in cryogenic tests at the French Saclay Laboratory. After 6600 A currents at 4.4K, the current increased to 9500 A with the coils cooled down to the 1.9K levels foreseen for LHC working, and after only a few quenches, demonstrating that the two-in-one design does not adversely affect performance. The field reached was 8.3 Tesla.

(Photo Saclay)

Wire chambers

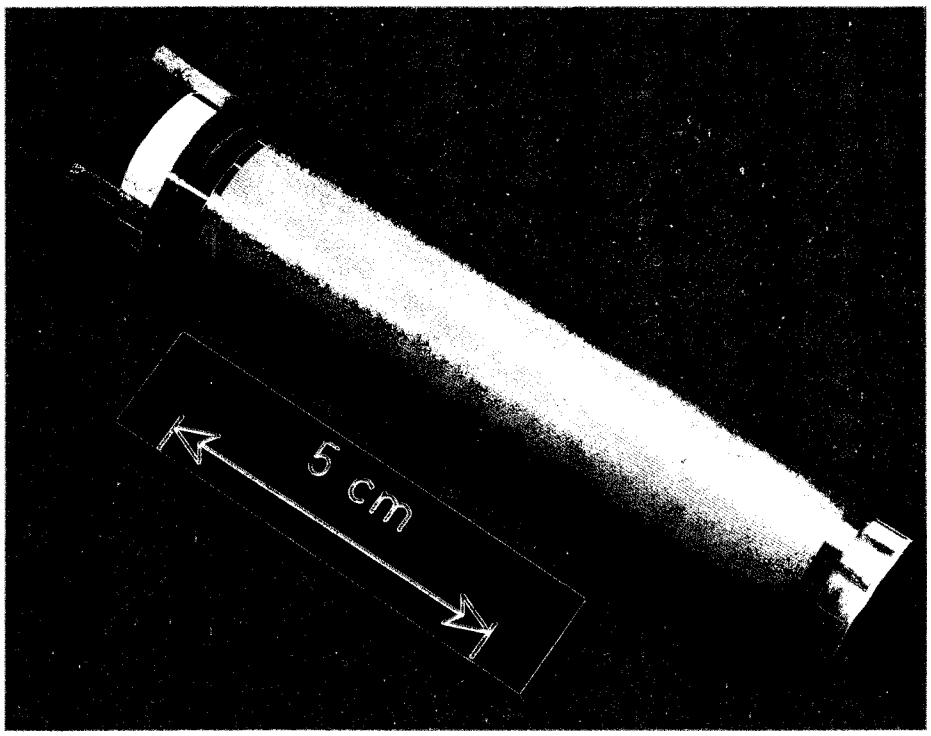
Trends and alternatives

The subtitle of this year's Vienna Wire Chamber Conference - 'Recent Trends and Alternative Techniques' - signalled that it covered a wide range of science and technology. While an opening Vienna talk by wire chamber pioneer Georges Charpak many years ago began 'Les funérailles des chambres à fils (the burial of wire chambers)', the contrary feeling this year was that wire chambers are very much alive!

At this year's conference, D. Imre began his summary talk by pointing out that although probably none of the participants had been born when the first (single) wire chamber came into operation in the 1920s, and that the meeting was attended by many young scientists who were born after the multiwire proportional chamber era began in the late 1960s, we are only just about beginning to really understand the fundamental aspects of gaseous detectors. Wire chambers are still essential in many particle detector domains and are enjoying a certain renaissance in the development work for the forthcoming SSC and LHC generation of big proton colliders.

Alternatives to wire chambers were reported mostly in the field of calorimetry, where T. Virdee reported on the impressive progress with warm and cold liquid calorimetry, mainly for electromagnetic calorimetry.

The field of semiconductor detectors was covered in an invited talk by R. Horisberger. The large variety of designs - strip detectors, pad detectors (both single and double-sided), drift detectors and pixel detectors - is remarkable. The future integration of front-end electronics (not only preamplifiers but some signal processing as well) will cope with the very high data rates expected at SSC and LHC, as long as the necessary radiation hardness and reliability is achieved. The limiting factor in precision will lie in the support structures, alignment and overall monitoring, although great progress has been made in these fields as well. Alternatives for wire chambers also emerge from work on fibre detectors.



Microstrip gas chambers are a promising new detector development, offering good spatial resolution, and avoiding the instabilities which occur when the wires in conventional chamber designs are crammed together, and could go on to play a major role in the next generation of high energy collider experiments. The model shown here was developed at CERN to explore the possibility of mounting microstrips on a curved plastic substrate.

(Photo CERN IT 34.7.91)

Software methods were reviewed in a enlightening talk by G. Kellner, starting with an overview of the SSC/LHC challenge. He not only pointed out the aspects of extracting the rare signatures of interesting physics events from a very high background - like looking for a needle in a haystack - but also gave very important advice on aspects of professional management in software development, crucial for ongoing applications.

The first afternoon of the five-day conference is traditionally devoted to the application of wire chambers outside high energy physics. After an introduction by F. Sauli, the progress in precision and reliability of wire chambers in medical diagnostics (X-ray imaging devices), in Positron Emission Tomography (PET) in vivo, in solid-state physics and in cosmic ray studies was presented. Ring Imaging Cherenkov (RICH) detectors are now operational even for experiments in high altitude balloon flights.

Since Time Projection Chambers are now standard, and as large Transition Radiation Detectors are now well understood, the remainder of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this report concentrates on the increasing fundamental understanding of wire chambers and on novel detectors.

Great progress in the fundamental understanding of gaseous detectors has resulted from improved application of transport equations using the angular dependence of electron interactions with gas molecules, a more precise calculation of the Townsend coefficient as a function of the reduced electric field, and an impressive convergence of simulations and time development of chamber pulses.

Extensive chemical studies have led to a better theoretical understanding of aging, while wire breakage is also understood far better now. Attention to many sophisticated details will allow wire chambers to be used in the high energy domain as well as in particle 'factories'.

Special emphasis was put on gas studies for several purposes - breakdown studies in new combined detectors (see below), achieving desirable properties like low multiple scattering (helium), high density gases for photon detection (xenon) or fast gases with low diffusion (CF_4).

Microstrip Gas Chambers (MGC) look very promising. Detectors with two-dimensional or pixel readout (including ring structures) have been built on thin quartz layers of only 200 microns, and first MGC results from a full scale high energy experiment (NA 12 -'GAMS'- at CERN) were impressive: relative energy resolution 10% at 5.9 keV, and spatial resolution of 30 microns. Various plastic and resistive glass supports were tested to overcome the instability of gain due to space-charge effects. First progress was also reported in managing the ageing problem.

Coordinate gaseous detectors with solid photocathodes may significantly change detection techniques (V. Peskov). The report of T. Ypsilantis on gas detectors combined with a cesium iodide reflecting photodiode was also notable. This detector is fast, compact, has small quantum fluctuations and, last but not least, is quite cheap. Significant progress may be expected in realistic experimental environments before the next Wire Chamber Conference in 1995.

The field of electronics has seen substantial progress in building trigger and readout electronics. The increased computing capacity by new applications-specific (ASIC) chips and field programmable gate arrays (FPGA) will lead to better handling of data streams from the LHC and SSC experiments.

Application of logic cell arrays in the H1 experiment at DESY demonstrates new possibilities. The logic functions can be changed by software to adopt the best algorithm, to run calibration measurements, to get raw data from selected stages of the readout or trigger chain and to test parts of the system online without any additional hardware.

Many suggestions were made to conference organizers W. Bartl, G. Neuhofer, A. Taurok and M. Regler (Institute of High Energy Physics of the Austrian Academy of Sciences) on how the conference should develop in the future. They ranged from a general instrumentation conference via a fundamentalist meeting (gas studies, ageing, etc.) to a meeting covering a selected few topics. The inclusion of semiconductor detectors was proposed.

