

PHYSICS

Artificial Gamma Radiation Approximates Cosmic Rays

New Simple Apparatus, Using old Cat-Stroking Principle, Expected to Generate Potential of 20,000,000 Volts

WITH production in Germany of artificial gamma rays of intensities that approach those of the mysterious cosmic rays, and with twenty million volts promised by a Princeton physicist's new apparatus, Prof. Arthur H. Compton, Nobel prizeman, foresees the possibility that man may be able eventually to tap the internal energy of matter and put it to work. A new idea of how the energy stores of our brilliantly radiating sun are supplied was also advanced by the University of Chicago professor, at a conference sponsored by the American Institute of Physics at New York.

An experiment by Dr. Walter Bothe, German physicist, was heralded by Prof. Compton as "remarkable" and as accomplishing what has long been "considered an impossibility." On his recent trip to Europe, Prof. Compton learned that Dr. Bothe has been able to produce artificial gamma rays by bombarding beryllium metal with alpha rays. These artificial gamma rays are an approach to artificial cosmic rays. They are the same kind of radiation as light and X-rays, except that they are much more penetrating. The beryllium metal from which they were obtained is the lightest metal that can be used practically, and the alpha rays that were used by Dr. Bothe in the bombardment are speeding hearts of helium atoms given off when radium and other elements disintegrate radioactively.

Amazing Result

The amazing result of Dr. Bothe's experiment, as explained by Dr. Compton, is that there is obtained from the bombardment of beryllium, through the giving off of the artificial super-gamma ray, much more energy than was supplied by the attacking helium atom heart. This is interpreted to mean that what happens is not the disintegration of the beryllium but an actual process of synthesis in which a heavier element, carbon, is formed and energy is liberated in the form of the artificial "soft" cosmic rays.

If that is so, the hope of obtaining

energy from such artificial synthesis is due for a revival. There is hope also that one element can be changed into another and that the age-long wish for transmutation may be fulfilled.

The practical application of this possible new energy source is made difficult by the fact that only one in fifty thousand of the projectiles hurled at the beryllium hits its mark and the process is therefore dreadfully inefficient. Although there may be places in the universe where the synthesis proceeds at a much faster rate, the physicists are frankly not optimistic about making this energy source competitive with coal, oil and water power.

But conditions in the sun may be different, and the theory is advanced that solar energy that warms and lights our earth may be the result of synthesis in the sun rather than the present favorite theory of the conversion of matter into radiant energy. This idea carried to its logical conclusions may greatly affect all ideas of how the solar system and our earth originated.

In testing these latest physical theories and providing more powerful electrical tools, a new electrical generator developed at Princeton University by Dr. Robert J. Van de Graaff, now of the Massachusetts Institute of Technology, will be useful. A large generator to be built in an airship hangar near New Bedford, Mass., is expected to produce ten to twenty million volts. A model built at Princeton gave one and one-half million volt sparks that jumped three feet.

Simplicity marks this new method of producing previously unattainable direct current voltage. It operates on the ancient principle of static electricity, that is utilized when you obtain sparks from a cat's back or scrape your feet across a rug and then touch metal. In the large generator the operator will sit inside one of two fifteen-foot-diameter electricity-collecting spheres, and, although he will be charged with from five to ten million volts, they will not harm him because he will not be grounded.

Prof. Compton, as the result of his

survey of present knowledge of the atomic nucleus, believes that "we may have to find some fundamental principles of the physical world which are as yet unknown" before the nucleus can be understood. He recalled that the Danish physicist, Prof. Neils Bohr, has suggested that perhaps the principle of the conservation of energy, long considered the foundation rock of modern science, is not obeyed when electrons are ejected from atoms.

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ENTOMOLOGY

Insects Active on Many Battlefronts Until Frost

DAMAGE to man's crops and trees, inflicted by enemies that never let up so long as they can crawl, is reported from a score of battlefronts in this country by the Bureau of Entomology of the U. S. Department of Agriculture. Until frost stills them, and even after frostfall, in greenhouses and other sheltered places, the war against giant man waged by swarming insects goes on unabated.

The fall armyworm is a foe that can be depended on to crop up somewhere every year. Its latest depredations, according to the Bureau of Entomology report, have been in the sugarcane and soybean fields of Louisiana, and in Michigan greenhouses. Another destructive caterpillar was the cabbage web-



DR. ROBERT J. VAN DE GRAAFF
Former National Research Council fellow, with the model of his high voltage generator.