

CERN Courier Archive: 1975

A LOOK BACK TO CERN COURIER VOL. 15, JANUARY AND FEBRUARY 1975, COMPILED BY PEGGIE RIMMER

TRIUMF

TRIUMF triumph

On 15 December the 500 MeV cyclotron at Vancouver produced its first full energy beams. After a month of gradually spiralling the beam further and further out in the machine, success came precipitately.

On 14 December an energy of 360 MeV had been reached at 690 cm machine radius and beam transmission out to this energy was looking good. By 12 noon the following day, protons were again at 360 MeV. In the next hour, appropriately with the TRIUMF Director J R Richardson at the helm, the beam was taken to the design energy of 500 MeV by tuning the trim coils.

An hour later, extracted beam of 10 nA was



detected and soon manoeuvred over 15 m to a beam dump. Using quadrupoles, it could be focused on a 1 cm² spot.

Champagne flows in the TRIUMF control room to celebrate first operation of the cyclotron at 500 MeV. Towards the right of the picture, E W Vogt (chairman of the TRIUMF board of management) is congratulating the laboratory director, J R Richardson.

By 16.00 hours the champagne corks had been popped.

We congratulate Professor Richardson and his team on their success in bringing such an adventurous machine into action. They join Los Alamos and Villigen as the world's three major 'meson factories'.

● Compiled from texts on pp11–12.

VILLIGEN

Superconducting muon channel begins operation

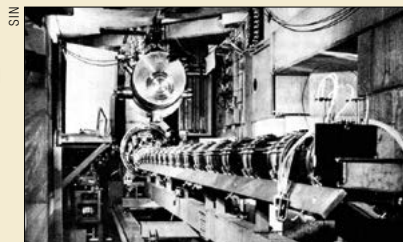
Operation of the 590 MeV cyclotron at the Swiss Institute for Nuclear Research, SIN, is going very well following improvements carried out during a shutdown last year. The most satisfying success was the smooth start of operation of the new superconducting muon channel.

Muon beamlines at intermediate energies have almost always used quadrupoles to focus the pions produced when the ejected proton beam hits a target, and to retain some of the muons produced as the pions decay. The idea of a solenoid is to produce a beam of pions on large spirals with small radii, close to the axis, so that the decay muons are much less likely to escape. Close on 100% efficiency can be expected.

Long, large aperture solenoids are needed – the SIN solenoid is 8 m long with a 12 cm aperture and a field of 5 T. To provide these conditions with a conventional magnet would involve a power consumption of 10 MW.

The solenoid uses copper stabilized niobium-titanium superconductor wound in sixteen sections on reinforced epoxy resin. The outer surface is in contact with a layer of copper pipes carrying the helium cooling, all enclosed in a thick walled steel tube, which is a magnetic return path. Gas cooled current leads connect the solenoid to a 1 kA supply. Cooling is by supercritical helium under a pressure of 6 to 10 atmospheres.

In the first test of the full solenoid in



The long superconducting solenoid at the SIN cyclotron has yielded the world's highest fluxes of muons.

December, the current climbed to 690 A before a quench. After repair, on 15 January the magnet immediately reached 5 T and stayed there for days. Since then it has operated continuously with no problems in

following the shutdown and re-starts of the accelerator schedule.

Pions are focused on the entrance to the solenoid and it can take a wide range of momenta. Muons emerge from the solenoid within a 20 cm² area and can be transported to two experimental regions by conventional magnets.

When the solenoid worked so well on 15 January, pions of 200 MeV/c were fed to the channel. The muon extraction was slowly brought down to lower momenta and at 180 MeV/c a pure muon beam was achieved. Maximum muon flux was reached at 115 MeV/c. The design intensity was 2.4×10^7 muons per second. After only a preliminary tuning 2×10^7 was achieved. Already the SIN cyclotron has the world's highest muon fluxes.

● Compiled from texts on pp36–37.

Compiler's Note



The photo of TRIUMF triumphant shows the prevailing gender demographics. Data aides and scanners apart, females were rare in physics, the Nobel category in which they are the least represented. Of the 206 physics Nobel prize winners since 1901, only two have been women: Marie Curie in 1903 with a 1/4 share, and Maria Goeppert-Mayer in 1963 also with a 1/4 share, Curie however becoming the sole recipient of the 1911 chemistry Nobel.

The lack of role models for women has long been overwhelming. The Royal Greenwich Observatory, founded in 1675, took almost 300 years before entrusting executive responsibility to a woman, Margaret Burbidge in 1972, though denying her the associated illustrious post of Astronomer Royal. In 1945 she had been turned down for a Carnegie Fellowship because only men were allowed to observe at Mount Wilson. But things look brighter for the daughters of today and tomorrow. In 2016, barely a year beyond its 60th anniversary, CERN appointed its first female Director-General, Fabiola Gianotti.