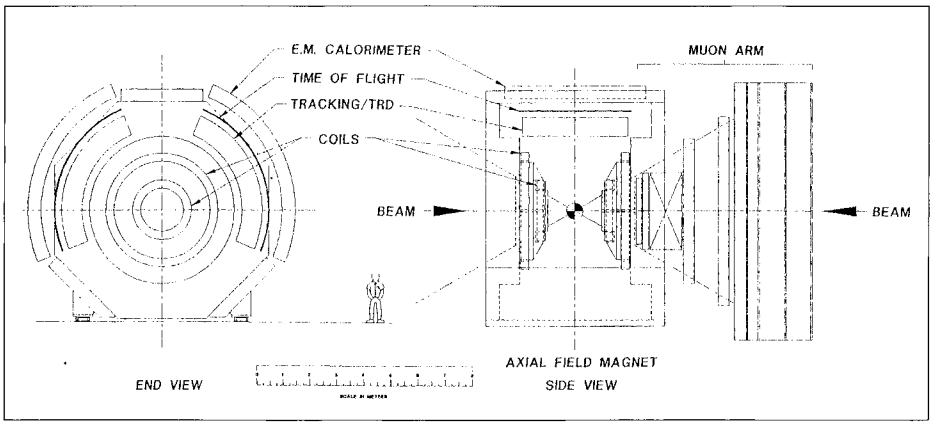
On the industrial front, the current economic recession has been felt, although there was a wide attendance at Vienna of scientists from Eastern Central Europe, representing a region undergoing a complete economic upheaval.

An unofficial peripheral topic was the reorganization of scientific collaborations in the region, including discussions on an international research centre for Central Europe (AUSTRON - December 1991, page 16). Another was a memorable Mozart concert given by the Vienna Chamber Orchestra in the Auersperg Palace, where Mozart himself had once conducted, long before the era of even single-wire chambers.

From Meinhard Regler

Around the Laboratories

Layout of the PHENIX detector for Brookhaven's RHIC heavy ion collider, with an axial field magnet.



BROOKHAVEN PHENIX arises

At its February meeting, Brookhaven's High Energy and Nuclear Physics Program Advisory Committee reviewed the status of the PHENIX (Photon Hadron Electron Nuclear Interaction eXperiment) proposal for the RHIC heavy ion collider.

The committee was pleased with the progress made by the collaboration and approved the preparation of a formal proposal. It is anticipated that a preliminary conceptual design report will be available for review at the September Committee meeting. This action puts PHENIX on an equal footing with the other major RHIC experiment, STAR (Solenoidal Tracking At RHIC, November 1991, page 17).

As a complement to STAR, PHENIX will focus specifically on electromagnetic signals and should be able to exploit the highest RHIC luminosities. It uses an axial field magnet and two central electron/photon/hadron spectrometers each covering 90 degrees in azimuth, where a range of detector options is being kept open. Muons would be intercepted in a forward detector arm.

The Committee also recommended that two groups which presented letters of intent for smaller experiments proceed to the preparation of proposals. A Brookhaven/Strasbourg/Beijing/NYU/Texas A&M/SSL-Berkeley collaboration will develop a Forward Angle and a Midrapidity Hadron Spectrometer; and a Brookhaven/Iowa State/INP (Krakow)/Jagellonian University (Krakow)/MIT/Illinois (Chicago)/Maryland/Wayne State collaboration will develop PHOBOS, a study of very low transverse momentum phenomena.

SACLAY Eta mesons at Saturne

Using a nuclear reaction, the new tagged eta meson facility now operating at the French Saturne National Laboratory in Saclay produces eta mesons (together with recoil helium-3 nuclei) by proton bombardment of a deuterium target. The proton beam is extracted from the Saturne synchrotron at 893 MeV, stabilized to 80 keV. This is a scant 1.5 MeV above the reaction threshold and close to the energy where eta production peaks.

The etas come out nearly monochromatic and in a narrow cone around the beam direction, facilitating the design of the eta decay detector. The recoil helium-3 emerges around the beam direction and signals the production of the eta.

The helium-3 is detected by the SPES II spectrometer which separates the ions from the unused incident proton beam. SPES II has had a distinguished career including a six year stint at CERN for investigations of hypernuclear and antiproton physics.

Previous work on eta decay has been carried out mainly using production by negative pions on protons at an incident pion energies well above threshold so the etas are not monochromatic. Tagging with the accompanying neutrons is not an easy task.

The new eta facility provides a 92% pure eta source and yields routinely 10^8 tagged etas per day. The possibility of a 50-fold increase of this yield has been demonstrated, although this is accompanied by a high hadronic background from the production target (the short-lived etas decay before they can leave the production target).

With the new facility, sensitive searches for rare and forbidden decays become possible. As a first experiment, a major international collaboration has made a convincing measurement of the branching ratio for the rare eta decays into two charged muons, about 5×10^{-6}. This preliminary result is close to the minimum (unitarity limit) calculated for this electromagnetic process, and is in agreement with most models.

In this first experiment at the Saclay eta facility, new upper limits were also obtained on some rare and for-

36 *Circle advertisement number on reader service form*

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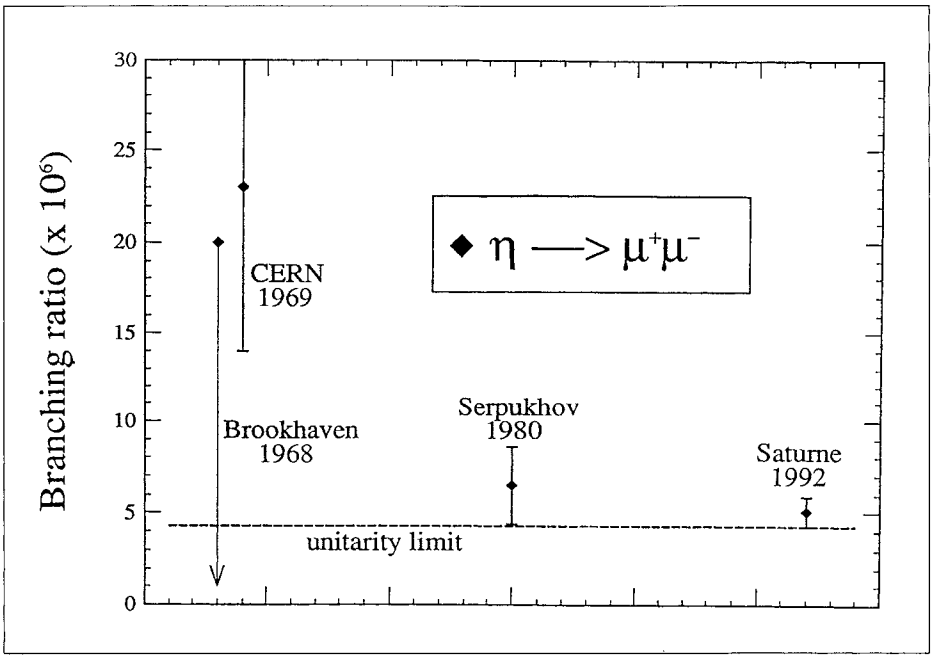
New limits on the branching ratio for the rare decay of an eta meson into a muon of charged muons measured at the French National Saturne Laboratory's new eta decay facility.



bidden eta decays, such as the muon-electron channel, which are a modest improvement over existing upper limits.

Plans are being made, though not yet funded, for a novel large acceptance spectrometer to measure many of the known and unknown eta decays to a level of 10^{-8} - 10^{-9}. For instance etas going to a neutral pion and a pair of muons or electrons test charge conjugation invariance at the level of a one-photon intermediate state; etas decaying into electron-positron pairs are an (indirect) test of the existence of leptoquarks, and eta going to a muon and an electron tests lepton family violation.

