

Accent on the future at Novosibirsk Conference

Status reports on colliding beam facilities, superconductivity, new acceleration concepts for linear colliders, and plans for future big accelerators... these were the main topics at the XIIIth International Accelerator Conference in Novosibirsk last summer.

The luminosity goals for the high energy colliders were spelled out. This year the superconducting Tevatron at Fermilab hopes to reach 10^{29} per cm^2 per s with 800 GeV proton and antiproton beams, climbing eventually to 10^{30} . The lower energy CERN Collider, with its addition of the ACOL antiproton collector, is shooting for 10^{30} in 1987-88. For the electron-positron colliders, TRISTAN in Japan was on the brink of first operation at the time of the Conference and as reported on page 1 has come superbly into action with 25 GeV beams. The Stanford Linear Collider should not be far behind with 50 GeV beams and is hoping for progressively improving luminosity — 10^{29} this year, 5×10^{29} early next year, 2×10^{30} a year later and 6×10^{30} at the beginning of 1990. The luminosity goal of LEP at CERN with 60 GeV beams is the design figure of 10^{31} which should be reached fairly quickly. Finally HERA at DESY in Hamburg, with electron beams of 30 GeV and proton beams of 820 GeV, aims for a luminosity of 2×10^{31} when it turns on in 1990.

The superconductivity sessions covered the magnets which are now confidently incorporated in both projects for the next hadron collider — the SSC in the USA and the LHC at CERN — following the experience at the Fermilab Tevatron and HERA. This work was reviewed also at the ICFA Workshop on

superconducting magnets held at Brookhaven in May of last year (see September 1986 issue, page 3).

Superconducting radiofrequency cavities are now being prepared for the 100 GeV stage of LEP at CERN, for HERA at DESY, for TRISTAN in Japan, and for the CEBAF linac in the USA. A superconducting linac is also an option under study for future linear lepton colliders in one of the two-beam schemes.

The various schemes for reaching high energies in linacs were reviewed and sets of parameters for linacs up to 1 TeV beam energy were presented less tongue-in-cheek than in the past. Experimental work, both on the linac schemes and on the plasma beat-wave concept are beginning to bear fruit.

The most ambitious of the future accelerator plans is, of course, the Superconducting Super Collider (SSC) in the USA which aims for 20 TeV proton beams. While this mighty project awaits a green light, CERN has pushed further its ideas on a 8.5 TeV Large Hadron Collider which could sit over the electron ring in the LEP tunnel. The LHC scheme would benefit from the existing high quality injectors at CERN and from the LEP infrastructure, and has the added attraction of rather easily having electron-proton collisions as an extra physics tool.

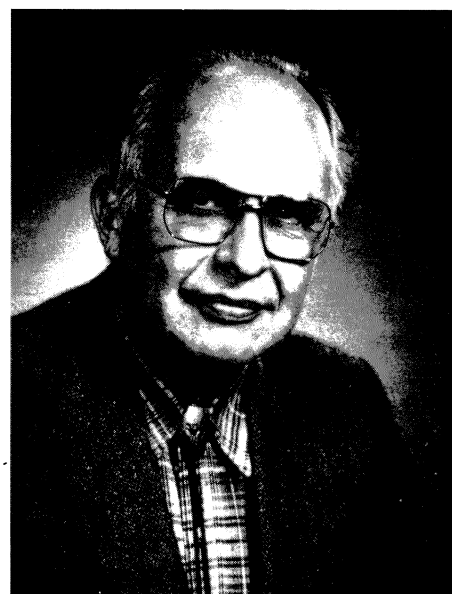
In the interim, the construction of UNK at Serpukhov in the Soviet Union is underway and they hope for 3 TeV beams for fixed target physics in 1993. On the electron front, people at Stanford are meditating about multi-hundred GeV machines to follow experience with SLC, and the Conference host Laboratory at Novosibirsk has similar ambitions.

People and things

On people

The prestigious Enrico Fermi Award, given by the US Department of Energy for exceptional and altogether outstanding achievement, was attributed in 1986 to Ernest Courant of Brookhaven and the late Stanley Livingston for their landmark contributions to the development of particle accelerators. It is unusual for the Fermi Award to be given posthumously, and a pity that after 'leadership contributions to the development of nuclear accelerators over a half-century' Livingston died last August before the announcement was made.

