

CERN 1981-8

In January Carlo Rubbia (right) took over from Herwig Schopper (left) as CERN's Director General. Centre is CERN Council President Josef Rembser.

(Photo CERN 441.12.88)

At the CERN Council Meeting in December, the Director General traditionally gives an end-of-year review. This time the presentation took on added significance as it marked the end of the eight-year mandate of Herwig Schopper, who handed over on 1 January to Carlo Rubbia.

Looking back over those eight years, Schopper pointed out several major trends. The dramatic growth in CERN 'users' (the scientists coming to the Laboratory to do their research) has led to CERN's research programme becoming really worldwide. The attrition of having to operate an expanding Laboratory under a constant budget has produced in its wake a healthy increase in the efficiency of CERN's big machines and experimental facilities.

For the manufacture of antiprotons, the ground had been prepared at the end of the 1970s, leading to the world's first high energy collisions of proton and antiproton beams in July 1981. The antiproton programme was considerably widened by the arrival of the LEAR low energy antiproton ring the following year.

To consolidate on the historic discovery of the W and Z bosons (the long-awaited carriers of the weak nuclear force) at the big proton-antiproton collider in 1983, a major antiproton improvement programme was launched, aiming to increase both the supply of antimatter and the scope of the experiments.

This culminated in the extraordinary proton-antiproton collision score in the latest run (September-December), tripling the total of the seven previous years combined, and matched by Fermilab in the US (December 1988, page 9). Physics results should not be far off.



Turning to other physics, Schopper stressed the effort to measure the basic properties of quarks and leptons, and to test the validity of different possible theories. The availability of higher collision energies (temperatures) has meant that the conditions of laboratory experiments have begun to approach those of the 'Big Bang', postulated as the origin of the Universe, and high energy physics now overlaps astrophysics and cosmology.

The outgoing Director General enumerated some highlights: the limits on the number of neutrino types emerging from the proton-antiproton collider studies; the determination of electroweak parameters in fixed target studies; precision measurements of delicate symmetry (CP) violation in the decays of neutral kaons; the push to find the distribution of quarks and gluons (structure functions) in nuclei using neutrino and muon beams and the resultant discoveries; the new effects found using

high energy ion beams; exotic atom successes at LEAR; and the unexplained 'staggering' of adjacent isotopes of mercury discovered at the ISOLDE isotope separator. These examples reflected the wide range of CERN's research programme, spanning energies from the eV range up to 600 GeV.

Another new trend is the detector development programme, where the stringent demands of physics at tomorrow's colliders has initiated a vigorous R and D effort, already producing its first fruits.

Turning with evident pleasure to the construction of the LEP electron-positron collider, Schopper sketched how planning for this giant machine had started early, with the first ideas being tabled in 1976. A series of in-depth design studies brought modifications in both machine design and location, with Council finally approving in October 1981 a 'stripped down' version, to be built under a budget reduced from the originally pro-

A new European plan to attack cancer

posed figure and held constant over a stretched construction period. With the necessary civil engineering authorizations in hand in the summer of 1983, the huge civil engineering operation was launched.

With installation now going very well and following the success of the initial injection studies in July, Schopper looked forward to the first electron-positron collisions, hoping for 50,000 Z particles by the end of 1989. (The Z, the electrically neutral carrier of the weak nuclear force, was discovered at CERN in 1983. So far, only the high energy proton-antiproton colliders at CERN and Fermilab provide enough energy to manufacture these particles – some 400 having been accumulated in five years.)

Moving from physics to management, Schopper showed how CERN's map of Member States now covers Spain and Portugal. The task of LEP construction had brought about major reorganizations – new divisions have been set up and large amounts of manpower transferred. New technical boards coordinate common interests across the divisional structure, while technology transfer and relations with industry have been given increased importance.

In thanking everyone for their help during a sometimes difficult period and in wishing his successor continuing success, Schopper reminded his audience of the 'CERN spirit', born during the foundation of the Organization, which has fostered CERN's competitiveness, while ensuring fairness, priority of scientific and technical goals against national or personal interests, and tolerance and respect for different cultures and attitudes.

While cancer remains the scourge of mankind, a large proportion of cases these days are amenable to treatment by irradiation. Bringing new irradiation centres to large concentrations of population is thus a vital task. This was highlighted at the first three-day workshop of the European Light Ion Medical Accelerator (EULIMA) project to assess the potential value of light ion beam therapy. Held in November at the Antoine-Lacassagne Centre, Nice, one of twenty cancer centres in France, the workshop was attended by some 60 delegates from Europe, USA, Canada and Japan, representing the fields of physics, radiobiology, radiotherapy and medicine.

The European accelerator initiative goes back to October 1985, the result of a proposal at a meeting of the heavy particle group of the European Organization for Research and Treatment of Cancer (EORTC). A preliminary EULIMA

meeting at CERN in March 1986 defined the project aims (March 1987, page 25). In spring 1988, financial support from the Committee for the European Development of Science and Technology (COD-EST) enabled experts in the field (mainly from Louvain-la-Neuve, Liverpool and Nice) to get together. Subsequently the Commission of the European Communities funded the workshop in the framework of its 4th Medical and Health Research Programme, in parallel with the

At the recent EULIMA workshop in Nice, Mark Philips (Berkeley) showed how light ions and protons can be used other than for cancer therapy, for example against a surgically inaccessible arterial problem in the vicinity of the brain – intracranial arteriovenous malformation (AVM). Top left, the untreated AVM is the black mass in the centre of the photo; top right, after the beam therapy the AVM is smaller; bottom left and right, the arterial system to the brain has almost resumed its normal pattern.

(Photo M. Philips, Berkeley)