The eta factory also makes possible new and detailed measurements of the eta electromagnetic transition form factor in the decay of etas into muon pairs plus a photon, and can probe perturbation theory in measurements of eta going to a neutral pion and two photons.

Artificial intelligence

A vivid example of the growing need for frontier physics experiments to make use of frontier technology is in the field of artificial intelligence and related themes. This was reflected in the second international workshop on 'Software Engineering, Artificial Intelligence and Expert Systems in High Energy and Nuclear Physics' which took place from 13-18 January at France Telecom's Agelonde site at La Londe des Maures, Provence. It was the second in a series, the first having been held at Lyon in 1990.

Four closely related sectors were covered - software engineering, expert systems, neural networks and symbolic manipulation techniques.

The magnitude and complexity of the experiments on the horizon for the end of the century clearly calls for the application of artificial intelligence techniques. However there are common problems in different areas (high energy, nuclear and plasma physics, space, telecommunications,...), and solutions are sought through research-industry collaboration in an international collaboration framework.

From an identification of the real needs of fundamental research using large installations, this approach leads on one hand to the development of new products or techniques which will find a place in industry, and on the other to improved artificial intelligence methods.

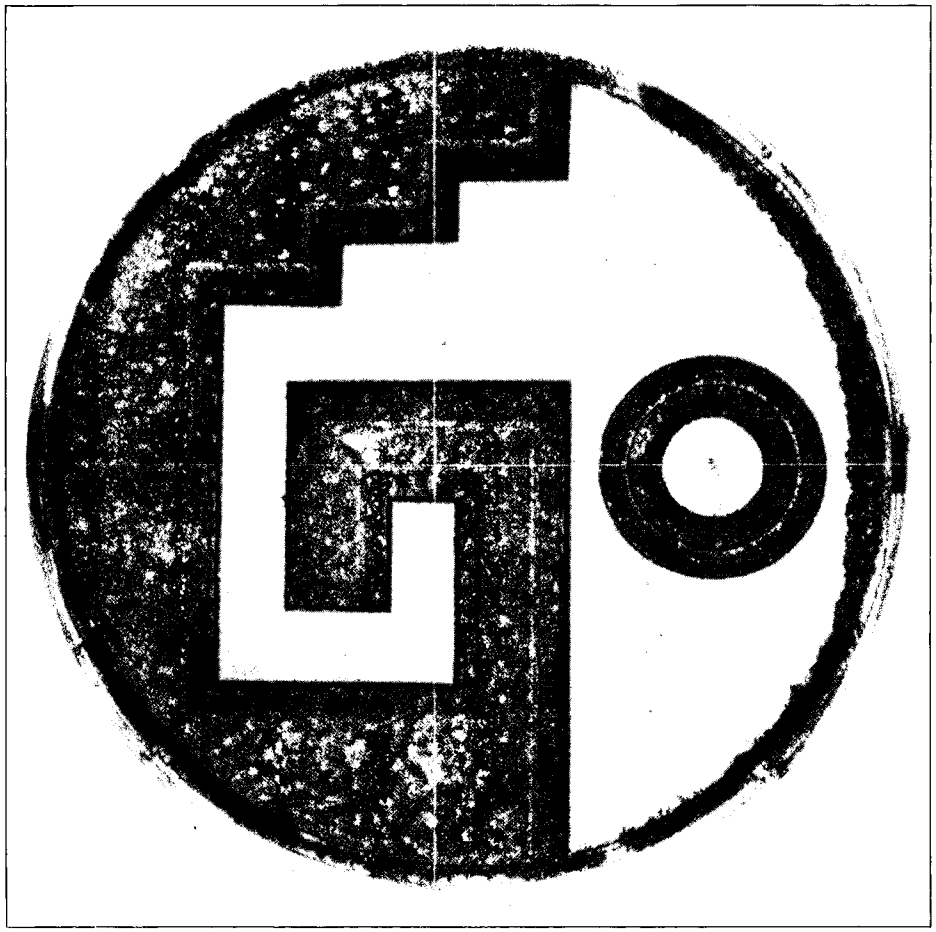
Many experts from outside particle physics took part in the workshop, including several having made pioneer contributions to the field. Coursework covered the logic of the method components of software engineering, object-oriented languages (EIFFEL), and applications using a variety of languages.

An introduction to artificial intelligence and expert systems was followed by a description of the PROLOG III language, the possibilities for genetic algorithms, and the use of neural networks for pattern recognition, together with their application in high energy physics.

Plenary sessions summarized three days of parallel streams, including several ongoing physics projects. Relations with industry play an important role. The programme continued with results and ongoing projects in neural network applications in particle physics and related sectors.

Symbolic manipulation techniques allow algebraic evaluation of measurable quantities to be introduced into computing, avoiding the otherwise tiresome and onerous aspects of precision calculations using numerical methods, notably in Feynman diagrams and accelerator parameters. MAPLE, REDUCE, FORM, SCHOONSCHIP and ASHMEDAI were among the codes described.

The 'ASTEC' symbol adopted by the community pushing for increased use of artificial intelligence techniques in particle physics.



Several industrial concerns, notably France-Telecom and France's National Centre for Telecommunications, contributed presentations and exhibits. A Numeris link allowed applications work.

A major outcome was the setting up of working groups (under the acronym ASTEC) covering four major themes:

1 - to establish and maintain world contacts between groups working on all subjects and to help integrate small units in larger projects;

2 - to organize relations with industry and other research areas through common projects;

3 - to contribute to the education in new techniques;

4 - to develop ideas for software standardization and interface protocols between different applications.

LISTSERV servers are installed at CERNVM (ASTEC at CERNVM) for information exchange between these groups and to reach out to the high energy and nuclear physics communities at large. A 'White Book' summarizing the results of this work will be published after the next workshop in the series, to be held in Germany in fall 1993.

The proceedings of the 1992 meeting will be published by World Scientific. Held under the auspices of the European Physical Society, CNET (the French centre for telecommunications studies), the French Atomic Energy Commission, the Ministry of Research and Technology, the Ministry of Foreign Affairs, and LAPP (Annecy), more than 250 participants from 18 countries took part.

From D. Perret-Gallix

KEK Deuterons

At the end of January, the 12 GeV Proton Synchrotron (PS) at the Japanese KEK Laboratory successfully accelerated deuterons to 11.2 GeV (5.6 GeV/nucleon), the limiting energy for deuterons with this ring. Beam intensity in this test exceeded 3×10^{11} particles per pulse.

With PS protons and with electrons and positrons for the TRISTAN collider, the advent of deuterons adds another important option to the KEK beam menu.

Since its completion in 1976, the KEK PS has been continuously improved, supplying proton beams for a variety of experiments. When many KEK high energy physics users were attracted to the TRISTAN project in the mid-80s, the PS experimental program underwent a transition and nowadays covers a wide field of research, including particle, hadron, nuclear and atomic physics as well as nuclear chemistry. Hence a recent request for a high energy deuteron beam.

The KEK PS chain consists of a 750 keV Cockcroft-Walton preaccelerator, a 40 MeV Alvarez linac and a 500 MeV booster synchrotron feeding the 12 GeV main ring. Extra beam from the booster is used for neutron scattering and muon science as well as for cancer therapy.