Robert K. Adair has been appointed Associate Director of Brookhaven National Laboratory for High Energy and Nuclear Physics. He is thus responsible for Brookhaven's AGS (Alternating Gradient Synchrotron) and Physics Departments, and Instrumentation Division.



Robert K. Adair — Brookhaven Associate Director

THE SCOTTISH UNIVERSITIES SUMMER SCHOOL IN PHYSICS

The proceedings of the schools provide pedagogical introductions to advanced topics at a level appropriate to research staff and students in high energy physics. All volumes are produced in hardcover editions at reasonable prices and are obtainable directly from SUSSP. Copies purchased through bookshops will be more expensive.

SUPERSTRINGS AND SUPERGRAVITY

1985 school. 550 pages. Editors: Davies & Sutherland. Price 24 pounds.

This school was conceived of as a topical survey of supersymmetry and supergravity but developed into an excellent introduction to all facets of superstring theory. The lecture notes provide the first comprehensive presentation of this exciting new subject. Also included are excellent reviews of conventional quantum gravity approaches and cosmology. Contributors: Duff, Ellis, Ferrara, Grisaru, Isham, van Nieuwenhuizen, Schwarz and West.

FUNDAMENTAL FORCES

1984 school. 540 pages. Editors: Frame & Peach. Price 20 pounds.

The school was primarily concerned with standard, and non-standard, models of the electro-weak theory, together with a critical assessment of the experimental evidence from the CERN collider (Darriulat, Jarlskog, Walsh, Dowell, Perl, Cashmore, Ledermann). In addition there were excellent reviews of Lattice QCD (Schierholz), Supersymmetry (Llewellyn-Smith) and Composite Models (Harari).

STATISTICAL & PARTICLE PHYSICS

1983 school. 500 pages. Editors: Bowler & McKane. Price 20 pounds.

The school was concerned with recent developments in statistical and particle physics which exploit and extend the analogy between statistical fluctuations in thermal systems and quantised field theories of elementary particles. Topics included: The onset of chaos (Feigenbaum); First order transitions (Gunton); Monte Carlo methods (Swendsen); Topological excitations (Goddard); Interface problems (Zia); Random systems (Moore); String theory (Green); Monte Carlo calculations (Rebbi).

GAUGE THEORIES

1980 school. 640 pages. Editors: Bowler & Sutherland. Price 15 pounds.

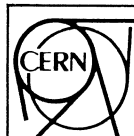
Topics included: Broken gauge theories (Appelquist); Neutrino physics (Barish); GUTS (Ellis); High energy interactions (Giacomelli); High energies (Glashow); Confinement ('t Hooft); QCD (Ross); Surface theories (Wallace); e^+e^- experiments (Wilk).

QUARK MODELS

1976 school. 500 pages. Editors: Barbour & Davies. Price 10 pounds.

Seminal articles on strings (Nielsen), Supersymmetry (Zumino), Confinement in lattice gauge theories (Susskind), and Quark models (Close, Pati, Dalitz, Sutherland, Yankielowicz).

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Pulling in the crowds

Behind the trendy docklands developments along the north bank of the River Thames, London's sordid 'East End' hides from the public eye. Defying the drabness of Mile End Road, a main artery leading towards the glitter of the City financial district, is Queen Mary College, part of the University of London.

British physics, rather like London's East End, has not benefited from the most glamorous of images in recent years. Gone are the halcyon days of Rutherford, or so it seems. Yet, when QMC physicists invited schoolchildren along to their department recently, they discovered, almost to their surprise, that there are youngsters out there who are interested in finding out more about physics. And not just any physics, but the physics of elementary, subatomic particles — a topic that some have dismissed as irrelevant and impractical, and which has even come under special scrutiny.

The schoolchildren came along in droves — some 2000 during the course of four days, from all over the country — in response to the physicists' invitation.

Centrepiece of the visit was an exhibition from CERN. Earlier, this had been at Bristol Univer-

sity at the annual meeting of the British Association for the Advancement of Science. CERN had done a professional job, and it gave Peter Kalmus, professor in particle physics, the idea of housing the exhibition in his department at QMC for a week to make it accessible to more people. At the same time, he hoped to encourage potential students to visit the college. In addition to the exhibition, there were to be lectures on antimatter and the W and Z particles — areas of research in which QMC has played a key role.

The lecturers found themselves giving their talks each afternoon in lecture theatres that were filled to capacity. In addition, a cable TV company came to film the proceedings for a programme called Eureka, which goes out to 12 European countries in three languages.

