

PHYSICS

Super Electromagnets

A NEW TYPE of magnet that works at extremely low temperatures has been perfected and successfully used.

Dr. S. H. Autler of the Lincoln Laboratory, Massachusetts Institute of Technology, told the American Physical Society meeting in Cleveland that the magnets should be useful in laboratory research and as part of very sensitive radio receivers. The phenomenon known as superconductivity is used to produce the very small, inexpensive magnets, which can replace much more massive ones for some purposes.

As all other electromagnets do, the superconducting ones make use of the fact that a magnetic field is generated around any wire carrying an electric current. If the wire is wound into a coil containing many turns, the field may be quite strong. The giant electromagnets that move slabs of iron in a steel mill make use of this fact, as do electric buzzers and telephone receivers.

The electric current in a wire consists of tiny, negatively charged electrons mov-

ing through the metal. Although this motion ordinarily results in an electrical resistance that heats the wire, as in a toaster, certain metals undergo a change in their properties when cooled to extremely low temperatures and show no electrical resistance.

These temperatures are near absolute zero, or more than 459 degrees below zero Fahrenheit. Since there is no known resistance to slow the electrons, a current once started in such a metal will seemingly flow indefinitely. Hence, the name superconductor.

Some common metals such as lead and tin become superconductors near absolute zero, but the new magnets are made of niobium because stronger magnetic fields can be obtained with this material. The magnets are kept in flasks, like large thermos bottles, that contain liquefied helium. Only a small voltage, such as from a flashlight battery, is needed to start the current. Once started, the current will continue to flow and generate an extremely stable magnetic field.

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PHYSICS

Find Hypernuclei's Age

A FLEETING lifetime of only about a ten-billionth of a second has been found for the new, man-made species of atomic nuclei known as hypernuclei.

In the strange world of atomic cores, where many of the laws of ordinary matter seem no longer to apply, the hypernuclei are among the strangest of the nuclear fragments so far discovered. They consist of ordinary atomic nuclei in which the neutral particle called a lambda hyperon is substituted for one of the neutrons.

When the lambda zero hyperon disintegrates after its extremely short life, the hypernucleus that contains it bursts apart.

By studying the various remains of this shattering, scientists are learning more about the forces of nature and what holds atomic cores together.

At the American Physical Society meeting in Cleveland, Dr. R. Levi Setti of the University of Chicago reported that hypernuclei have so far been made only for the seven lightest elements, from hydrogen through nitrogen. Even in this limited range, he said, the picture being drawn of hypernuclei is "quite different from ordinary nuclear physics."

This is because the neutral lambda particle is different from the ordinary nuclear constituents, neutrons and protons, and does not obey the same laws. The known information on hypernuclei comes mainly from studying about 600 examples when the tracks made by their disintegration

products were left in photographic emulsions.

Liquid helium bubble chambers can be used to study the hypernuclei in a controlled manner, Dr. Martin M. Block of Duke University reported. He said a lambda helium four could be formed in the liquid helium by absorption of a negatively charged K meson. A lambda helium four is a helium nucleus containing two protons, one neutron and the lambda zero hyperon.

Dr. Block said the liquid helium bubble chamber is a "very powerful instrument" for studying light hypernuclei because the helium nucleus can form only three different types of hypernuclei, making their identification easy and certain.

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PSYCHOLOGY

Dogs Too Long in Kennels Fail the Blind

PUPPIES as well as children may suffer from too long confinement in institutions during early development, Dr. J. P. Scott of the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Me., and C. J. Pfaffenberger of Guide Dogs for the Blind, San Francisco, suggest as the result of research on dogs.

Puppies left for long periods in kennels show a much higher proportion of failures when trained as Guide Dogs than do those

puppies which are promptly sent out to private homes.

During the normal procedure at Guide Dogs for the Blind, puppies are raised in the kennels and begin to get their first contacts with the outside world when they are given a series of puppy tests beginning at eight weeks of age. These tests take the puppies outside the kennels and give them contact with many human handlers. This lasts until 12 weeks of age when the puppies are placed in "foster homes" provided by 4-H Club members, returning to be trained as Guide Dogs at one year of age.

In some cases puppies were left in the kennels for longer periods because homes were not immediately available. When the records of these puppies were examined it was found that the number of puppies becoming successful Guide Dogs fell from 90% to 40%, if kept in the kennels more than two weeks after the normal time for placement.

Hereditry as well as early experience plays a part. Puppies which failed the original aptitude tests showed an even higher rate of failure as adults. Furthermore, some of the dogs left in the kennels as long as seven weeks still became successful Guide Dogs, indicating that animals with especially good hereditary capacities were able to withstand the unfavorable early environment.

The dog experiences are comparable to those noted by human social workers upon children reared in orphanages. The exact reason for the detrimental effects of this type of early experience cannot be told from the data, but one of the chief reasons for later failure is the inability to "take responsibility" for the blind person in situations requiring independent judgment by the dog. This suggests a failure of the puppy to complete the process of socialization and become strongly attached to human beings.

The researches are reported in the *Journal of Genetic Psychology* (September, 1959).

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ENGINEERING

Heavy-Duty Helicopter Carries Finished Bridge

See Front Cover

THE HEAVY DUTY helicopter called the Westland Westminster manufactured by the Westland Aircraft Ltd., Yeovil, Somerset, England, received its final test as it carried aloft a 103-foot, fully decked bridge.

The photograph of the cover of this week's SCIENCE NEWS LETTER shows the helicopter with the bridge in tow. In its final effort the helicopter carried the bridge at nearly 70 knots an hour and completed turns of 30 degrees. The "flying crane's" test started earlier this year with an undecked bridge to which decking stages were added in subsequent tests.

Powered by two Napier Eland turbo shaft engines, the helicopter will also be in a passenger or troop-carrying version capable of seating as many as 46 persons.

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