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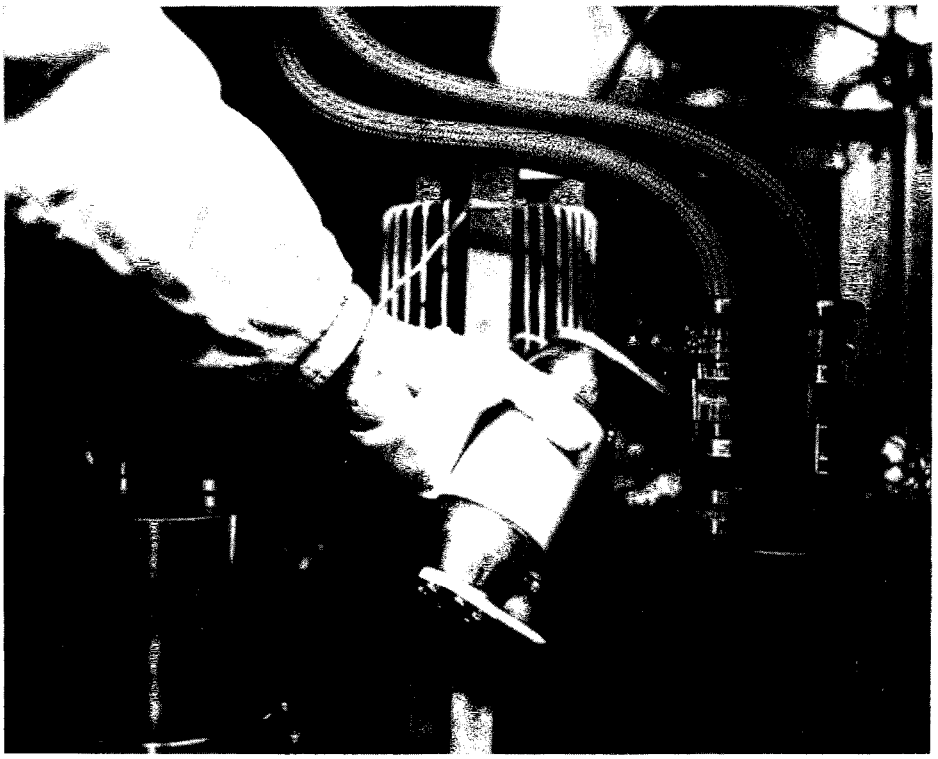
A vacuum capacitor being installed at the 12 GeV proton synchrotron at the Japanese KEK Laboratory to widen the accelerating radiofrequency range. Together with other modifications, this resulted in successful acceleration of deuterons to 11.2 GeV.



To supply deuteron beams, several modifications had to be made in each PS section, the largest being for the radiofrequency systems. As acceleration in the linac takes place in every other r.f. cycle, the resulting deuteron velocity is just half that of the protons. Consequently the r.f frequency range in the booster and main ring had to be increased by 33 and 50 per cent respectively, achieved by attaching a vacuum capacitor to each accelerating gap and increasing the ferrite bias current for each cavity. To accommodate the increased bias current, power supplies were upgraded.

The successful deuteron test shows that the KEK PS can accelerate ions of charge-to-mass ratio 1/2, expanding experimental possibilities. Currently kaon decay experiments receive highest PS priority. For the future of the machine, several ideas have been aired, including a heavy ion collider of energies up to 7 GeV/nucleon, and a phi-factory.

Honouring Edoardo Amaldi in his hometown

As reported briefly last month, on 25 January Italian physicists gathered in Piacenza, accepting an invitation from the local authorities to honour the memory of distinguished physicist and CERN founding father Edoardo Amaldi who died on 5 December 1989. Attended by Ugo Amaldi and other members of the family, the event ended in Carpaneto, the village where Edoardo Amaldi was born in 1908, with the dedication of the local school and the unveiling of a bronze bust.

The meeting was attended by many Italian scientists and representatives of local and national authorities, together with high school students and members of the local community.

Nicola Cabibbo, giving a keynote speech 'Edoardo Amaldi, scientist and European citizen', retraced the many-faceted aspects of Edoardo Amaldi's life, stressing the variety and far-reaching results of his research, from early investigations on molecular and atomic physics, through fundamental work in Enrico Fermi's group on nuclear physics using neutron probes, subsequent nuclear studies with electrostatic accelerators, cosmic ray research, and experiments hunting for magnetic monopoles, to his activity in later years in developing gravitational-wave antennas.

These contributions to physics would be sufficient to ensure Edoardo Amaldi a place in physics

At the first CERN Council session in Paris, May 1952. Left to right - Pierre Auger, Edoardo Amaldi and Lew Kowarski. At the meeting, Amaldi was named Secretary-General of the provisional CERN organization.

history, but contemporary science owes him a great deal for his seminal and catalyst role in foreseeing the needs of advanced research and promoting and realizing the necessary scientific infrastructure, both at a national and international level.

In Italy he accepted the heavy burden of keeping physics research alive when politics and the Second World War emptied the Italian universities, and the physics renaissance of the early 1930s came to a sudden halt. At the end of the War he resisted the attraction of the big US Laboratories, choosing instead to crusade for the rebuilding of physics research in Italy, and in Europe in a spirit of supranational cooperation.

His efforts found response in eager European scientists and several years of vigorous and enthusiastic work led to the institution of CERN, and he acted as Secretary-General of the provisional Organization from 1952-4. He also played a key role in developing European cooperation for space research, which went on to become the European Space Agency. In Italy he promoted, with Gilberto Bernardini, the establishment of the Istituto Nazionale di Fisica Nucleare, INFN, for national research in nuclear and subnuclear physics.

The ceremony in Piacenza continued with the presentation of the book 'Edoardo Amaldi, scienziato e cittadino d'Europa' (Leonardo, Rome) consisting of a biography by Carlo Rubbia for the Biographical Memoirs of the UK Royal Society (the English version has appeared as CERN Report 91-09), and the reprint of a comprehensive interview by leading Italian science writer Piero Angela, together with an introduction by Giorgio Salvini.

Presenting the book, Salvini underlined the spirit which characterized all Amaldi's activities and which remains an important guideline for all scientists - a precise sense of moral duty to enforce truth in all contexts. In particular Salvini, quoting from the book, stressed Edoardo Amaldi's political activity in pursuit of strengthening Italian science and technology, and his awareness and contributions to nuclear and global disarmament, first in the framework of the Pugwash Conferences (after the Russell-Einstein Manifesto) and later with his own and W.K.H. Panofsky's initiative to involve National Academies in studying the technical aspects of practical nuclear disarmament, in particular the disposal of nuclear warheads. This programme is continuing with annual meetings to be held in various countries under the name 'Amaldi Conferences'.

Edoardo Amaldi felt it was his duty as a scientist to help political leaders and opinion makers understand the implications of highly advanced technologies, with their promise of economic and social benefits on one hand, but with the dangers of their misuse on the other, demanding strict but nevertheless rational and dispassionate control.

Piero Angela complemented the presentation with observations of more personal nature on the style and the human character of Amaldi, his strong feelings and his attention to the problems of humanity.

The event, in a spirit Edoardo Amaldi himself would have appreciated, was also an occasion for the presentation of a concrete programme of activities, planned by a new institution bearing his name. Fernando Amman, chairman of its Scientific Committee, described the promotion of Piacenza agriculture and economy, with particular emphasis on cooperation with East European countries; international meetings on themes of science and technology and their economic and environmental impact; the founding of the 'Amaldi Lectures' by leading international scientists, and the collection and publication of all Amaldi's historical papers.