The success of this venture shows to the doubtful that physics can pull in the crowds — if put over in the right way. And it shows again that fundamental research can captivate young minds. So what if it isn't going to lead to a new manufacturing industry next year; if it can encourage more students to regard physics as interesting, then basic research is performing an important task.

(From an article by Christine Sutton which originally appeared in the 'New Scientist'.)

Taking advantage of its presence in England for the annual meeting of the British Association for the Advancement of Science, the CERN itinerant exhibition visited two other seats of learning before returning home. Pictured is the facade of Queen Mary College, London, where nearly 2000 schoolchildren saw the exhibition. Packed lectures on particle physics were held in parallel. At Royal Holloway and New Bedford Colleges, London, the exhibition was a key feature of a series of Open Days visited by fifty schools, the local population and some 300 industrialists.

(Photo Georges Claude)

Jean Sacton of Brussels has been reelected Chairman of the European Committee for Future Accelerators (ECFA). It was originally intended that Italo Mannelli would take over from Sacton, until Mannelli was elected as the next Chairman of CERN's Scientific Policy Committee, succeeding Don Perkins.

At CERN, Pierre Darriulat has been appointed Director of Research from 1 July, to succeed Robert Klapisch. Pierre Lehmann (France) has been elected Vice President of CERN Council.

Geoff Manning has left the Directorship of the Rutherford Appleton Laboratory to become Chairman of Active Memory Technology Ltd, a new computer company specializing in array processors. Paul Williams becomes Acting Director of the Laboratory.

Retirements

Recently retired from CERN is Erhard Fischer, who made his mark in the 60s and 70s as Leader of the Vacuum Group for the Intersecting Storage Rings. Under his leadership, the ISR became the first large scale vacuum system bettering 10^{-11} torr, at a time when typical accelerators achieved 10^{-7} torr. This improved on the ISR design figure, very fortunately so as subsequent experience showed that the machine could not have worked at the specified 10^{-9} torr. A long term effort by his group also ensured that the ISR vacuum withstood the effects of large proton currents. His wide knowledge of accelerators has led to contributions on topics such as the motion of ions trapped in the ISR anti-proton beams.

Another of the long-serving accelerator physicists now 'retiring' from CERN is Bryan Montague. He participated in the building of the Proton Synchrotron and first came into prominence as the prime mover of the work on radiofrequency particle separators which delivered much purer particle beams to the experimentalists at the PS.

He did much work on the electron ring accelerator concept after it first emerged in the Soviet Union and then joined the construction team of the Intersecting Storage Rings, with particular responsibility for the flags and scrapers for monitoring and tidying the beams. In recent years he has been an authority on polarization in electron-positron storage rings.

▼ Louis Dick, spin physics specialist and a pioneer of the gas jet target technique, was given an enthusiastic ovation by his colleagues to mark his 65th birthday

(Photo CERN 461.11.86)



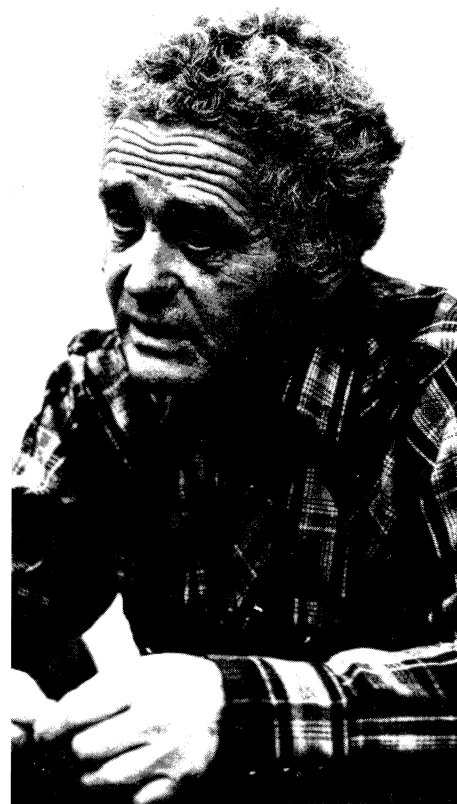
▲ Theoretician Gerard 't Hooft (left) at the Amsterdam Trippenhuis on 24 November after having received the prestigious Lorentz Medal of the Royal Dutch Academy of Sciences from Leon Van Hove (right), who also gave the address. Centre is Academy President Johan van der Waals.

