

Ask an Astronomer

Question: "Why do we see spiral arms in some galaxies?"

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Spiral galaxies get their name from the shape of their disks, in which clouds of stars that we call "spiral arms" extend outward from the central nucleus of the galaxy.

These apparent structures are caused by gravity.

The gravitational force from the galaxy's core causes all the stars in the galaxy to rotate around it.

But the stars themselves are also strong sources of gravity. Stars in the outer regions tug on the rest of the galaxy.

As stars move at different speeds around the galactic center, they feel each other's gravitational influence, like the wakes from ships passing in the ocean.

In many galaxies, the wave is in a spiral shape and this spiral moves through the stars and clouds disturbing them.

So why are the spiral arms so much brighter than the rest of the galaxy if they are just being tossed by a wave?

When a gravity wave passes through a gas cloud it squeezes the cloud.

Dense clouds of gas and dust collapse and form new stars.

The band of younger, brighter stars becomes visible to us as a spiral arm.

Many galaxies have a spiral structure, but depending on the angle we see the galaxy from, this structure may or may not be visible from Earth.

Over the years, astronomers have obtained spectacular images of spiral galaxies, helping us better understand both the distant universe, and the galaxy in which we live.

For "Ask an Astronomer," I'm Dr. Steve Lord of NASA's Infrared Processing and Analysis Center at the California Institute of Technology.