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Nobel Prize in Physics 1958



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The Nobel Prize in Physics 1958 was awarded jointly to Pavel Alekseyevich Cherenkov, Il´ja Mikhailovich Frank and Igor Yevgenyevich Tamm *"for the discovery and the interpretation of the Cherenkov effect"*.

RESEARCH INFORMATION:

The notion of matter as something built up of very tiny and indivisible atoms is a heritage from classical times. Since, however, experimental research in our days has shown that the atoms in their turn are complicated structures, the notion of indivisibility has been transferred to the so-called elementary particles of which the atom is composed, in the hope of therewith having reached the ultimate limit for the division of matter.

However, the different kinds of elementary particles showed an alarming tendency to increase in number - something which is at variance with the attractive idea that matter is built up of one or at most two kinds of particles.

Among the most successful and noteworthy uation is Dirac's theory of particles and attempts to interpret this situation is Dirac's theory of particles and antiparticles, which may be designated, almost, as each other's mirror images. Both kinds of particles are conceived as arising through the formation of pairs and as reciprocally annihilating each

other. The world in which we find ourselves belongs, by chance, to the one kind of particles, among which sporadically occurring antiparticles are very quickly destroyed. On account of the mirror symmetry it would be very difficult to decide whether a remote star or galaxy belonged to the one or the other kind of matter.

There were probably very few physicists who at first ascribed to this side of Dirac's otherwise very valuable theory any real import until, quite suddenly and unexpectedly, the first antiparticle, the positive electron, was discovered by Anderson in cosmic radiation in the year 1931. Continued investigations showed that the new particle behaved in all respects according to Dirac's theory: that it was manifested, namely, in connection with some energetic process, always together with an ordinary electron, and that it disappeared in the same way and with equal suddenness. Today nothing is better known and clearly elucidated than this process of pair formation and annihilation.

Nonetheless it now seemed desirable to test the validity of this remarkable theory upon the antiparticle to the proton, the nucleus of the hydrogen atom - a process which required, however, about 2,000 times as great an amount of energy. Such quantas of energy do, certainly, occur in cosmic radiation, but in such a random way that it was finally realized that the only systematic way of investigating the process was through the controlled production of the antiproton by means of an accelerator with a sufficiently high capacity.

It has been said of the *Bevatron*, the great proton accelerator at Berkeley University in California, that it was constructed chiefly with a view to the production of antiprotons. This is perhaps an exaggeration, but in so far correct as its peak achievement, 6 milliard electron volts, was set with a view to the energy required for the pair formation of protons - antiprotons. That it was constructed in Berkeley was due to the tradition established there ever since Lawrence built the first cyclotron and McMillan developed the principle for the synchronization of relativistic particles.

But even if antiproton research was thus first made possible through this technologically very impressive machine, the actual discovery and investigation of the

antiproton was chiefly the merit of Chamberlain and Segrè. With similar methods an antiparticle to the neutron has subsequently been discovered, a discovery whose importance lies in the fact that the concept of the antiparticle was thereby extended to include also the neutral elementary particles.

Professor Emilio Segrè, Professor Owen Chamberlain. Your discovery of the antiproton was made possible through the excellent resources at the Radiation Laboratory in Berkeley. It is, however, your ingenious methods for the detection and analysis of the new particle that the Royal Swedish Academy of Sciences wishes to recognize on this occasion.

I need surely not remind you, Professor Segrè, of the occasion, twenty-one years ago, when your compatriot Enrico Fermi received his Nobel Prize in this selfsame place. You and he were intimate friends and you had been collaborating with great success. Both of you belonged to that group of distinguished Italian scientists that was westward bound in those days.

Also you, Professor Chamberlain, must surely have an intimate and abiding recollection of your years together with Fermi in Chicago.

For more details please visit:

http://www.nobelprize.org/nobel_prizes/physics/laureates/1959/press.html