(Photo Harry van Steenis)

Computing School

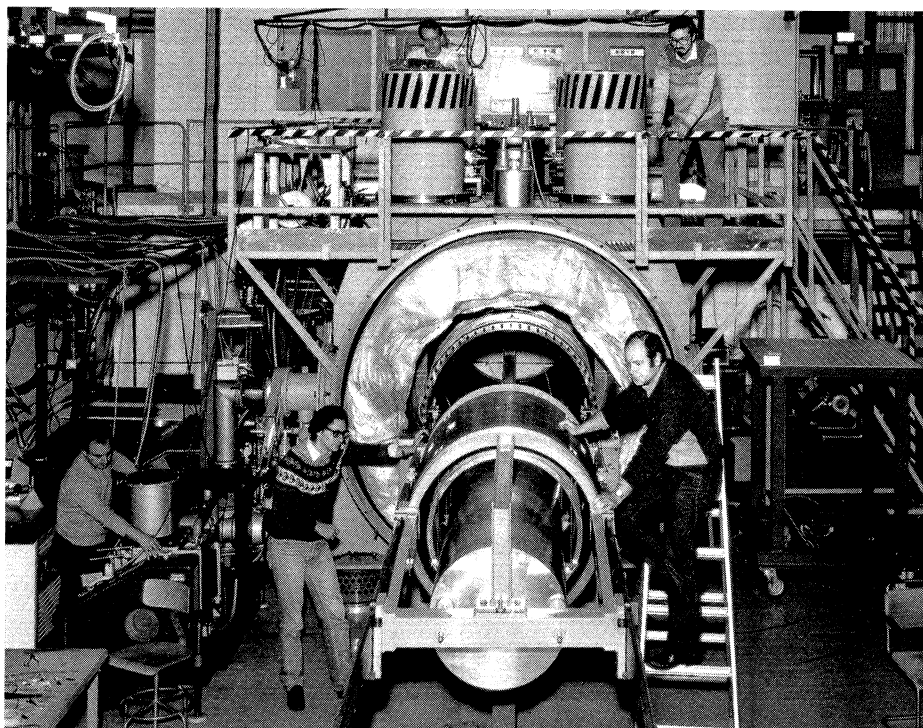
The CERN School of Computing, hitherto biennial, has become an annual event. The School is aimed at postgraduate students and research workers in physics or computing. This year it will cover a wide range of topics, and is being held in Troia, Portugal, from 13-26 September. Further information from Mrs. Ingrid Barnett, CERN, 1211 Geneva 23, Switzerland.

► Yuri Orlov addressed a packed meeting of the Yuri Orlov Committee recently at CERN.



At CERN recently was Heinrich Rohrer, who shared the 1986 Nobel Physics Prize with Gerd Binnig for their development of the scanning tunneling microscope, and with Ernst Ruska, pioneer of the electron microscope.

(Photo CERN 302.11.86)



Gravitational waves

The search goes on for gravitational radiation — the carrier of the large scale force between accumulations of matter. The existence of such waves was implied by the first formulations of general relativity some sixty years ago, but

Highly sensitive cryogenic antennae, such as this one at CERN operated by a Rome group, and two more in the US, are looking for signs of gravitational radiation. Although the individual detectors see some effects, no coincident signals are reported and the search goes on.

(Photo CERN 305.11.86)

Martin Wilson from Oxford Instruments (left) gave the second John Adams Memorial Lecture at CERN on 27 November, seen here with Phil Bryant who organizes the CERN Accelerator School. The theme of the lecture was 'Accelerators and superconductivity: a marriage of convenience' and Martin Wilson reviewed the long, hard road to the present applications of superconductivity, in which accelerator Laboratories played such an important part. While at the Rutherford Laboratory, Wilson helped develop the famous Rutherford cable. In addition to the big hadron machines, Martin Wilson cited widespread applications in nuclear magnetic resonance scanners and the promising development of tiny electron synchrotrons for silicon chip lithography.