From Alessandro Pascolini

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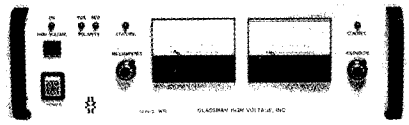

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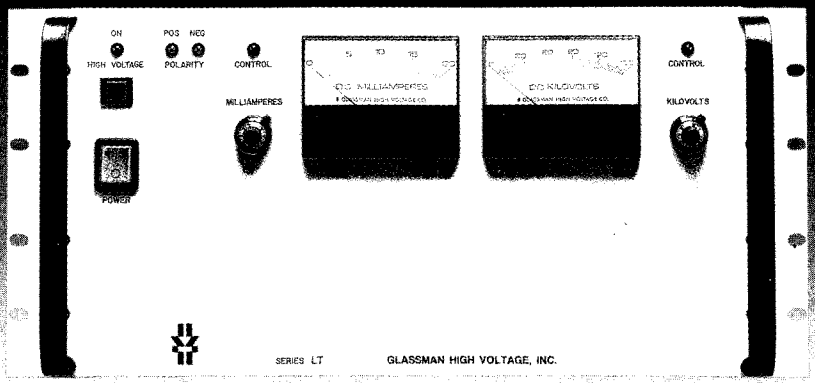

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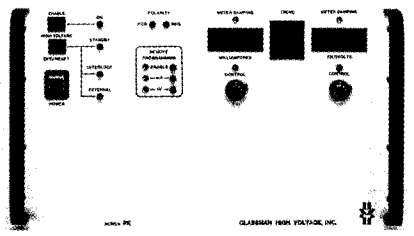

Series PK regulated high voltage power supplies cover DC output ranges from 0 to 3 kV through 0 to 500 kV with 4, 8, 12, or 15 kW maximum power. For models up to 125 kV, the power supplies are totally enclosed in a 19-inch rack; above 125 kV, the high voltage multipliers are housed in an open stack. Models are available with positive, negative, or reversible polarity.

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Local operation is simplified by the use of dual voltage and current digital panel meters, with selectable damping, and dual bargraph analog displays, together with full status indicators. External monitoring/control and an intelligent interlock system are standard.
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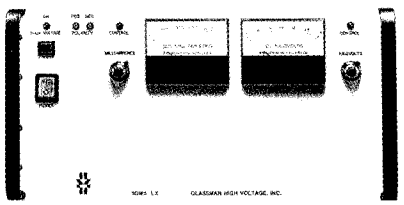

DC SUPPLY TO 125 kV...
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Glassman High Voltage

86 *Circle advertisement number on reader service form*

People and things

On people

Magda Ericson of the Université de Lyon I receives the Alexander von Humboldt award for her outstanding contributions to intermediate energy physics.

Don Perkins of Oxford, and a former Chairman of CERN's Scientific Policy Committee, receives the Holweck Prize awarded jointly by the UK Institute of Physics and the Société française de physique. It recognizes his many important contributions, notably the earliest (1947) sighting of a cosmic ray pion interaction, and, much later, his incisive contributions to the interpretation of high energy neutrino scattering data.

US B factory plans

Plans for high intensity electron-positron collider rings to manufacture B particles at the Stanford Linear Accelerator Center (SLAC - June 1991, page 8) and Cornell (July 1991, page 8) have encountered budget restrictions from the respective US funding agencies (Department of Energy and the National Science Foundation).

Meanwhile Cornell's CESR electron-positron ring continues to push for high luminosity (collision rate) and could eventually allow a glimpse of CP violation with B particle decays, although not nearly as much as the full CESR-B proposal with its asymmetric (unequal energy) storage rings.

If no new money is available, the idea at SLAC is to go for a 'zero-budget' B physics solution, slicing money CERN-style from the normal operating budget to build a twin ring asymmetric energy electron-positron collider in the existing 2.2 kilometre PEP tunnel.

Magda Ericson - Humboldt Award

Chalk River superconducting cyclotron fully commissioned

The TASCC superconducting cyclotron at the Canadian Chalk River Laboratory, which supplied its first beams back in 1985, has now accelerated uranium-238 ions to 3 MeV per nucleon. Eventually these ions will be taken to 10 MeV per nucleon. TASCC beams now cover almost the whole Periodic Table, from carbon to uranium.

46-46

The Massachusetts Institute of Technology (MIT) Laboratory for Nuclear Science celebrates in May its 46th anniversary. Why 46? Founded in 1946, this gives a symmetric 46-46 event. The programme extends from 'The Beginnings' (Victor Weisskopf) to 'The Future' (Steven Weinberg and Jerome Friedman), while Murray Gell-Mann gives a lunchtime diversion with 'Recording Bird Songs in the Himalayas'.

Don Perkins - Holweck Prize

Emilio Zavattini 65

Now passing a long career milestone is imaginative CERN experimentalist Emilio Zavattini. After studies in Rome and initial research work in cosmic rays at Testa Grigia, he came to CERN in 1955, joining the cosmic ray cloud chamber project before moving to early accelerator experiments. After two years working at Columbia's Nevis synchro-cyclotron with Leon Lederman on muon capture and muonic atoms, he returned to CERN to help initiate a long and remarkable series of such experiments using characteristically ingenious instrumentation and techniques. Several times this has resulted in valuable new limits of precision.

He has also contributed to several major hadronic physics experiments, and worked with Lederman in muon pair studies at Brookhaven. Recently he has turned his attention to preci-

At the 'Finland at CERN' industry exhibition on 30 March, left to right; CERN's Communication and Public Education Group Leader Hannu I. Miettinen, Finnish Ambassador Antti Hynninen, and Juha Nummela from Tumo of Turku. Behind them is CERN's flowering magnolia with a dusting of unseasonal late spring snow.

Horst Nesemann of DESY in front of a new wiggler magnet at the DORIS III electron-positron ring at the Hamburg Laboratory, now very much oriented towards synchrotron radiation research (July/August 1991, page 10). The new 'Wiggler Lab' was officially inaugurated on 6 February.

(Photo Petra Harms)

sion quantum electrodynamics, using a clever method to look for vacuum birefringence in a magnetic field, and to particle searches by looking for their effect on light in a magnetic field.

1992 SLAC Summer Institute

The twentieth annual SLAC Summer Institute will be held from 13-24 July at the Stanford Linear Accelerator Center. This year's topic, The Third Family and the Physics of Flavour, covers the experimental problems in identifying and studying the heavy quarks, the phenomenology of CP violation, and the possible origin of flavor. The Institute is arranged in two separate sessions - a seven-day school followed by a three-day topical conference. The final day of the topical conference includes a symposium on the tau particle and its impact on high energy physics. Registration requests to Jane Hawthorne, SSI Coordinator, SLAC, PO Box 4349, MS 62, Stanford, California 94309; e-mail (bitnet) SSI at SLACVM; fax (415) 926-3587.

Meetings

The III International Conference on Calorimetry in High Energy Physics will be held from 29 September-2 October in Corpus Christi, Texas. Further information from: INTERCAL @SSCVX1

The 13th International Magnet Technology Conference will be held from 20-24 September 1993 in Victoria, British Columbia, Canada, hosted by TRIUMF. Further information from P.A. Reeve, phone (604) 721-7725, fax (604) 721-7715, e-mail reeve at uvphys.bitnet

Meson factories

A new book 'The Meson Factories' by Torleif Ericson (CERN), Vernon Hughes (Yale) and Darragh Nagle (Los Alamos) in the Los Alamos Series in Basic and Applied Sciences published by the University of California Press (ISBN 0-520-07549-8) is a suitably introduced collection of reprints on the physics, accelerators, instrumentation and applications of meson factories, understood as high intensity proton machines in the 0.5-1 GeV range producing a wide range of secondary beams.

As well as physics, these machines have made a significant impact in other areas, notably beam therapy for cancer. The side-coupled technique developed at Los Alamos is now used in about 2000 specially-built clinical machine worldwide, a market valued at a billion dollars and estimated to have handled 10 million cancer cases. Similar machines are also used for non-destructive testing of rocket and jet motor components.

CERN Courier index

The index for Volume 31 (1991) of the CERN Courier is now available from Petra Pamblanco, DG Division, CERN, 1211 Geneva 23, Switzerland, fax +41 22 782 1906, e-mail petra_pamblanco at macmail.cern.ch. Please specify whether you require an English or French index.

Satio Hayakawa 1923–92

P.K. Malhotra (front row, left), with colleagues Atul Gurtu (centre) and Tariq Aziz from Bombay's Tata Institute, at the opening of the 'Towards the LHC Experimental Programme' meeting at Evian, France, on 5 March. He died two days later.

