PHYSICS

Cosmic Rays Analyzed

Particles of the lighter elements found by British physicists to be present in cosmic rays in vast excess of their previously known existence in the universe.

➤ THE COSMIC ray thinking of scientists will have to be changed again in the light of new observations revealed to the Royal Institution in London by Prof. C. F. Powell, F.R.S., of the H. H. Wills Physical Laboratory of Bristol University.

Prof. Powell disclosed that University of Bristol physicists, Drs. A. D. Dainton, D. W. Kent, and P. H. Fowler, have recently analyzed the mass spectrum composition of the cosmic rays bombarding the earth at a height of 95,000 feet. They found that, contrary to previous reports, the particles of the lighter elements, lithium, beryllium and boron, are present in vast excess of their known existence in the universe.

This is interpreted to mean that the cosmic rays reaching the earth are not representative of conditions at their points of origin and that the nuclei of the heavier elements have been in collision in their journey through space. These collisions cause the splitting of the heavy nuclei into smaller particles. As a result the lighter nuclei are found in such preponderance by the time the cosmic rays reach the earth's upper atmosphere.

Prof. Powell believes this new information may lead scientists back to an earlier theory of two pioneer American cosmic ray physicists, Dr. Bernard Peters and the late Dr. H. L. Bradt. This early theory proposed that the matter which is shot earthward to produce the cosmic radiation is initially "composed entirely of the heavier elements, possibly iron and nickel; and that the lighter nuclei, particularly those of hydrogen and helium, arise through the fragmentation of the heavy nuclei in collisions with interstellar hydrogen."

Iron and nickel are suggested as the parent elements of cosmic radiation because they are the heaviest elements so far observed shooting earthward out of space.

Prof. Powell points out the urgent necessity for gathering further cosmic ray information at heights in excess of 100,000 feet to get away from the interference of the molecules in the earth's atmosphere. Even at 90,000 feet the atmosphere is still sufficiently dense to exert a pressure of almost one-quarter pound per square inch.

At 120,000 feet the atmospheric pressure would be reduced to about one-fifteenth pound per square inch.

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ASTRONOMY

Clue to Age of Universe

Astronomer advises that age of universe can be figured out more exactly by making comparisons between near-by and distant clusters of galaxies.

➤ THE AGE of the universe can be estimated more exactly by comparing near-by and distant clusters of stellar systems or galaxies which contain hundreds of systems like the Milky Way galaxy to which we belong, points out Prof. Fritz Zwicky of Mount Wilson and Palomar Observatories of the Carnegie Institution of Washington and the California Institute of Technology, Pasadena, Calif.

The question of the age of the universe can be decided through the use of a new, powerful method, that of "dimensionless morphology." There is no need to probe painstakingly into space with conventional methods to discover about how old the universe is, Dr. Zwicky states. For a quick decision, the use of the 200-inch telescope will be necessary.

Astronomers interested in the universe's age should concentrate on near-by and exceedingly distant groups of galaxies, comparing them for number of galaxies and way in which the brightest ones are distributed in the groups, and for change of color among the individual galaxies, he remarked.

If the universe is only three billion years old and is expanding, we should be able to note changes taking place among these clusters of star-cities. Those farthest from us would have been expanding the least and should be the most compact.

Many theories about the age of the universe have been presented within recent decades. The shift toward the red end of the spectrum in the fanned-out light of a distant nebula has been interpreted by some to be caused by the external galaxies flying from us, the more distant receding the fastest. If this is true, a much smaller universe started flying apart about three billion years ago. Others hold that the universe is much older and only appears to be expanding.

"One of the easiest approaches to the problem of the age of the universe," Prof. Zwicky reports to the Astronomical Society of the Pacific, "lies in the investigation of objects whih could not possibly have existed in their present form in a much more contracted universe."

Regular and irregular clusters of galaxies, particularly clouds of such space-filling clusters of stellar systems, are of such tremendous size they could not possibly have existed as we know them in a small, compact universe.

"If we find at great distances many compact clusters of galaxies whose total popuiation is considerably greater than that of the clusters in Coma, Perseus and Hydra, we may be on the trail of some evolutionary changes," Prof. Zwicky concludes.

Some sponsors of the short-age of the universe hold that the evolution of stars closely parallels the evolution of the universe. It will therefore be fruitful to compare in particular the frequency of supernovae, worn-out stars flaring up for the last time, in very distant galaxies with the frequency of such brilliant flare-ups in neighboring galaxies, the CalTech astronomer states.

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GEOLOGY

Find Unusual Phosphate Minerals in Brazil

➤ NEWLY-DISCOVERED occurrences of several uncommon phosphate minerals in northeastern Brazil have been reported by Dr. Joseph Murdoch, professor of geology at the University of California at Los Angeles.

Addressing geologists attending the Cordilleran section meeting of the Geological Society of America at the University of Southern California, Los Angeles, Dr. Murdoch revealed he had found such minerals as graftonite, lithiophilite, triplite, amblygonite and apatite in mine cuts where beryl and tantalite were mined during World War II.

The beryl and tantalite had originally been mined for use in steel production.

The phosphate minerals, however, are in the nature of geological oddities—they are found only in small quantities and have little or no commercial use.

The U. C. L. A. geologist said it was possible for him to visit far-flung pegmatite areas of the South American country because of the aid given him by the Brazilian government.

Some of the minerals found on his trip are still to be identified.

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