

# COSMIC RAY RIVALS TO MEET IN DEBATE

## Clash of Millikan and Compton Theories to Form High Point at Scientific Convention.

### 4,500 TO ATTEND SESSIONS

#### Atlantic City Meeting This Week to Hear 1,500 Papers—Gerard Swope to Speak on Unemployment.

Special to THE NEW YORK TIMES.  
ATLANTIC CITY, Dec. 25.—The nature of cosmic rays, revolving around the specific question whether they enter the earth's atmosphere as electrically charged particles or as photons, will be the subject of debate between two of America's outstanding physicists at the annual meeting of the American Association for the Advancement of Science, which opens here Tuesday.

More than 4,500 scientists, laboratory workers and teachers of science will attend the meeting of the association and its affiliated scientific bodies.

The two physicists who will discuss the nature of cosmic rays, a subject which has agitated the entire scientific world, are Professor Arthur H. Compton of the University of Chicago and Professor Robert A. Millikan, president of the California Institute of Technology. They are the only living American winners of the Nobel Prize for Physics and both are leaders in this field of research.

While Professor Compton will defend his theory that cosmic rays are not true rays but enter the earth's atmosphere as electrically charged particles moving at tremendous speed, Professor Millikan will hold to his conception that the rays are not particles but photons, true rays of extremely short wave length.

Dr. G. L. Locher of Rice Institute will present a third paper in the round table at which the subject will be debated.

#### Recent Tests Back Compton.

Dr. Compton will be armed with maps and charts, just completed, showing the results of cosmic-ray tests made under his direction within the past eighteen months by sixty observers at eighty-one widely scattered places on the earth's surface. Observations made by seven parties, including his own, have been correlated by Professor Compton in support of his theory. Two additional parties are now at work.

Professor Compton and Professor Millikan will read their papers on Friday. The debate between the two will be the high point of the meeting.

Although differing in their basic conceptions as to the nature of cosmic rays, Dr. Compton and Dr. Millikan agree that at sea level the rays consist of a mixture of electrically charged particles and photons. This is due to secondary effects.

Crucial is the question whether cosmic rays vary in intensity according to latitude. Dr. Compton finds that they "show a marked variation in intensity at the temperate and polar latitudes," owing to the effect of the earth's magnetic field. He points out that photons, or true rays, should not be thus affected.

Another central point of the debate will concern the variations of intensity of cosmic rays with altitude. According to Dr. Millikan's hypothesis, cosmic rays should become more intense at higher altitudes, up to a maximum point, where the intensity begins to diminish rapidly. Dr. Compton's theory, on the other hand, is that the rays increase in intensity with altitude and do not diminish but "approach a limiting value." In this theory Dr. Compton supports himself on the observations made by Professor Piccard in his famous balloon ascension into the stratosphere, and on those of Professor Regener of Germany, who sent a balloon up twenty-five miles this Spring.

Dr. Millikan's hypothesis about cosmic rays, that they originate in interstellar space as "birth-shivers of the atom," derives from the larger hypothesis advanced by his former colleague at the University of Chicago, Professor W. D. MacMillan, mathematic astronomer, to the effect that energy is being resynthesized into matter at a subelectronic level everywhere in space. Dr. Compton holds that cosmic rays contain so much energy that thousands of millions of volts would be required to produce them artificially.

The question has more than academic or purely scientific interest, for the belief of scientists is that cosmic-ray study may lead to new knowledge of how radiant energy is produced and how atomic energy may eventually be liberated for useful purposes.

#### 1,500 Papers to Be Read.

This year's meeting of the American Association for the Advancement of Science will be one of the largest and most interesting ever held.

Fifteen hundred papers will be read and lectures delivered on a wide variety of subjects, including mathematics, physics, chemistry, astronomy, geology, geography, zoology, botany, anthropology, psychology, sociology, economics, history, philology, meteorology, engineering, medicine, dentistry, agriculture, education and science in general.

In the field of economics, the unemployment question will occupy a prominent place, relief and prevention being allotted considerable space on the program. Speakers on unemployment will include Gerard Swope of New York, chairman of the board of the General Electric Company, and Charles F. Kettering of Detroit, president and general manager of the General Motors Research Corporation.

Dr. Franz Boas of Columbia University, noted anthropologist, retiring president of the association, will deliver his address Tuesday evening. The new head of the association is Dr. John J. Abel of Johns Hopkins Medical School, Baltimore.

Sessions will be held from Tuesday to Saturday, inclusive, in the Municipal Auditorium.