(Photo CERN HI 12.3.92)

Satio Hayakawà 1923-92

Doyen of Japanese physics Satio Hayakawa died on 5 February, aged 68. A life-long leader in various fields of physics, his talents and interests extended from cosmic rays, particle physics and nuclear physics to cosmology. He was continually opening new physics frontiers, each time characteristically organizing a new research group.

After graduation from Tokyo, his research career began after World War II, working under Tomonaga on cosmic rays. He quickly moved to the forefront of Japanese cosmic ray and particle physics, becoming a valued collaborator of Yukawa, Tomonaga and Sakata. At 29 he was named first full professor of the Institute of Fundamental Physics newly established at Kyoto, and six years later moved for good to Nagoya, where he eventually became the University's President.

While working on cosmic rays, meson theory and nuclear reactions as a theorist, he also created experimental high energy physics and nuclear physics groups. Many distinguished experimentalists began their careers under his guidance. He was also a driving force behind the ultimate establishment of Japanese KEK Laboratory (where he served on the Board of Counsellors) and other national research institutes. A plasma physics pioneer, he was a founder of Nagoya's Institute of Plasma Physics.

His deep knowledge of nuclear physics was quickly applied to astrophysics, resulting in important initial studies of stellar life-cycles. He then turned to the new field of X-ray astronomy, where he promoted satellite programmes, again making many distinguished contributions. The latest example of his continual activity was to push for more research on gravitational waves, where he did not live to see the outcome.

Hayakawa was an all-round scientist, for whom theory and experiment were inseparable. He was also a staunch advocate of international collaboration in space research and high energy physics. He served as the chairman of the IUPAP Commission on Astrophysics.

Prince Kumar Malhotra (1935-1992)

As mentioned briefly in the April issue, Prince Kumar Malhotra, Senior Professor at Bombay's Tata Institute of Fundamental Research, died on 7 March while attending the 'Towards the LHC Experimental Programme' meeting at Evian-les-Bains, France, on 7 March. 56 years old, he was a nationally and internationally ac-

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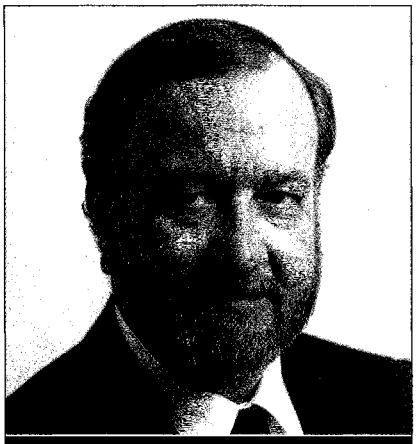

Dr. Glenn F. Knoll, holds a Master's degree from Stanford University and a Doctorate in Nuclear Engineering from the University of Michigan.

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Further information and a position description:
Dr S. N. Tovey, (613) 344 5086, e-mail tovey@rchep.ph.unimelb.edu.au,
or Dr G. N. Taylor (613) 344 5456, e-mail taylor@rchep.ph.unimelb.edu.au,
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Applicants should be willing to participate in the supervision of honours as well as postgraduate students. A genuine interest in the undergraduate teaching program is essential and evidence of success in teaching English may be required. These positions will be available from 1 January 1993.

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Applications should be sent, in duplicate, quoting three referees (including facsimile numbers) to the Director, Personnel Services, The University of Melbourne, Parkville, Victoria, 3052, Australia, by 30 June 1992.

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The Department of Radiation Sciences, Uppsala University, invites applications for this post by June 1, 1992. The successful candidate will be expected to participate in experimental and/or theoretical research in elementary particle physics. The teaching obligations will be limited during the first six years to approximately one course (100 hours) annually. After six years the amount of teaching will be negotiable.Uppsala University has a vigorous activity in experimental and theoretical research in the most advanced topics of particle physics. There are groups working at CERN in LEP, on LHC planning, and in the NMC/SMC experiment. In house, there is a research program at the local accelerator CELSIUS, where rare meson decays will be measured. The detector, WASA, is near completion. A new laboratory for detector research for LHC and WASA is being planned.
Sweden is participating in the planning of a neutrino telescope. Uppsala is involved in astroparticle theory and the telescope prototype design. Other theoretical activities include the phenomenology of the standard model and beyond, the early universe, and more formal subjects as well. At present thirty scientists and graduate students are working in these projects. The lectureship is open to any candidate in the fields mentioned above. The application should be directed to the Rector of Uppsala University, at the following address :The Registrar's Office, Uppsala University, Box 256, S-751 21 Uppsala, Sweden.It should contain a) curriculum vitae, b) written account of research and teaching activities with special emphasis on items which are judged important for this post, c) certified list of degrees, d) list of publications and e) other documents that the applicant wants to submit. Reprints of ten (considered the most important) published scientific articles should be submitted at the latest on June 21. More information can be obtained by contacting **Professor Gunnar Tibell at the Department of Radiation Sciences, Box 535, S-751 21 Uppsala, Sweden:telephone +46-18-18 38 49 or fax +46-18 38 33.**

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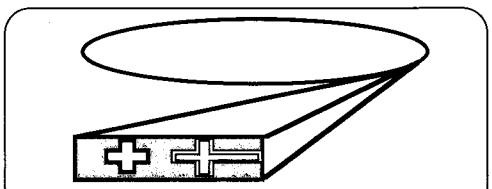
Dekan des Fachbereiches Physik der Universität Dortmund, Postfach 50 05 00, 4600 Dortmund 50, Tel. (0231) 755 - 3501.



The Swiss-Norwegian Beam Line

The Swiss Norwegian Beam Line Project is an international scientific collaboration between Switzerland and Norway, whose aim is the design, construction and operation of a Synchrotron Radiation Beam Line at the European Synchrotron Radiation facility in Grenoble, France. The beamline will serve the needs of a wide community of scientists, who will carry out experiments in physics, materials science and molecular biology. The project is now recruiting a

Beamline Technician

who will be responsible for the assembly and testing of the beamline. He/she will, at first, assist the Project Engineer in the design and specification of beamline equipment, supervise the work of short-term contract mechanical and electrical staff employed on the project, and in 1994 assist Project and Visiting Scientists with their experiments. The ideal candidate should have some experience in the field of vacuum technology, and should also be familiar with precision mechanics and control systems.

The position will be offered initially for a three-year period; by mutual agreement it can then be converted into a permanent position. Although the final construction and operation of the beamline will take place in France (Grenoble is ~2 hrs from Geneva), much of the initial design and assembly work will be carried out in England. The candidate would therefore be required to spend up to a year in England and then move on to France. The working languages of the project are both English and French. The starting salary for the position will be SFr 55'000 per year. Starting date is negotiable. Interested applicants should contact by **1 June 1992** at the latest:

Prof H-P Weber, Inst. de Cristallographie, Section de Physique, Université de Lausanne, CH-1015 Lausanne, Switzerland. Tel: (+41) 21 692 2354

claimed experimental physicist for his invaluable research in high energy physics and cosmic rays.

Joining the Tata Institute in 1956, his early work on cosmic ray jets and his formulation of the dependence of multiplicity on energy, known in the literature as the 'Malhotra-Wroblewski' relation, brought his name to the fore. He played a leading role in setting up the Tata Experimental High Energy Physics group, leading initially to bubble chamber studies in collaboration with CERN and research centres in India, Japan, Europe and the USA. In 1983 the group under his able leadership joined the L3 collaboration to study electron-positron collisions at the LEP ring then being built at CERN, fabricating more than 1000 proportional chambers. He was the moving spirit behind this effort.

He also organized bubble chamber analysis in several Indian Universities - Jammu, Chandigarh, Banaras and Delhi. He was well known at CERN, having worked there from 1975-6 and from 1989-90, and in the US, where he worked at Northwestern from 1965-7 and Fermilab from 1981-2. He was a member of the IUPAP commission on Particles and Fields from 1981-7. He was elected Fellow of the Indian Academy of Sciences in 1985 and Fellow of the Indian National Science Academy in 1986. His quiet charm won him many friends all over the world.

