PHYSICS

Positive and Negative Electrons Apparently Produced in Pairs

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PAIRS OF ELECTRONS, one positive and one negative, are sometimes produced when gamma rays from the element thorium pass through matter. This was reported by Dr. Carl D. Anderson of the California Institute of Technology, Pasadena, as a support of Dr. R. A. Millikan's contention that cosmic rays are originally mostly photons, or "bits of light," like gamma rays. Dr. Anderson has observed that among the energetic cosmic ray electrons there are about as many positive as negative electrons, as if they were produced in pairs.

Dr. Niels Bohr, the great Danish physicist now in Pasadena, said that after listening to the evidence it was scarcely possible to doubt the reality of the positron. He is the particular authority for modern theoretical physicists, yet he gave them something of a shock when he said that although theory had predicted the positron few theoretical physicists would have dared emphasize that before experiment had brought it out.

The basis for our belief in the positron is therefore almost entirely an experimental one.

Dr. Bohr began a series of lectures on the foundations of atomic mechanics. He began with a careful discussion of the famous uncertainty principle, which has in recent years received unhappy treatment. He explained how the act of observation disturbs an electron or atom so that we must remain uncertain as to what its behavior would have been had we not observed it. If we give up the idea of trying to find what it would have done we save ourselves a great deal of worry and see the problem more rationally. Paradoxes then all disappear and atomic mechanics can describe all phenomena, provided we do not inquire about the atomic constitution of our measuring apparatus.

When, however, we examine too closely we get into trouble with relativity. Physicists are stumped at this point and need further experiments to help them out.

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METALLURGY

New Discovery Shows How Films Hold Fast to Metals

BETTER protection for metal surfaces against rust and corrosion may be one of the practical results of an important discovery in pure science just reported to the Royal Society by two British physicists, Prof. G. Finch and Dr. Quarrell of Imperial College.

Their discovery has to do with the way thin films of atoms or molecules arrange themselves when they are deposited on the surface of other metals by the special electrical method known as "sputtering." They found that the atoms in such films arranged themselves in the shapes of the metallic crystals underlying them, and not in the crystal shapes proper to their own natural makeup. Thus alumimum deposited on platinum assumed the dimensions of the platinum crystals so far as length and breadth were concerned, though the aggregations of atoms kept the greater height characteristic of aluminum. In this case the aluminum actually became denser than normal, because in two of its dimensions it had patterned itself upon the denser metal, platinum.

A deposit of zinc oxide upon zinc again crowded its crystals to fit them to the dimensions of the smaller zinc crystals. However, in this case the zinc oxide crystals grew taller than normal, so that their total volume remained unchanged.

The significance of the shaping of the deposited substance's crystals to fit the shapes of the underlying metal lies in the fact that there must exist between the crystals of the deposit and those of the substratum a special union or bond that will hold very firmly against any disruptive force. The deposited film is no mere loose layer laid over the surface, but is gripped by every atom in it.

The influence of the underlying metal extends for some little distance upwards, the Imperial College physicists discovered. The crystal shapes of the underlying metal were preserved through a deposited layer as much as fifty atoms thick, their X-ray photographs showed. They are continuing their studies of the physical properties of the films they have already deposited, and are making new films for further research.

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In recent experiments, it was found that peas on diseased vines grow more rapidly than peas on healthy vines.

The Department of Agriculture says that industry could use up a million more bales of cotton than it now takes, by wider use of cotton in bags and bagging.

In ironing different fabrics, a home economics specialist advises that linen withstands more heat than most fabrics, cotton takes less ironing heat, wool still less, then silk, and then synthetics.