CERN Courier Archive: 1969

A look back to CERN Courier vol. 8, June 1969, compiled by Peggie Rimmer

RUTHERFORD

Concrete magnets

Wrapping up synchrotron magnet coils poses no small problem. They have to be electrically insulated, both from the magnet yoke and one turn of the coil from another, and the insulation usually has to mechanically hold the coil together. The electrical insulation is straightforward but the mechanical stresses are considerable, as is the risk of destruction by radiation.

In thinking about this problem, R Sheldon and G B Stapleton of the Rutherford Laboratory have proposed a novel method of magnet construction. It involves using concrete – more precisely castable ceramics which are highly resistant to irradiation – to "pot" the whole magnet as an "integral structure". The coil is wound without any insulation and assembled onto the magnet yoke, using spacers to avoid electrical contact. Assembly is done inside a steel pipe and concrete is pumped in under pressure.

Small magnets (up to 50 cm long) have been built and tested, and have indicated that the method gives the required insulation and retains the necessary tolerances following thermal cycling and pulsing. This new concept holds out the prospect of magnets which could be cheaper and free from the problems of radiation damage.

● Compiled from texts on pp172–173.

CERN

Development of multiwire proportional chambers

Quite often, theoreticians, confronted with some major difficulty, have successfully gone back 30 years to look at ideas that had been thrown overboard. But it is rare that experimentalists go back 30 years to look again at equipment which had become out-dated. This is what Charpak and his colleagues did.

In the 1930s, ion-chambers, Geiger-Muller counters and proportional counters were vital pieces of equipment in nuclear-physics research; other types of detectors have since largely replaced them. Now the introduction of micro-electronics makes it possible to purchase miniature components for amplification of the signal on a wire for a thousandth of the cost only 10 years ago, and the proportional counter is making a comeback in a new array – the "multiwire proportional chamber" – which has several features, making it a very useful addition to the armoury of particle detectors.

[*There followed a masterly account, by Georges Charpak, of the meticulous manner in which the best of detector R&D is done, finishing with the following remarks.*]

At present, we lack sufficient experience to know what their [multiwire chambers] limitations are. Several groups are investigating various aspects of the mechanism of amplification so it may therefore be expected that information will very soon be available for work on large units. Already, certain applications are being actively studied where proportional chambers can probably play a very useful part: in low-energy nuclear physics in the focal planes of spectrometers and, maybe, in medical physics for constructing large surface detectors which measure the spatial distribution of X-rays emitted by radioactive elements in human organs.

● Compiled from texts on pp174–176.

SPACEFLIGHT

Watch this space

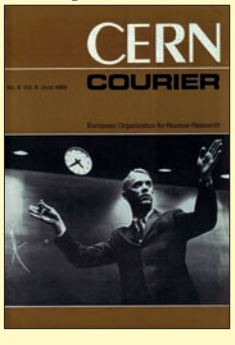
On 4 June, Russell L Schweickart came to CERN to talk on "The Flight of Apollo 9 and the Future of Space Exploration". It is estimated that about 1250 people came to CERN that night to hear the astronaut (in the Main Auditorium, and elsewhere via closed-circuit TV) and a further 1250 saw projections of the film, *Apollo 9*, on the following two days.

Russell Schweickart climbs out of the Apollo 9 capsule at the end of the mission. (Image credit: NASA.)

Schweickart was Lunar Module pilot of the Apollo 9 mission. He was launched into space on 3 March to carry out, in Earth orbit, a series of tests on the Lunar Excursion Module, the small spacecraft which has to separate from the parent capsule when in lunar orbit to carry two astronauts down to the surface of the moon and back. During the flight, the techniques of transferring men from the command module to the lunar module, the separation of the two craft and their "docking" were successfully tested. These tests were repeated in lunar orbit during the Apollo 10 flight and all is now ready for the historic Apollo 11 mission due to be launched on 16 July for the first landing of man on the moon on 20 July.

● Compiled from texts on p177.

Compiler's Note



These three stories heralded three breakthroughs.

The Large Electron-Positron collider was the first accelerator to use concrete magnets. With conventional magnets unaffordable, 3392 concrete dipoles were installed for half of the cost.

The first moonwalk was on 23 July 1969. Now the Moon is a potential training ground for astronauts preparing for Mars landings.

The Charpak genie was out of the bottle when his multiwire proportional chamber and subsequent developments launched the era of fully electronic particle detection. In an early example of knowledge transfer, the increased recording speeds allowed faster scanning and lower body doses in diagnostic tools for nuclear medicine.