Yves Rocard 1903-1992

Yves Rocard, former Director of the Physics Laboratory of the Ecole normale supérieure, Paris, died on 16 March, aged 89. Outside a restricted circle of physicists he was better known as the father of former French Prime Minister Michel Rocard.

Notable contributions in physics included being the first, according to Markus Fierz, to relate critical opalescence to a correlation length becoming infinite, and pioneer studies in vibration phenomena and radio-electricity, not to speak of his military-oriented research. In addition he was a driving force behind the post-war renaissance of French physics as director of the Physics Laboratory of the Ecole normale from 1945 to 1970. This laboratory previously concentrated on optics - a subject brilliantly pursued by Alfred Kastler and Jean Brossel - and followed a tradition of physicists remaining in their ivory towers.

Yves Rocard opened up the laboratory and started many new activities, in particular a radio astronomy group which went on to become autonomous and famous, and a solid-state physics group under Pierre Aigrain, a Navy officer more at ease at Bell Labs than on an aircraft carrier. Among the students in this group was Pierre-Gilles De Gennes, who went on to become the 1991 Nobel Physics Laureate.

For particle physics, Yves Rocard invited Maurice Lévy to set up a theory group whose members (or their descendants) still play an important role in Ecole normale, Orsay, Paris VI and VII, Bordeaux, Marseille, Montpellier, Nice, and CERN. Yves Rocard and Maurice Lévy invited Hans Von Halban to create a high energy experimental physics group which later became LAL, the Laboratoire de l'Accélérateur linéaire in Orsay, whose considerable achievements include one visible to any visitor at CERN: LIL, the LEP preinjector.

Yves Rocard was also a supporter of the Les Houches Summer School and of its founder, Cecile Morette-DeWitt. Some of us had the pleasure of meeting him there a few years ago at the inauguration of a building financed by his Association. We did not know it was to be the last meeting.

André Martin

B.W. 'Bill' Gamble 1919-1992

One of the colourful early pioneers of CERN, B.W. 'Bill' Gamble, died on 14 February. Arriving at CERN in 1954 as acting head of Personnel, he played a major role in shaping the fledgling Organization. With the move to the Meyrin site, he became Head of General Services, where his highly developed organizational abilities were continually in demand. In particular he ensured the success of the early major scientific meetings on the site with their unique atmosphere, and set the pattern for the site security service which went on to achieve an impressive reputation. He thrived on challenge and responsibility and epitomized the early CERN spirit of enthusiasm. After a series of key administrative positions, he retired from the Laboratory in 1984.

M.A.B. Beg

The gifted Pakistani theorist M.A.B. (Baqi) Beg of Rockefeller, who died on 30 January 1990 at the age of 55, had been scheduled to speak at a meeting at Quaid-i-Azam University, Islamabad, that March. This was instead dedicated to his memory. The proceedings of this meeting, together with some additional papers, are now published by World Scientific (M.A.B. Beg, Memorial Volume, edited by Ahmed Ali of DESY and Pervez Hoodbhoy of Islamabad, ISBN 981-02-0714-X).

The book concludes with a fascinating paper, written by Beg just before he died, for the 70th birthday Festschrift for Luigi Radicati, giving a front seat view of the dramatic theoretical physics of the mid-1960s and Beg's own role in the development of classic SU(6) results.

EPAC 92

Europe's accelerator physicists, together with a sprinkling of colleagues from other continents, gathered in Berlin during the last week in March for the third European Particle Accelerator Conference.

High energy physics front-line machines were of course heavily represented, with pride of place going to the host country HERA electron-proton collider at DESY in Hamburg, where the proton ring has taken superconducting magnet technology a stage further. During the week commissioning for the European Synchrotron Radiation Facility at Grenoble advanced, with a 10 milliamp stored beam being reported.

The conference programme emphasized smaller accelerators. Another significant feature was the ever-closer relationship between the accelerator community in the big Laboratories and industry, reflected in many presentations and in the accompanying industrial exhibition. A full EPAC report will feature next month.

In the tunnel at Brookhaven soon to be occupied by the RHIC heavy ion collider, RHIC Project Head Satoshi Ozaki, left, explains a RHIC point to US Secretary of Energy James Watkins. With them are, left to right, David Goldman and James Yeck of the Department of Energy, and Brookhaven Director Nicholas Samios.

Photo Brookhaven

Laboratory correspondents

Argonne National Laboratory, (USA)
M. Derrick

Brookhaven, National Laboratory, (USA)
P. Yamin

CEBAF Laboratory, (USA)
S. Corneliussen

CERN, Geneva, (Switzerland)
G. Fraser

Cornell University, (USA)
D. G. Cassel

DESY Laboratory, (Germany)
P. Waloschek

Fermi National Accelerator Laboratory, (USA)
M. Bodnarczuk

GSI Darmstadt, (Germany)
G. Siegert

INFN, (Italy)
A. Pascolini

IHEP, Beijing, (China)
Qi Nading

JINR Dubna, (USSR)
B. Starchenko

KEK National Laboratory, (Japan)
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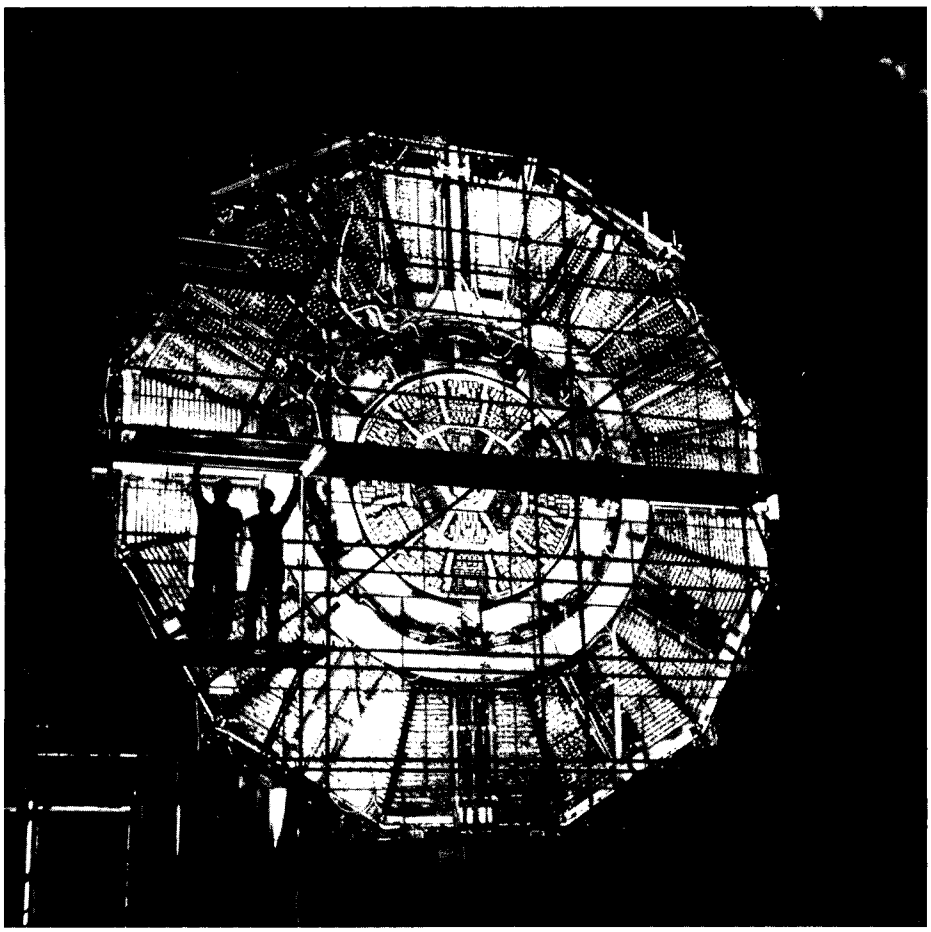
Win a trip to Seville's Expo'92

Expo'92 in Seville is probably the last major World Fair of the 20th century. Its theme, 'The Age of Discovery', highlights the achievements of science and its promise for the future. Befitting its place as the largest pure science Laboratory in Europe, CERN will be prominent, while 30 September has been designated a special 'CERN Day of Science' at the Expo.