(Photo CERN 440.11.86)



TWO FACULTY POSITIONS

High Energy Physics University of Iowa

The Department of Physics and Astronomy at the University of Iowa invites applications for two tenure-track faculty positions in experimental elementary particle physics beginning in August 1987. The appointments are authorized at the assistant professor level, but higher level appointments will be considered for qualified candidates. We invite applications from outstanding candidates at any level and in all areas of experimental elementary particle physics. Faculty duties include undergraduate and graduate teaching, guidance of research students, and personal research both independent and in collaboration on existing experiments. Applications, including a curriculum vitae and a statement of research interests, should be sent to:

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Applicants should send a curriculum vitae, publication list, description of research experience and names of three references to

**Dr. Stanley Majewski
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Application deadline is March 1, 1987.



The Swiss Federal Institute of Technology in Zurich invites applications for a

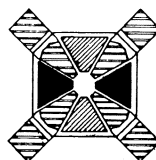
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Applications with curriculum vitae and list of publications should be submitted before February 15, 1987, to:

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Stig Lundqvist (left), Chairman of the Scientific Council of the International Centre for Theoretical Physics (ICTP), Trieste, about to present one of the 1986 ICTP Dirac Medals to Alexander Polyakov of the Landau Institute of Theoretical Physics, Moscow, who admires his new ICTP tie. Looking on is ICTP Director Abdus Salam. Polyakov's award came in recognition of his important work in quantum field theory. The other 1986 ICTP Dirac Medal goes to Yoichiro Nambu of Chicago's Enrico Fermi Institute.



their detection has taxed the ingenuity of experimenters.

Any signals would be easily screened by seismic noise, etc. In an effort to eliminate this background, a network of three highly sensitive cryogenic detectors was set up — one at CERN, used by a Rome group, another at Stanford and a third at Louisiana State.

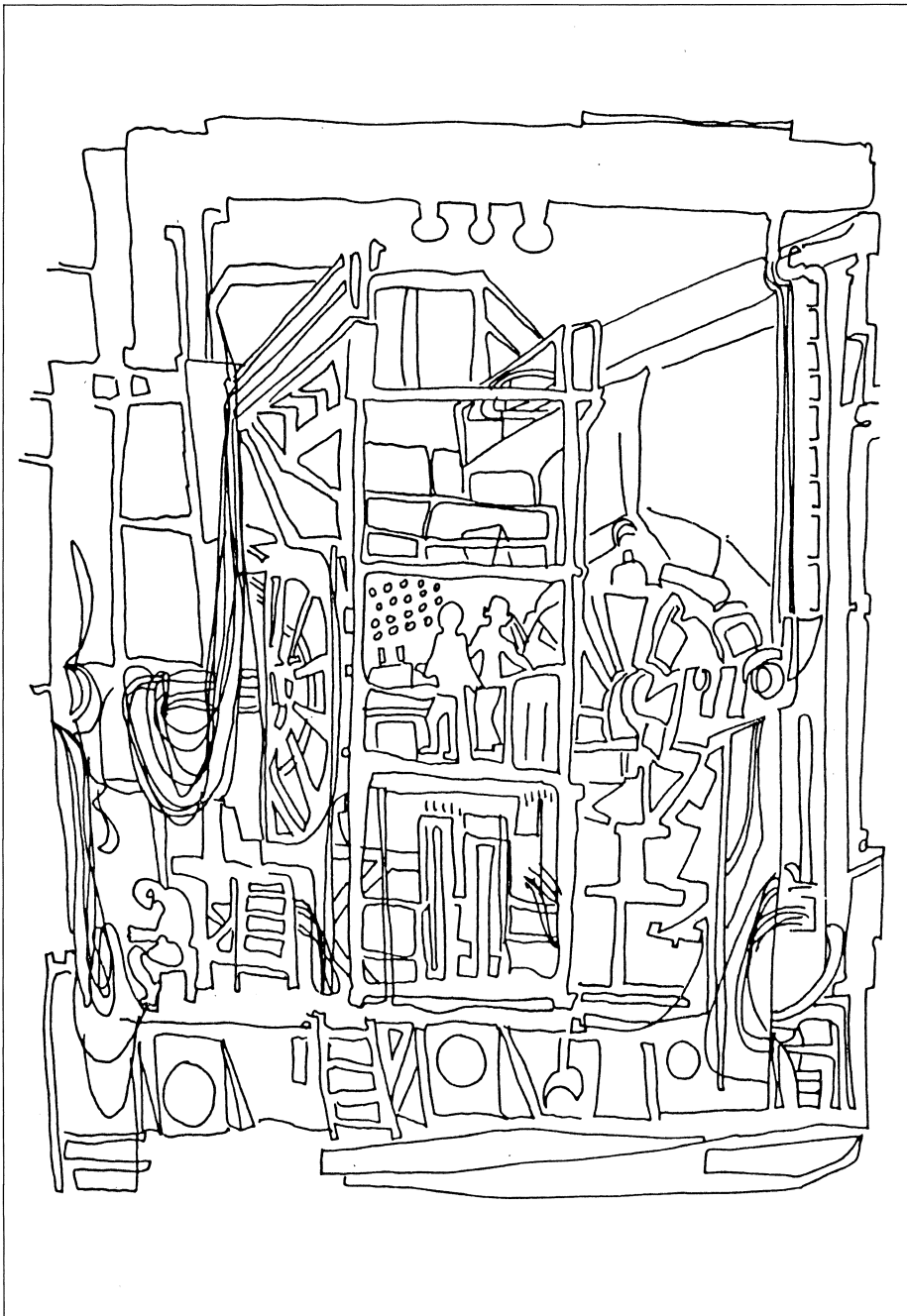
Preliminary results indicate no triple coincidences, despite individual detectors picking up some 60 'events' per day. However even the phenomenal sensitivity of these cryogenic detectors (about 1 part in 10^{18}) is insufficient to match the size of the signals expected from outside our Galaxy, where most of the gravitational activity should originate.

