a strong magnet, which turns the moving positive and negative particles in opposite directions.

In one pair of photographs, the nearly straight original track of a fast moving electron is seen to give rise to two oppositely curved tracks. The velocity of the particle causing the track may be estimated from the curvature of the path, the slower the movement the greater being the curvature. Thus it can be calculated that the formation of positive and negative electrons in the above mentioned instance was accompanied by a loss of energy equal to their mass multiplied by the square of the velocity of light—just as is the case when cosmic and gamma rays are changed into matter.

The fundamental law of the transformation of energy into matter seems therefore to have been exemplified for a second time, in a different manner.

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interest on his debts, and the science investment is less than 36 per cent. of the increase of next year's interest over this year's.

This small fraction of the federal expenditure that is being spent for scientific research will pay into the purses of the public, in savings, better living and increased earnings, dividends of thousands per cent. in the coming years. Some of the most outstanding industrial developments of today had their roots in Uncle Sam's delving into science in past years and the contributions made to human health and happiness, not always to be evaluated in dollars and cent. are legion.

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PHYSICS

Advanced Physics Theory Lags Behind Experimentation

THE MOST highly developed parts of that highly developed field of the new physics, quantum mechanics, are not good enough to predict the results of clever experimenters. The Zeeman effect, which describes the behavior of an atom in a magnetic field, and the light given out by the hydrogen atom are the subjects under fire.

So complacent is the physicist about these matters that the discrepancies would not be believed were they not put forward by the highest authority in the field. Prof. V. W. Houston, who has announced these results obtained at the California Institute of Technology with the collaboration of Prof. Y. M. Hsieh of Yenching University in China and L. E. Kinsler, a graduate student, is known to have done the best experimental work in both these fields. He is at the same time one of the country's foremost theoretical physicists so that his interpretations must be considered as quite reliable.

Prof. Houston had worked up a method based on the supposedly sound theory of the Zeeman effect for measuring the specific charge of an electron. His results were accepted and revised all previous work. Now with Mr. Kinsler he has found that in the simplest and apparently surest case, namely that of helium, the specific charge seems to come out wrong. Any physicist would have bet a hundred to one against this result.

In the other experiments with Prof. Hsieh on the fine structure of the hydrogen spectrum the results are startlingly different from the predictions of the equation of Prof. P. A. M. Dirac, British physicist. This equation represents the pinnacle of achievement in theoretical physics and was the main contribution of Prof. Dirac, who recently was awarded the Nobel Prize. But Profs. Houston and Hsieh show that even this equation is not good enough for exact work.

The difficulty with the theory seems to be that it treats the atom as if it were alone in space. Actually it is connected with its surroundings through electromagnetic fields. In other words it is part of the whole universe. How to take this interaction into account is likely to prove a highly difficult problem.

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PSYCHOLOGY

Stuttering Children Found to be Talkative

CHILDREN who stutter are more talkative, and use more words when they talk, than do children in an "average" group, Dr. H. Meltzer of the St. Louis Psychological Service Center has discovered. He applied the same test, consisting of the imaginative identification of the shapes of a number of ink blots, to fifty child stutterers and an equal number of children of the same ages taken from the general population.

The small stutterers were found to be nearly forty per cent. more talkative than the "control" group, that they averaged 200 words apiece as against 135 for the other children, and that they responded to the question "What could that be?" quite as quickly as did those without speech impediments.

"If the number of words used in the total time taken is considered as an index of rate of talkativeness, the mean rate for stuttering children is 51.08 per cent. greater than it is for the control group," Dr. Meltzer commented.

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