



Center of Starburst Galaxy Messier 94 (NGC 4736)

A Spiral Galaxy Generates “Sparks” of Stars

Looking like a wildly spinning firework wheel, Messier 94 (NGC 4736) is a spiral galaxy with an unusual feature: a starburst ring. The ring, filled with spark-like stellar clusters in this NASA’s Hubble Space Telescope image of the center of Messier 94, is a region around the galaxy’s nucleus where stars are forming at tremendous rates.

Starburst rings, which occur in just 20 percent of spiral galaxies, may result when galaxies are drawn together by their mutual gravity into collisions or close encounters. M94, however, has not had a significant galactic collision. Study of its stars shows evidence of a collision with nothing larger than a dwarf galaxy – similar to the Small Magellanic Cloud that orbits our Milky Way galaxy.

Instead, M94’s dazzling ring appears to have formed through basic galaxy formation processes: a pressure wave traveling outward from the galactic center, compressing the gas and dust in the outer regions. As material is compressed, the gas starts to collapse into denser clouds. Inside these dense clouds, gravity pulls the gas and dust together until the temperature and pressure are high enough for stars to form.

M94’s brilliant center gets the focus in this Hubble image, but the galaxy is also unusual because it appears to have another ring on the outskirts of the galaxy (not visible in the Hubble image.) Though it looks detached in some astronomical images, the ring is actually a pair of faint spiral arms outside of M94’s core region that extend far into space. This discovery has effectively tripled the galaxy’s known diameter, originally estimated at 30,000 light-years in diameter.

M94 also has much less dark matter than many other galaxies. Astronomers do not know why it lacks the expected amount of dark matter, but the galaxy has been extensively studied as a result.

M94 is located 17 million light-years away in the constellation Canes Venatici.



The ground-based image of Messier 94 shows the location of Hubble’s image. Note the faint spiral arms that create a ring-like appearance in the ground-based image.

Image Credit: Hubble: ESA/Hubble & NASA; Ground-based: Hillary Mathis, N.A. Sharp/NOIRLab/NSF/AURA

VOCABULARY

Nucleus: The center of a galaxy, typically dense with stars and home to a supermassive black hole.

Dwarf galaxy: Small, faint collections of up to a few billion stars and gas. They may orbit larger galaxies, like the Milky Way.

Dark matter: An invisible form of matter that doesn’t emit, absorb, or reflect light, or interact with normal matter.

Front Image Credit: ESA/Hubble & NASA

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