1987 JINR-CERN School of Physics

The 1987 JINR-CERN School of Physics is the tenth in a series organized by the Joint Institute for Nuclear Research (JINR, Dubna, USSR) and CERN. The aim is to teach various aspects of high energy physics, especially theoretical, to young experimentalists with at least one year's research experience, coming mainly from Member States of JINR and CERN. The 1987 School will take place at the Varna Department of the Academy of Social Sciences and Manage-

Artist's impression of a particle physics detector from 'Der Multimensch', the latest book from Pedro Waloschek, CERN Courier's regular correspondent at the German DESY Laboratory in Hamburg. Pedro's book (published by ECON Verlag of Düsseldorf) gives a fascinating glimpse into the inside world of particle physics.

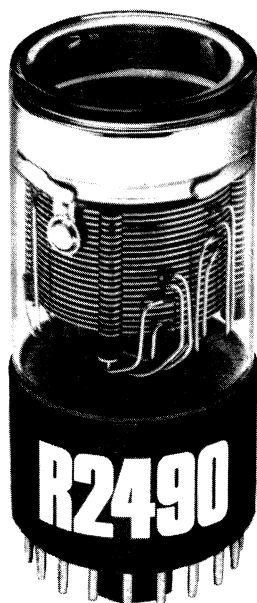
(Illustration Jutta Waloschek)



FOR HIGH ENERGY PHYSICS

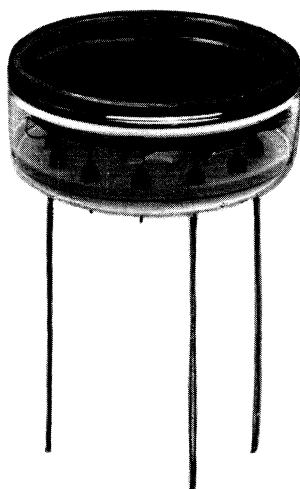
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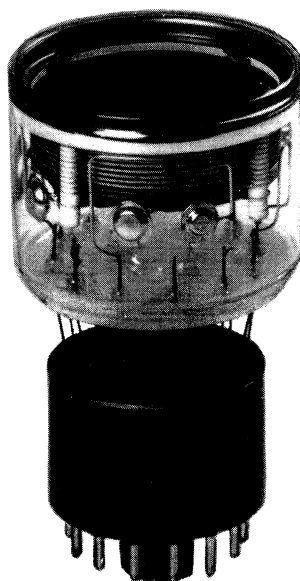
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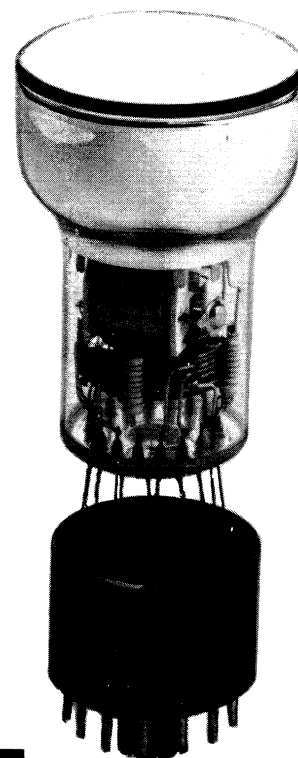
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Visiting CERN in November was Greece's Deputy Minister for Industry, Energy and Technology Mme Vasso Papandreou, seen here with CERN Director General Herwig Schopper.