The CERN Courier is organizing a competition, the prizes being trips to the Expo, with all reasonable expenses paid. To enter, you should find three attributable quotations which exemplify the role of science (in general, not just particle physics), adding who made them, when, where, and why. The winning entries will be used in the special international press coverage being organized for the CERN Day on 30 September.

Entries should be sent to the Editor, Gordon Fraser, CERN Courier, CERN, 1211 Geneva 23, Switzerland, to arrive before 31 July. They should be accompanied by your name, address, and place of work, and indicate where you can be reached quickly (telephone, fax or electronic mail). Entries are restricted to those working at major Laboratories or to readers of the CERN Courier (please include mailing label). They will be judged by the Editor in consultation with CERN's Expo'92 Organizing Committee. Their decision will be final. The winners will be notified as soon as possible.



HEAVY ION FUSION MEETING

A European Research Conference 'Prospects for Heavy Ion Inertial Fusion' will be held in Crete from 27 September-1 October, covering the beam and target aspects of inertial confinement fusion and organized by the European Science Foundation in association with the European Physical Society. Further information should be requested as soon as possible from I. Hofmann at GSI Darmstadt, fax +49 6151 359 985 bitnet UL50 at DDAGSI3.

The Seville Expo'92 which opened on 20 April highlights the role of discovery in general and science in particular. As part of CERN's major contribution to this, the final World Expo of the 20th century, the eight-metre diameter 'rosette' illumination of the Aleph experiment at LEP takes shape high up on the wall of the Pabellon del Futuro.

Advertisements in CERN COURIER

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Inquiries for the rest of the world: **please see page III.**

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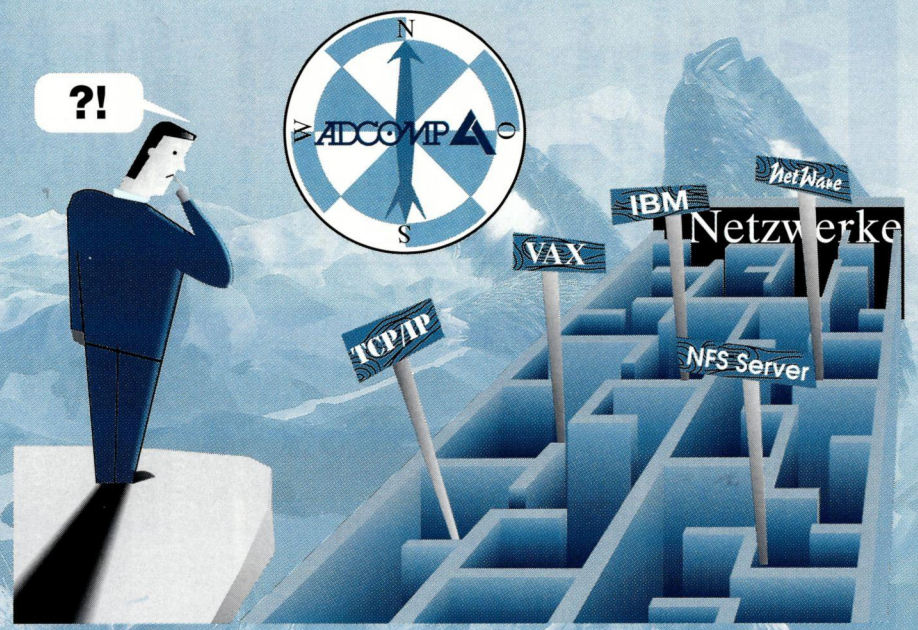

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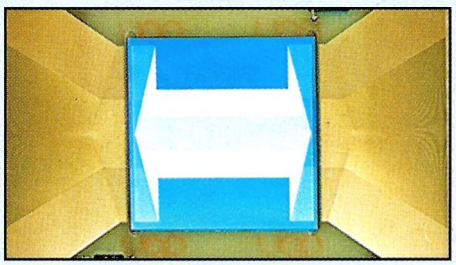
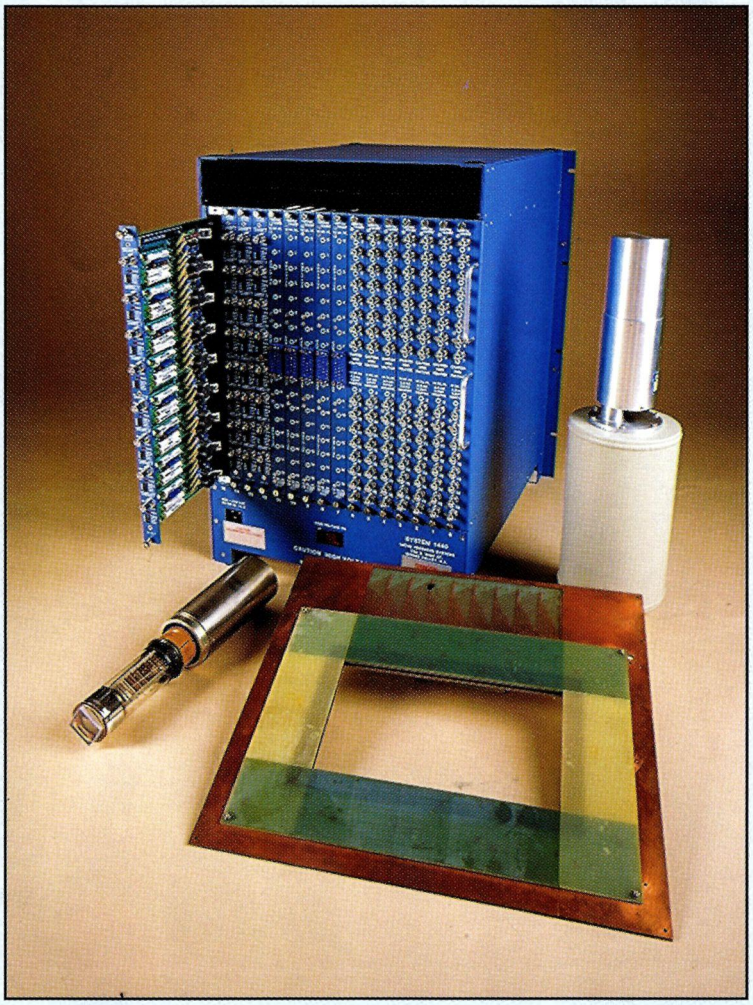


Even silicon strip detectors can now be powered by the 1440 System. (Photo courtesy of Fermi Accelerator Lab, Experiment E-791.)



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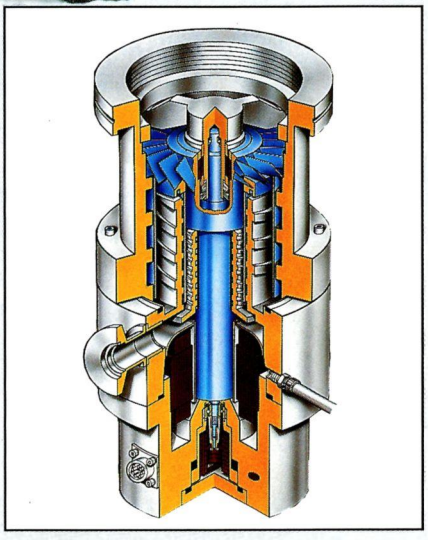

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