

ASTRONOMY

# Distant "Universe" Found Much Bigger Than Supposed

## Examination of Photograph Made With Special Schmidt-Type Telescope Reveals Shape of Andromeda

**P**ROOF that the distant Andromeda galaxy is about as big as our own galaxy, or Milky Way system, has been obtained by Dr. Robley C. Williams and Dr. W. Albert Hiltner of the University of Michigan.

The constellation of Andromeda, the chained lady, is overhead on autumn nights, and the galaxy may be seen, if the sky is dark, with the naked eye. It is so far away that light, travelling 11,000,000 miles per minute, takes about 720,000 years to reach us. About 15 years ago Dr. Edwin P. Hubble, of the Mt. Wilson Observatory, showed that it is a disk-shaped mass of stars, like that comprising the Milky Way, of which the sun is part. This is one of the nearest of these outer galaxies, but millions of others can be seen, with the greatest telescopes. Only a few are close enough for the individual stars to be revealed.

It appeared that the Andromeda galaxy and the others were far smaller than ours, which is estimated to be around 100,000 light years in diameter. Several years ago Dr. Joel Stebbins and Dr. A. E. Whitford made measurements with the electric eye attached to the 100-inch reflecting telescope at Mt. Wilson, the world's largest. These showed that the object extended much farther than one could see, or photograph, with the same telescope.

Using a new photograph of the galaxy,

taken by Dr. Hubble with a special Schmidt-type telescope at the new Mt. Palomar Observatory, Drs. Williams and Hiltner have determined its shape. This has been done with an instrument invented by Dr. Williams, called the isophotometer. It automatically examines a photograph, and draws a line corresponding to a region of a certain brightness. It, also, uses an electric eye, which is sensitive to far slighter effects on the plate than the eye could detect.

From the lines drawn by this instrument, they find that, in its greatest length, the galaxy is at least 13 times as long as the apparent diameter of the moon. At the accepted distance for the Andromeda object, this corresponds to a linear diameter of 80,000 light years. Since there is some evidence that the object extends still farther, it seems that its size is about the same as our Milky Way. They also find evidence, far out from the center, of two previously unknown places where the stars are closer together.

One important feature of the work is that the measurements were made despite a considerable amount of fogging of the negative from the general light of the sky, which is present even at the best locations. In fact, in the outer parts of the galaxy, the brightness is actually less than the sky. However, the instrument detects the difference between the sky light, which is uniform, and the

sky light plus galactic light, even though the latter is very minute.

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## Cartoon Characters Lend New Romance to the Stars

See Front Cover

**I**N JULY the sun will be in the constellation of Mickey and Minnie Mouse! High in the northern evening sky appears Pluto the pup! On autumn evenings you can see the heavenly figure of Donald Duck!

Such statements as these will be perfectly reasonable if it should happen that new star groups, which are making their bow this month in the demonstration at the Fels Planetarium of the Franklin Institute in Philadelphia, should become generally adopted. For, with Walt's own permission and assistance, a whole galaxy of Disney characters appears on the artificial sky vault of the planetarium.

However, Wagner Schlesinger, director of the Fels Planetarium, and his asso-

### CONSTELLATIONS A LA DISNEY

*The constellations of Bootes, the bear driver, and Corona Borealis, the northern crown, as they appear in star maps, are shown at the left. In the middle is the ancient figure, which dates back some 3,000 years. The right-hand picture shows how Walt Disney has fitted Madame Upanova, from the ostrich ballet in Fantasia, around these stars, for the April demonstration in the Fels Planetarium. The cover picture shows how Mickey and Minnie Mouse have been fitted around the stars of Gemini, the twins. Castor is in Mickey's face and Pollux in Minnie's nose. These pictures were photographed from the planetarium dome by Gladys Muller.*

