

As is covered in our main article, the CERN site is 20 years old this month. When the first people moved in, they were housed in 'temporary' barracks. How temporary can you get? The picture shows one of these barracks being dismantled a few weeks ago after twenty years of continuous use.

to be regarded as forming a group dubbed the electron spin-spin interaction reservoir, with a single parameter typifying it: the spin temperature.

The various other kinds of magnets present in the sample then form as many other energy reservoirs as there are different kinds (proton, deuteron, etc., reservoirs).

As the electron reservoir is made up of very powerful magnets in comparison with the other groups, a strong thermal coupling may be expected between the electron reservoir and each of the others. The tendency will therefore be for this thermal coupling to bring the various nuclei to the same spin temperature as the electron reservoir.

This thermal coupling provides a new dynamic polarization mechanism. If the electron spin-spin interaction reservoir can be cooled, i.e. if its spin temperature can be lowered, the spin temperature of the other reservoirs will be lowered at the same time. The direct effect of this will be to raise the polarization of the free nuclei in the sample.

The cooling is produced by irradiating the sample with microwaves at a frequency close to the magnetic resonant frequency of the electron.

It has been possible very accurately to check this latter method experimentally, especially with partially deuterized 1,2-ethanediol (see vol. 13, page 184), in which the protons and deuterons assume the same spin temperature as the electrons, giving high polarization.

However, the two polarization mechanisms described above are closely related and difficult to distinguish. Nevertheless, the results obtained with a sample of partially deuterized m-xylene (2,2-D6) doped with BDPA (6×10^{18} spins/cm³) proved the existence of these two mechanisms.

The results of measuring the proton polarization in relation to the micro-

wave wavelength exhibit four peaks (see illustration), the two highest of which are caused by the solid-effect dynamic polarization mechanism, while the two lowest are due to the cooling of the electron spin-spin interaction reservoir.

The latter mechanism becomes dominant in certain substances like butanol and propanediol, for example.

Just as it is possible to produce dynamic polarization by cooling the electron spin-spin interaction reservoir, the proton interaction reservoir can be cooled by irradiation with an r.f. field. There seems to be a thermal coupling between this reservoir and the quadrupole energy reservoir of the deuterons due to the interaction with the electric field gradient in the target.

The deuterons can be purely aligned by cooling this reservoir. The alignment, like the polarization, defines a certain degree of orientation of the spins of the deuterons, which can

assume three different orientations in a magnetic field. The degree of alignment may become as high as 60 % for the deuterons having a favourable orientation in the external magnetic field, and this corresponds to a spin temperature of 7 μ K. The average alignment of all the deuterons is unfortunately only about 10 %.

Better results could probably be obtained in monocrystals, in which it is possible to select the orientation of the molecules.

BEBC dismembered

Since the beginning of March, somewhat drastic surgery has been performed on BEBC, the 3.7 m European bubble chamber.

It will be remembered that BEBC had been from time to time behaving rather oddly during the charging and discharging of the magnet. While the



Photo taken at the beginning of May, showing a view of the dismantling of the magnet of BEBC, the 3.7 m European bubble chamber: iron magnetic shielding (1); lower (2) and upper (3) parts of the vacuum enclosure of the magnet; turbo-molecular vacuum pumps for the 'fish-eye' windows (4); the two superconducting coils (5); a handling platform (6); the two cryostats (7); the cover of the upper cryostat (8) suspended from the bar of the travelling crane which has a 170 ton carrying capacity. The chamber proper, not dismantled, is inside the shielding (1).



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magnet was being reheated last January, the same transitory phenomena re-occurred and measurements soon confirmed that there was a short-circuit not in the coil itself, but between the non-superconducting auxiliary wires. It was therefore decided to make repairs rather than run the risk of operating under these conditions bearing in mind there is a huge amount of energy stored in the magnet (730 MJ at 3.5 T). In order to make the repair, the magnet has had to be systematically dismantled starting with the upper plug of the magnetic shielding down to the coil and its defective wires inside the vacuum tank and the cryostats.

By the beginning of May, the diagnosis that had been made in February was shown to be right. While the whole of the superconducting section of the coil is in good order, the effects of a short-circuit have been detected (burnt insulation, fused copper wires,

etc.) between the ordinary wires passing vertically along one of the stays. The double pancake stacks are at present being taken apart so that the pancakes can be cleaned and the whole of the coil carefully inspected.

It is hoped that an explanation for this incident will be found, and various theories are now being examined. We shall be returning to this question in a subsequent issue.

Technology Meeting

From 24-26 April, CERN was the scene of the 'Meeting on Technology arising from High Energy Physics' which was the main subject of our April issue. Over 220 participants arrived from throughout Europe and heard review talks on the major fields of technology involved in doing our research. Half the time of the Meeting was available for touring the CERN

site where almost 300 exhibits were on display.

On Saturday, 27 April, the gates were opened for visitors from the technological and industrial community close to CERN. For example, technical colleges and chambers of commerce from Lyon, Bourg, Annecy, Grenoble, etc... in France and from Geneva, Lausanne, etc.* in Switzerland were invited to visit the exhibition.

Reactions to the Meeting were generally very favourable and most people appear to have drawn something useful from their visit. Many people seemed interested in sustaining the flow of information on the technological front. An attempt is being made to learn with some precision just what interested the industrial community before discussing whether CERN could do anything useful to respond to these interests.

In addition to the visitors from outside the laboratory, CERN staff also had the opportunity to learn in more detail of the work of their colleagues and even as a purely internal exercise in technological communication the Meeting and exhibition served a very useful purpose.

CERN COURIER Readership survey

In this issue of CERN COURIER is a readership survey for our 'external readers.' We should be grateful if you would give a few minutes to filling this in and returning it to CERN as soon as possible.

The aim of the survey is two-fold. First of all we should like to spring-clean our distribution list. Inevitably over many years, people's interests change and there may be a considerable number of names on our list, of people who at one time had reason to receive the journal but who are now