

M101: The Pinwheel Galaxy

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A Star-studded Galaxy

Giant spiral galaxies were not built in a day. Construction on these mammoth objects, like Messier 101 (M101) shown in this Hubble Space Telescope image, lasted billions of years.

This photograph of M101, nicknamed the Pinwheel Galaxy, showcases a spiral galaxy's well-known features. A galaxy is a collection of stars, gas, and dust held together by gravity. Galaxies come in three different varieties: spirals, ellipticals, and irregulars.

Spiral galaxies, like M101, have well-defined spiral arms that wind around the galaxy within a rotating pancake-shaped disk of material. In this Hubble telescope "face-on" view of M101, bright blue areas of star formation pepper the spiral arms, which look like the arms of a pinwheel. Dark, thin dust lanes follow the spiral structure into a yellowish central bulge containing older stars.

In fact, M101's disk is so thin that the Hubble telescope easily sees many more distant galaxies lying behind it. Seeing these background galaxies shows that a galaxy's disk is really mostly empty space.

The Hubble image of M101 is 95,000 light-years across. A beam of light would travel 95,000 years to get from one side of the pictured galaxy to the other. M101 is estimated to contain hundreds of billions of stars. If each star were a drop of water, one would need about five Olympic-size swimming pools to hold the hundreds of billions of stars. Many of the stars are smaller, cooler, and redder than our Sun. The hot, blue stars along the spiral arms are rare, but they are so bright they stand out in this image.

The galaxy lies 25 million light-years from Earth in the northern constellation Ursa Major (The Great Bear). We are seeing M101 as it looked 25 million years ago. The light we are seeing from the galaxy began its journey to Earth at the beginning of our planet's Miocene Period, when mammals flourished and the Mastodon first appeared.

VOCABULARY

Messier Catalogue (M): A catalogue of about a hundred of the brightest galaxies, star clusters, and nebulae compiled in the late 1700s by French astronomer Charles Messier.

Elliptical Galaxy: A galaxy that appears elliptical in shape; some are more elongated, while others are more spherical. It is essentially a big mass of mostly old stars and contains very little gas or dust (interstellar matter).

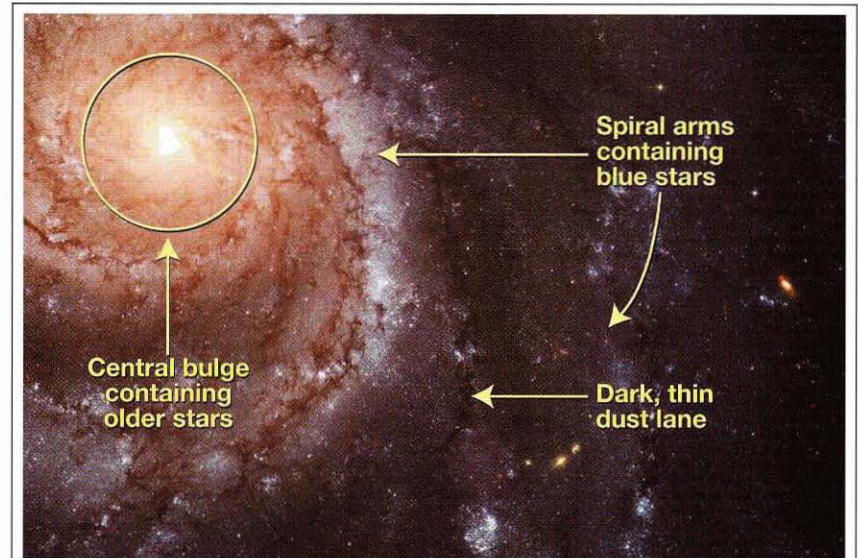
Irregular Galaxy: A galaxy whose shape is neither elliptical nor spiral. It appears unorganized and is often rich in gas and dust (interstellar matter).

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This close-up view of spiral galaxy M101 shows many details that may be overlooked when viewing the full image. For example, dark, thin dust lanes are clearly visible in the spiral arms. Clusters of young, blue, hot stars dot the spiral arms. The bright nucleus at upper left appears brighter and redder than the rest of the galaxy seen in the image. Stars near the bulge, which surrounds the nucleus, are older and redder than those in other regions of the galaxy. M101's disk is so thin that several background galaxies can be seen. A spiral galaxy, for example, appears at the edge of a spiral arm at far right.

You can get images and other information about the Hubble Space Telescope on the World Wide Web. Visit <http://www.stsci.edu/outreach> and follow the links.

The corresponding classroom activity for this lithograph can be found at: <http://amazing-space.stsci.edu/> or may be obtained by contacting the Office of Public Outreach at the Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218.

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