

ASTRONOMY

Bending of Light May Help Scientists Find Remote Objects

RUDI W. Mandl, the mathematically-minded Czechoslovakian dishwasher of New York City, apparently has started something. It is now revealed that his suggestions may enable astronomers to detect objects farther away than the present observing limits of their telescopes. Mandl, it will be recalled, had his brief moment of fame recently when Prof. Albert Einstein published calculations based on his ideas.

Scientists at California Institute of Technology and Mt. Wilson Observatory are wondering if Mandl's basic idea may not provide astronomy with a gravitational telescope, composed of stars, for studying distant nebulae beyond the reach of all man-made telescopes no matter how powerful they may be now, or however powerful they may ever be made at any time in the future.

Mandl, to recall a few facts, asked Prof. Einstein to check through mathematical calculations, and publish the result, on the idea that light rays from a distant star should be bent and gathered into a telescopic effect as they passed by some nearer star. Mandl hoped that an additional ring of light would thus be formed about the nearer star and that this would provide a test for the theory of relativity.

Easy for Einstein

The problem was a fairly simple mathematical exercise for Einstein but unfortunately for Mandl's hopes the effect, said the famous relativist, was principally of academic interest since little hope could be held that the phenomenon might be observed.

But at the seminar discussions at the California Institute of Technology and Mt. Wilson, Mandl's idea has not died and, in fact, holds promise of aiding astronomy in a way he perhaps did not foresee. As a matter of fact for nearly a year now Dr. Fritz Zwicky of the Institute has been making calculations on the same happening with distant nebulae instead of single stars. Rudi Mandl, it seems, talked to other people before he was able to get to see Prof. Einstein. Among others he talked to the famous television engineer, Dr. V. K. Zworykin of the Radio Corporation of America. And Dr. Zworykin told Dr. Zwicky about it.

Dr. Zwicky has calculated, and will soon publish in the technical journals of science, that if a nebula has more than 10,000,000,000 stars in it and were not too diffuse its gravitational field should be so powerful that light from a still more distant nebula would be bent slightly in passing by it.

If the earth happened to be in line with the two nebular systems it might be found that the nearer one, instead of hiding the more distant one, would gather the rays and bend them into the instruments of an observer on the earth. A star-studded gravitational telescope with a focal length of millions upon millions of miles would thus be achieved.

The effect seen on earth should show the nearer nebula with a ring of light around it. If the earth and the two nebulae were not exactly in a straight

line the ring of light would not be uniform and might even appear as two spots of light on opposite sides of the nearer nebula.

A fortuitous peculiarity of the phenomenon is that the more distant is the farther nebula, the more helpful is the nearer one in brightening it. Calculations indicate that the gain in light brightness may be as much as several hundredfold. In this way it may be possible to study objects far too distant for the most powerful telescopes to see directly. And even though still more telescopes were built the same situation would still be true.

The size of the universe, the behavior of the red shift of light at these enormous distances and the masses of the nebulae themselves are only a few major problems which could be studied by the new technique.

If Dr. Zwicky's former estimates of the mass of the nebulae are correct, Mt. Wilson astronomers should soon find an example of the ring of light which he predicts about an occasional nebula. And no one would like that better than one Rudi Mandl.

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AID STUDY OF NEBULAE

With the aid of such "nearby" nebulae as that of Andromeda, shown above at a distance of about 1,000,000 light years, scientists are hoping to study still more distant nebulae which are now beyond the range of the largest telescopes. In the insets: Prof. Albert Einstein, top, published calculations of dishwasher Rudi Mandl of New York, left, showing that theoretically the light from a distant star should be focused as it passed a nearer star. Prof. Fritz Zwicky of California Institute of Technology, right, learned of Mandl's idea from Dr. V. K. Zworykin of RCA, bottom, and has applied the calculations to a similar effect for distant nebulae.