(Photo CERN 288.11.86)



ment, Varna, Bulgaria, from 6-19 September.

Further information from Miss D. A. Caton, Organizing Secretary, 1987 JINR-CERN School of Physics, CERN, 1211 Geneva 23, Switzerland, or from Mrs.

T. S. Donskova, USSR, 101 000 Moscow, Head Post Office, PO Box 79, JINR, as appropriate.

Particle physicist John Rander practising a few tricks for a big climb. Such methods, described in his new book 'Assure sec' (in French), are the last resort in today's new wave of athletic rockclimbing.

(Photo Brigitte Rander)

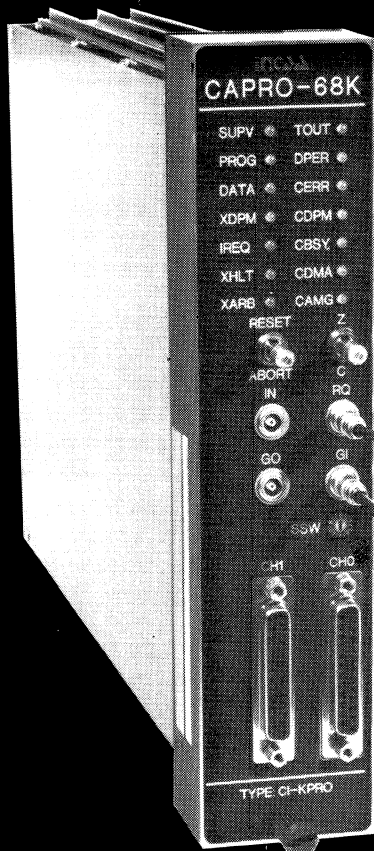
Rock steady

An American experimental physicist leading the Saclay group participating in the construction of the electromagnetic calorimeter for the ALEPH experiment at CERN's LEP electron-positron Collider recently published a book in French on a subject rather far afield from particle physics: John Rander, in collaboration with his French wife, Brigitte, is the author-illustrator of 'Assure sec!' *Techniques d'escalade en falaise*, published by Edisud in Aix-en-Provence. The author drew from experience ranging from leading climbs on Yosemite walls, solitaires, frozen waterfalls, alpine north-faces... to sunny limestone cliffs in the south of France. John worked with René Turlay at Saclay on the WA 1 neutrino experiment at CERN before participating in ALEPH.

LEAR workshop

The fourth workshop to discuss physics at CERN's LEAR Low Energy Antiproton Ring will be held at Villars-sur-Ollon, Switzerland, from 6-13 September. As well as results from LEAR experiments to date and immediate plans, the meeting will also look to the longer-term future. Further information from C. Leluc, University of Geneva/-DPNC, 24 Quai E. Ansermet, 1211 Geneva 4, Switzerland.





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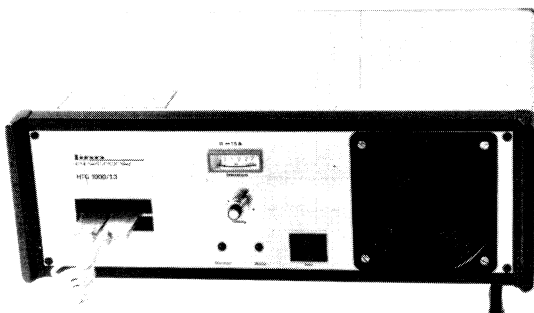
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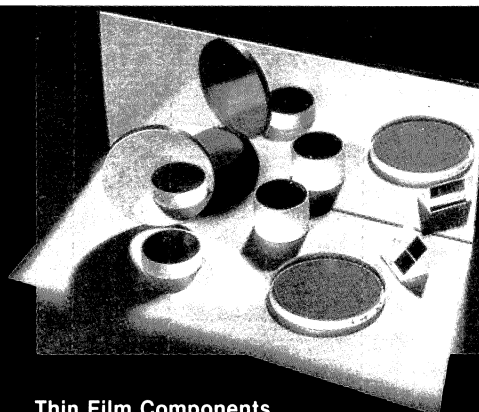
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