Ask an Astronomer

Question: "Can a galaxy die?"
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Varoujan Gorjian:

Like most things, the answer to the question of the death of galaxies depends on your definition. If you define "dying" as no longer existing in a form where we would look at it and still call it a galaxy, then yes galaxies can die.

One way this could happen is if a galaxy collides and merges with another galaxy. The original galaxy wouldn't be around anymore. So you could then say that the original galaxy "died" in the merger, even though there is a larger galaxy left over.

But there is another way a galaxy could die.

Galaxies are basically a large collection of stars. Stars are continually running out of fuel and dying. But in galaxies with enough raw material to make new stars, a young population of stars will replace the dying ones.

However, if enough time passes and a galaxy converts all of its available gas into stars and then the stars die out, at that point the galaxy would no longer exist in the form that we are familiar with. There would be almost no light generated by the galaxy and it would be a combination of dust, black holes, cinders of white dwarfs, and neutron stars.

Some intermittent light may be generated when some remaining wisp of gas not big enough to make a star falls onto a neutron star or a black hole or from the rotation of a neutron star -- which is called a pulsar -- but pretty much the galaxy would be dark in most wavelengths of light.

This process would take many tens of billions of years. But it fits the definition where the galaxy no longer exists in a way that we would ever identify it as a galaxy, and hence, it would be dead.

For "Ask an Astronomer," I'm Varoujan Gorjian for NASA's Jet Propulsion Laboratory.