

COSMOLOGY

Einstein and de Sitter Return To Euclidean Idea of Cosmos

Receding Nebulae and Heckmann's Suggestion Cause Eminent Scientists to Drop Theory of Curved Space

PROF. ALBERT EINSTEIN, father of relativity, says that space may be and probably is the sort of uncurved, three-dimensional space that Euclid imagined and countless generations of schoolboys have learned. Although Prof. Einstein in a sense scraps the less familiar and more complicated brands of space-time that he has been using, this does not affect the validity of relativity, which has been at the foundation of so much scientific thinking for the past two decades.

Worked Together

Prof. Willem de Sitter, Dutch astronomer, who had built his own shape of universe on Einsteinian foundations, joins with Prof. Einstein in espousing space which is on the average Euclidean. These two eminent astrophysicists conceived the new kind of universe when working together recently at Mt. Wilson Observatory and their joint announcement was made to the world through the medium of the *Proceedings of the National Academy of Sciences* just issued. Prof. Einstein is now en route to his home in Germany while Prof. de Sitter is travelling in South America.

This joint announcement, that is sure to cause a furore in the world of science, means that the universe around us may be not only unbounded but infinite, instead of finite and unbounded as Einstein and his followers have previously believed.

In the Euclidean universe now reenthroned, light travels in straight lines and goes on and on forever and ever. A ray of light would not traverse the circuit of the universe and come back to where it started as it would in the superseded Einstein and other varieties of space. Curvature of space is on the average banished from the universe.

"We must conclude that at the present time it is possible to represent the facts without assuming a curvature of three-dimensional space," Profs. Einstein and de Sitter say in their report.

Two important developments made

Einstein and de Sitter change their universes. One of these was the piling up of evidence at Mt. Wilson Observatory at Pasadena, Calif., by Dr. Edwin P. Hubble and others that the shift toward the red of spectrum lines in light from far distant nebulae is evidence that the universe is expanding at a terrific rate, as high as 15,000 miles per second and that the farther away the nebula the faster the recession.

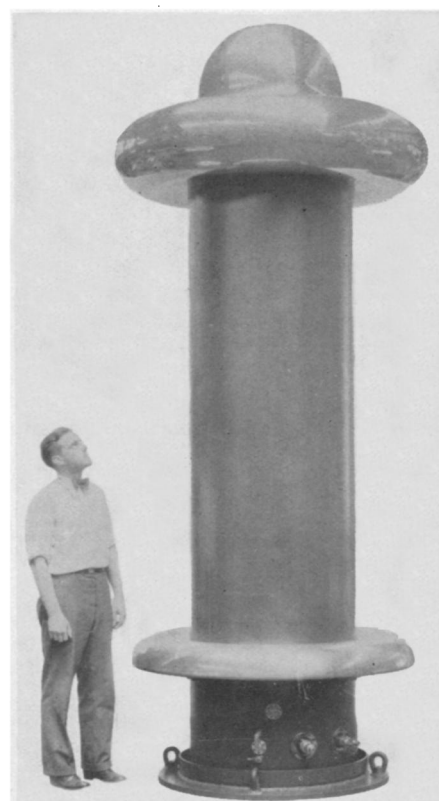
The other factor was the demonstration by Dr. Otto Heckmann, privatdozent in astronomy at the University of Goettingen, Germany, that an expanding universe can have matter throughout it and still be Euclidean. When Einstein built his first universe he did not dream of an expanding space. He thought it static and constant in size and found himself forced to make space curved to fit this idea. This gave his famous finite but unbounded universe which, upon Dr. Heckmann's suggestion, he and de Sitter now revise.

Red Shift in Light

Into the equations of Einstein relativity which have stood the test of time, Profs. Einstein and de Sitter, following Heckmann's lead, have inserted both Euclidean space and the recessional velocity of the nebulae indicated by the expanding universe idea and the Mt. Wilson measurements of red shift in light from the nebulae. The scientists were then able to compute the density of matter in the universe and found that it compares favorably with the ideas that are current as to how matter is spread throughout space on the average.

It is almost impossible to imagine how thinly spread on the average is the matter in the universe. One pound of matter spread throughout a sphere sixteen times the diameter of the earth would give this extremely small density of matter. And as the universe is expanding at a super-terrific rate at extreme distances outward, always getting larger as it were, the density of the matter in the universe must be getting less and less.

Profs. Einstein and de Sitter observe, however, that as more astronomical data are gathered it will undoubtedly be possible to determine with more precision the density of matter in the universe. If it should turn out that there is more matter per unit volume of space, then it will be necessary to return to the original Einstein space even with an expanding universe. If the matter is more sparsely distributed, it will be necessary to learn to live in a space of average negative curvature, such as Lobatschewski, the Russian scientist, dreamed of a century ago. In this strange space an infinite number of lines parallel to a given straight line can be drawn through any point. (Please turn page)



NEW WEAPON AGAINST CANCER

Seven hundred thousand volts will be made easily available to the California Institute of Technology scientists by two new giant X-ray transformers made by engineers of the General Electric Company. One of these, shown above, has already been shipped to the coast and the other is nearing completion.

Cancer research will benefit from the building of these new transformers, which will be used in the Kellogg Radiological laboratory to operate the X-ray tube of Prof. C. C. Lauritsen. Rays equal in penetration to those of radium at present used in treatment will be produced with their aid. Electricity from the mains at 220 volts, fed into these two transformers placed end to end, will come out at the other end as a total electric pressure of 2,000,000 volts.