The new Laboratory Whisperers

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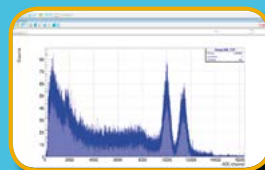
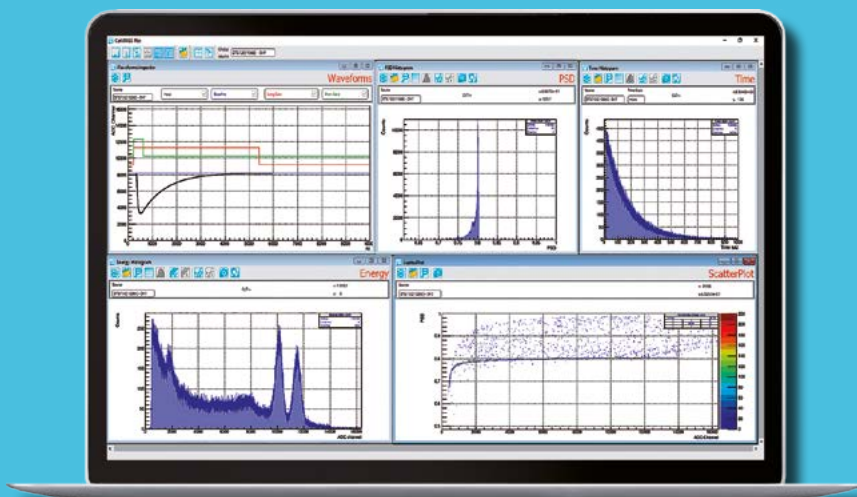
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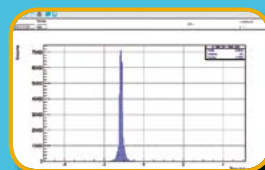
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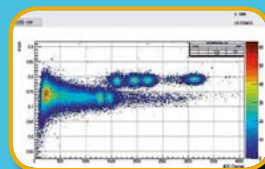
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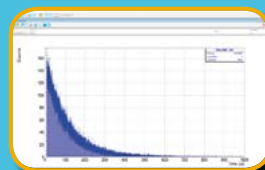
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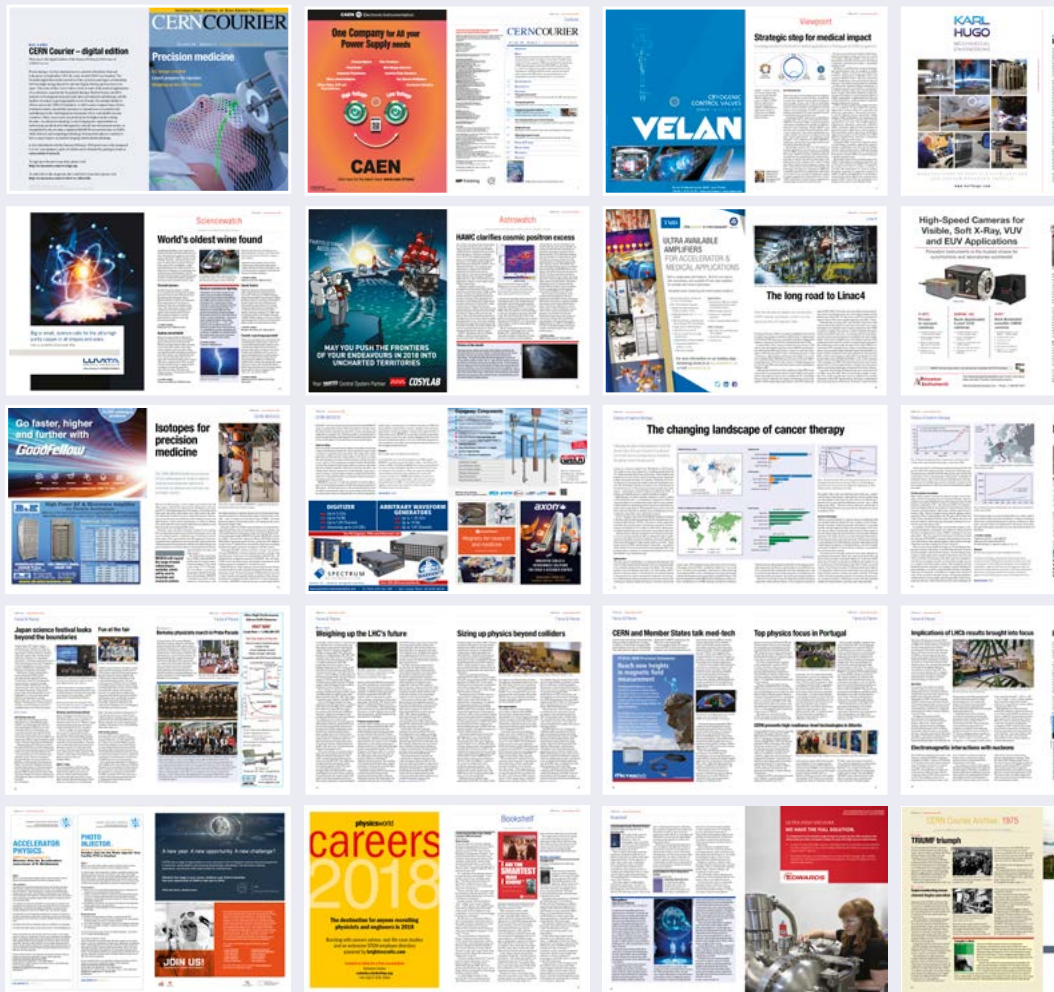


