Prof. Tullio Levi-Civita— Extends Relativity Theory

MORE precise in defining the fundamental law of the universe than even Einstein's general theory of relativity, Prof. Tullio Levi-Civita, mathematical physicist from the University of Rome, announced to Harvard's Tercentenary Celebration new relativistic formulae that apply to two bodies instead of just one as is the case with those of Einstein.

Previous verifications of the general theory of relativity dealt only with gravitational fields due to a single body, Prof. Levi-Civita explained. In the classic case of the advance of the perihelion of the planet Mercury, Einstein considered the field as due to the sun alone, an approximation which is legitimate owing to the smallness of the ratio of the mass of the planet to that of the sun.

But Prof. Levi-Civita now considers the corresponding problem for two bodies of comparable mass as for instance two suns or stars whirling around each other.

His equations show that it is possible to visualize the force exerted as consisting of two parts, one an attraction that acts the way Newton assumed and the other an Einsteinian perturbation. These two together produce an advance of perihelion.

This is not so surprising, he declared, but it is strange that the center of gravity of the motion wobbles slightly instead of being at rest or moving uniformly in a straight line.

Einstein's sensational prediction of the advance of Mercury's perihelion which brought his general theory of relativity into prominence was tested by direct observation. The revision of the Einstein theory that Prof. Levi-Civita suggested cannot be tested upon the planet Mercury with quite so much ease, but Prof. Levi-Civita does expect that astronomers will test it by observations upon double stars which are gigantic systems of twin suns seen as one spot of light in telescopes but capable of being disentangled by their spectra or "rainbows" of light.

Prof. Levi-Civita's solution of the relativistic problem of several bodies will probably be the focus of mathematical and astronomical work for several years to come. The expounder of this new relativistic view is no novice in mathematical physics. He has been a leader in hydrodynamics, theoretical dynamics and pure geometry. His contribution to the theory of absolute differential calculus is credited with helping to lay the foundation for the general theory of gravitational relativity of Einstein. Now, at the age of 63, he is older than Einstein.

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THE BLUE NEBULAE

Ordinary photographic methods bring out the blue nebulae at center and right, but do not indicate the importance of the giant red nebula at the lower center of the photograph. Compare this photograph with that on the facing page.

Prof. Ronald Aylmer Fisher— Poses Mathematics Problem

LIKE mathematical problems? Here is one which was given to the learned American Mathematical Society meeting in connection with the Tercentenary celebration of Harvard University by the noted British mathematician, Ronald Aylmer Fisher, professor of eugenics at the University of London.

"The agricultural land of a predynastic Egyptian village is of unequal fertility. Given the height to which the Nile will rise, the fertility of every portion of it is known with exactitude, but the height of the flood affects different parts of the territory unequally. It is required to divide the area, between the several households of the village, so that the yields of the lots assigned to each shall be in predetermined proportions, whatever may be the height to which the river rises."

If mathematicians can solve this problem, said Dr. Fisher, one of the primary problems of what is called mathematically "uncertain inference" will be solved.

Dr. Fisher's invited paper dealt with the history and role of uncertain inference in mathematics. The field is one in which mathematical reason is applied to uncertainties, yet applied with logical rigor.

The problem is one which is being increasingly met in science where it is necessary to take observation data with all their imperfections, their paucity in number and imperfect precision, and yet draw inference from them which the observations warrant.

Lack of this method of uncertain inference, the British mathematician pointed out, is the basis for the old phrase "anything can be proved by statistics."

Science News Letter, September 12, 1936

Dr. W. F. G. Swann— Discusses Cosmic Rays

ALL physicists agree that some of the cosmic radiation which strikes the earth's atmosphere from outer space must be electrically charged particles flying at high speeds. But, in the opinion of a number of investigators, those bullets of energy called photons must also play a part.

Speaking at the Harvard Tercentenary Celebration, Dr. W. F. G. Swann of the Bartol Foundation of the Franklin In-