

ASTRONOMY

# All Outside Universes Are Composed of Stars

## New Investigation Rules Out Possibility That Elliptical Nebulae Are Composed Only of Dust

**E**VIDENCE that all the millions of nebulae observed in the far-flung regions of space are composed of stars was presented before the meeting of the American Astronomical Society in Williams Bay, Wis.

Dr. Lyman Spitzer, Jr., of Yale University, stated that failure to resolve the so-called elliptical nebulae into stars had led to the suggestion that they are composed of dust and not of stars at all. However, his recent investigation rules out this possibility, Dr. Spitzer said, and makes it fairly certain that the ellipticals, like their better-known relatives, the spirals, are composed almost entirely of stars.

Nebulae are diffuse patches of light seen in the sky. Some of these are clouds of gas and dust situated within our own Milky Way galaxy, whereas others are at tremendous distances (the nearest is 680,000 light-years away) and are considered to be other systems similar to the Milky Way as a whole.

These exterior galaxies are mostly classified into two main groups—the ellipticals and the spirals. The former range in shape from globular to elliptical, and appear highly concentrated,

showing no resolution into stars. On the other hand, the spirals appear as flattened disks, and have often been called the "pinwheels of space." Many spirals have been resolved into stars, but the ellipticals, whether globular or flattened, cannot be separated into stars with our present telescopes.

"An evaluation of the rate of energy dissipation for atoms and for dust shows that interstellar particles of low density require only 40 million years at most to lose any great initial energy, and to come to equilibrium, with velocities less than 12 miles a second," Dr. Spitzer said. "Any interstellar matter in a globular galaxy must be almost entirely concentrated to the center or, in the case of elliptical systems, to the equatorial plane. The total mass of such matter in a globular system cannot exceed 1/500 of its total mass, although no such limit exists for elliptical systems. In any case, the amount of dust or atoms throughout most of an elliptical or globular galaxy must be quite negligible, and the visible light from a galaxy of this sort must be largely direct starlight, not diffuse or scattered light."

Many photographs of exterior galaxies seen edgewise show the presence of dark matter in their equatorial planes. This is possible, according to Dr. Spitzer's theoretical investigations. The stars in such systems form an extended envelope around the assumed highly flattened disk of dark, dense matter.

*Science News Letter, September 20, 1941*

## Meteors Don't Explode

**"S**HOOTING STARS" that flash in the night and burst in the air do not explode like an artillery shell, but instead seem to fly apart due to atmospheric pressure when they plunge toward earth.

Dr. Fred L. Whipple, of Harvard Observatory, reported before the American Astronomical Society, on his studies of the trails of 28 meteors which broke apart or burst in the air while shining brightly enough to be photographed.

These trails are included in the Harvard collection of over a thousand meteor trails taken during the last few years.

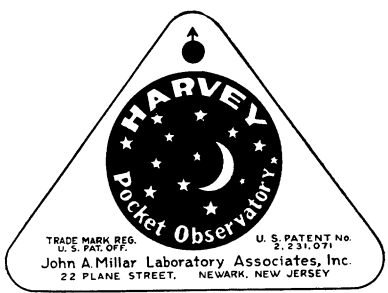
Although an internal explosion due to external heating and expansion may break the original meteoroid as it passes into the atmosphere, Dr. Whipple believes the evidence of these trails shows that atmospheric pressure on the irregular surfaces of the broken fragments produces the observed changes in their direction. However, the process of splitting should result in deformations that would soon be smoothed by melting and vaporization by friction with the air.

There are photographs of two trails in which three successive divisions occurred as the meteor broke into more and more pieces, and one in which a double or multiple division can be detected. In another case the brighter component and the fainter one deviate together in the same direction, and the brighter (presumably the heavier) deviates more than the fainter. This would be explained on the basis of atmospheric pressure acting for a fraction of a second on irregular surfaces of the fragments.

Dr. Whipple said that "one meteor divided at a height of 48 miles, and two others at about 35 miles each. The splitting usually occurs at maximum light, or about two-thirds of the distance along the meteor trail. Both slow and fast meteors are represented by the split trails, and at least three are members of meteor showers. Split trails do not appear unusual except for their duplicity, and do not seem to represent a distinct class of meteors."

*Science News Letter, September 20, 1941*

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