PSD Scatterplot



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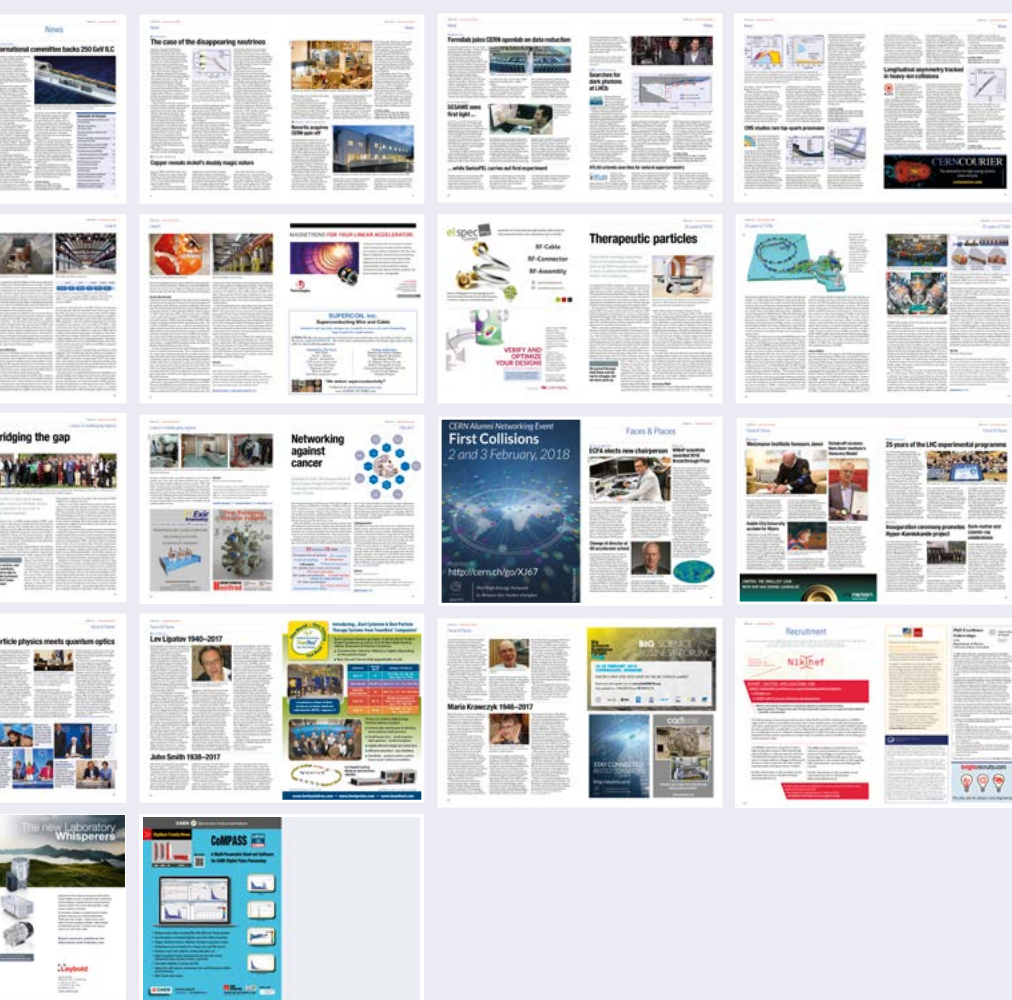
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WELCOME

CERN Courier – digital edition

Welcome to the digital edition of the January/February 2018 issue of *CERN Courier*.

Proton therapy was first administered in a patient at Berkeley National Laboratory in September 1954, the same month CERN was founded. The breakthrough followed the invention of the cyclotron, and the relationship between high-energy physicists and oncologists has grown closer ever since. This issue of the *Courier* takes a look at some of the medical applications of accelerators, in particular for particle therapy. Hadron beams can allow tumours to be targeted more precisely than conventional radiotherapy and the number of centres is growing rapidly across Europe, for example thanks to efforts such as the TERA Foundation. A shift to more compact linac-driven treatment centres, meanwhile, promises to expand access to particle and radiotherapy in the challenging environments of low- and middle-income countries, where cancer rates are predicted to be highest in the coming decades. Accelerator technology is also bringing new opportunities in radioisotope production for theragnostics and advanced treatment modes, as exemplified by the recently completed MEDICIS research facility at CERN, while detector and computing technology from particle physics continue to have a major impact on medical imaging and treatment planning.



Also distributed with the January/February 2018 print issue is the inaugural *Courier* year-planner, copies of which can be obtained by getting in touch at cern.courier@cern.ch.

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