SOME PAPERS PRESENTED AT THE MEETING BY INVITATION

REPETITION OF THE MICHELSON-MORLEY EXPERIMENT

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This investigation was undertaken with the view of making a more accurate test than had hitherto been obtained and may be divided into three parts as follows:

The first preliminary observations were begun in June, 1926. The principle employed was not essentially different from that in the original Michelson-Morley experiment, with the exception that in this investigation the observer was mounted on the apparatus, revolving with it while making observations.

Several hundred observations were made, all indicating the same negative result as was obtained in the original investigation. According to calculations furnished by Dr. Stromberg a displacement of 0.017 of the distance between fringes should have been observed at the proper sideral time. No displacement of this order was observed.

The second preliminary investigation was begun in the fall of 1927. In this the optical parts were supported on a heavy disk of cast iron, floating on a circular mercury trough as in the original experiments. The chief modification, however, consisted in the fact that the light source was placed vertically over the center of the revolving disk and rotated with it. The return image, by a simple system of reflections, was rendered stationary, thus avoiding the necessity of mounting the observer on the apparatus. The stationary interferometer fringes could therefore be measured in the usual way by means of a micrometer eyepiece, the observer being at rest above the center of the rotating disk. The length of the light path in this experiment was fifty-three feet.

In consequence of inadequate temperature control (and probably unsymmetrical strains in the apparatus) the results, while not so consistent as could be desired, still showed clearly that no displacement of the order anticipated was obtained.

In the final series of experiments, the apparatus was transferred to a well-sheltered basement room of the Mount Wilson Laboratory. The length of the light path was increased to eighty-five feet, and the results showed that the precautions taken to eliminate temperature and pressure disturbances were effective.

The results gave no displacement as great as one-fiftieth of that to be expected on the supposition of an effect due to a motion of the solar system of three hundred kilometers per second.

These results are differences between the displacements observed at maximum and minimum at sideral times. These directions correspond to Dr. Strömberg's calculations of the supposed velocity of the solar system.

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