

and her husband M. Joliot in their Paris laboratory.

The fears of scientists that the physical laws of the conservation of energy do not hold in experiments on atomic collisions are rapidly lessening, the veteran scientist-peer told his listeners. Up until last year, he pointed out, certain tests seemed to indicate that more energy was liberated in some types of atomic collisions than was put into them.

In his opinion, Lord Rutherford continued, recent studies on the nucleus of atoms justifies the assumption, that the conservation of energy holds for all atomic transformations.

New measurements on the masses of atoms by Prof. F. W. Aston at Cambridge University in particular, Lord Rutherford indicated, have shown that the masses of some elements were not previously known with sufficient precision. Such lack of knowledge, if not proving definitely that the conservation law holds, plainly strengthens the case for the hitherto basic principle of physical science.

*Science News Letter, September 14, 1935*

## AERONAUTICS

## New Stratosphere Flight To be Made in October

RAPID City, S. D., has been selected as the site for another flight of the stratosphere in October, officials of the National Geographic Society have announced.

Studies of the weather conditions at Stratobowl in the Black Hills for the last fifteen years disclose that October usually has periods of good weather long enough to make the flight a possibility.

In the decision which will send the Society-Army Air Corps balloon Explorer II aloft again, Rapid City won out over Scott Field, Illinois, as the take-off site. Much of the equipment is still at Rapid City, and it had been decided that if weather conditions at the two places were at all comparable for October the South Dakota site would again be used.

The entire top of the Explorer II is being rebuilt in the Goodyear Zeppelin factories in Akron, Ohio, and will be delivered to Rapid City this month.

*Science News Letter, September 14, 1935*

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## PHYSICS

# High Temperatures Calculated For Radio Roof of World

## Exceedingly Low Densities of Kennelly-Heaviside Layers Declared Traceable Only to High Temperatures

IT HAS been just ten years since the existence of the radio roof surrounding the earth—the layers of ionized atmosphere which reflect radio waves—was first demonstrated. Known as the Kennelly-Heaviside layer after the American and British scientists who first postulated its existence, these reflecting layers have been the subject of intensive research ever since.

Not one, but three, layers have been found which are now called the E, F<sub>1</sub> and F<sub>2</sub> regions at heights of roughly 65, 115 and 150 miles respectively.

Much useful knowledge has already been gleaned from the ten-year research, but few more startling suggestions have occurred than that just offered by Prof. E. V. Appleton, Wheatstone professor of physics at the University of London.

Reporting new tests, Prof. Appleton, with R. Naismith as co-worker, (*Proc. Royal Society*, July), suggests that in the F<sub>2</sub> layer, between 124 miles and 248 miles above the surface of the earth, the temperature at noon time in summer should be 1700 degrees Fahrenheit. Such extreme temperatures are needed to provide a reasonable explanation for his experimental findings.

A temperature of 1700 degrees Fahrenheit corresponds to 927 degrees on the Centigrade scale, which is sufficient to melt elements such as cadmium, calcium, lead, lithium, magnesium, silver, tin and zinc. No man-directed balloon with a magnesium alloy gondola may ever reach altitudes of 150 miles, but what would happen to it if it did makes one pause and think.

"Owing to the low molecular density of the air at the level of the region F<sub>2</sub>," says Prof. Appleton, "we may expect marked heating by solar radiation. This can take place as a result of molecular dissociation, or as a transfer of energy to the electrons via excited molecules, or as a result of the process of ionization generally." Such heating reduces the density of the air at which the greatest ion production can take place.

In a shorter summarizing article (*Nature*, July 13), Prof. Appleton has discussed this same point as follows:

"It is not difficult to show that the

abnormally low value of summer noon ionisation density can only be the result of a reduced summer air density at the level in question, otherwise we should have to assume that the solar ionising rays differed in quality from summer to winter. Such a reduced air density can again only be the result of an increased temperature. Putting these ideas into quantitative form, we find that the molecular temperature must be three to nine times as high on a summer noon as on a winter noon, and that the absolute temperature at a level of 300 km. must be at least 1,200° K on a summer day."

Three hundred kilometers amounts to about 186 miles, and 1,200 degrees K equals 1,700 degrees Fahrenheit.

*Science News Letter, September 14, 1935*

## ENGINEERING

## Tower and Insulators Spread Steel Network Against Sky

SYMMETRY and design typify the SCIENCE NEWS LETTER cover this week, in the illustration of a modern tower for electric transmission lines. The auxiliary copper leads carrying the current around the giant insulators can be seen hanging in large arcs at the left, near the center. The insulators must not only be of sufficient size to prevent a jump-over of the line voltage at thousands of volts to the ground but should also hinder, if possible, the much higher voltage of lightning strokes.

*Science News Letter, September 14, 1935*

## ● RADIO

Tuesday, Sept. 17, 3:30 p. m., E.S.T.

SCIENCE IN TRANSPORTATION, by Dr. C. F. Hirshfeld, chief of research, Detroit Edison Company.

Tuesday, Sept. 24, 3:30 p. m., E.S.T.

THE DEPRESSION AND MENTAL DISEASE, by Dr. Carney Landis, New York State Psychiatric Institute and Hospital.

In the Science Service series of radio addresses given by eminent scientists over the Columbia Broadcasting System.