PHYSICS

Relativity, Quantum Theories Reconciled by Eddington

Complete Ignorance Impossible, He says; Even When Position of Particle is Unknown the Uncertainty is Limited

THE UNIVERSE as a whole shook hands mathematically with the realm of the infinitesimal, as Sir Arthur Eddington, the British universe-maker, acted as master mind and introducer before the meeting of the National Academy of Sciences.

The unification of the relativity theory and the quantum theory was Sir Arthur's task. He took the universe as pictured in formulae by Einstein and others, himself included. He took the mathematical picture of the sub-atomic world of the quanta. He brought them together.

It is difficult, nearly impossible, to put what he has done into words. Sir Arthur says so himself. It is a matter of expressing the constants of the universe and of gravitation in terms of the electric charge and mass of the electron. The mathematical language of astronomy is translated into the language of sub-atomic physics.

One of the strange ideas used is that in the universe of relativity mass is associated with the curvature of space and that in a flat, purely Euclidian space there would be no mass or matter. To get at the mass in the realm of the quantum theory, Sir Arthur used what he called a "short cut." He dug out the mass by means of the use of the famous uncertainty theory, which says that the mass of a particle can be known only if there is uncertainty about its position.

Uncertainty Limited

There is a limit to the uncertainty of the position of a particle in the universe even if it is totally unknown. Sir Arthur used an analogy that might have referred to the present Dillinger pursuit. The authorities, he said, might know absolutely nothing about where an escaped criminal is located, but they can locate him within some 12,000 miles because he must be on the surface of the earth. So Sir Arthur locates the particles whose mass is desired as somewhere in the universe, with a certainty of a few thousand million light years. With this limit to the uncertainty he is able to derive without the aid of experiment values of the electron and proton that agree closely with those obtained by experiment.

The electric charge on these particles originates in the division of the universe's mass into a large number of particles, Sir Arthur explained. The charge comes when there are at least two particles and it can not exist when there is only one.

There is one incidental philosophical observation from Sir Arthur's uncertainty procedure: "You can not produce complete ignorance."

The numbers 136 and 137 bob up in the intricate equations as specially significant and interesting numbers. They are expressions of the degree of freedom involved, the ways that things can be considered and arise from out of the properties of the particles.

Sir Arthur gave credit to Prof. P. A. M. Dirac of England and Dr. Hermann Weyl, now at the Institute for Advanced Study, Princeton, for their work upon the problem of uniting the relativity and quantum theories.

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BOTANY-GEOLOGY

Plants of Hot Springs Aid in Rock Formation

PLANTS that build rock formations were described before the meeting of the National Academy of Sciences, by Prof. William Albert Setchell of the University of California. In spite of their massive activities, the plants themselves are very humble, being only thread-like algae, relatives of the slimy scums common on stagnant water.

The plants studied by Prof. Setchell are those of the hot springs. They extract minerals from the hot water, especially lime and silica. With the flinty silica, at least, they form shells about their bodies, within the layers of jelly-like stuff which they secrete. The extracted lime, in other springs, is deposited in crumbly masses. But in all cases the work of the plants seems to be that of active extractors, not merely of passive and inert objects on which the minerals deposit themselves. Their activity seems to be associated with the possession of the food-forming pigment, chlorophyll; though most of these plants are not visibly green because of their possession of other color-bodies that mask the chlorophyll.

Not all the plants that exist in hot springs aid in forming rock. Some deposit no mineral matter at all. There is one species, living in the hottest parts of the springs, that deposits crystalline sulfur when the water contains lime, but it does not separate out the lime.

Science News Letter, May 5, 1934

GEOLOGY

Supposed Meteorite Scars Called Ancient Lake Beds

THE "BAYS" of the Carolina coastal plain, which are great elliptical depressions lately called the result of a monster bombardment with fragments of a comet in some past age, were declared to be nothing more than shallow lake beds with sandy rims raised by the wind, by Prof. Douglas Johnson of Columbia University, speaking before the meeting of the National Academy of Sciences. (*See SNL, April* 1, 1933, *p.* 202)

The sand of the rims was derived from the sandy borders of the former lakes, Prof. Johnson said, and characteristic effects of wave erosion are still traceable in places, although the lakes are now for the most part filled with bog deposits, thickly overgrown with vegetation.

The longer axes of these elliptical "bays" are in general parallel, and this fact has been held up as evidence for the arrival from space of a flock of meteorites or a small comet made up of stony or iron fragments, crashing into the earth in one tremendous shower. But this parallelism, the speaker believes, was caused by wind control, as was also the varying breadths of the surrounding rims. He could detect no evidence that their formation was due to wave or current action.

Science News Letter, May 5, 1934

Freezing bread with "dry ice" to keep it fresh is the latest trick of the baker's art, reported to *Die Umschau.* When the bread is thawed out again it is as good as new, it is claimed. A patent on the process has been applied for.