Astronomers spot “missing link” black hole

Part of: GS-III- S&T - Space (PT-MAINS-PERSONALITY TEST)

Using data from the Hubble Space Telescope and two X-ray observatories, the researchers determined that this black hole is more than 50,000 times the mass of our sun and located 740 million light years from Earth in a dwarf galaxy, one containing far fewer stars than our Milky Way.

Black holes are extraordinarily dense objects possessing gravitational pulls so powerful that not even light can escape.

This is one of the few “intermediate-mass” (PT SHOT) black holes ever identified, being far smaller than the supermassive black holes that reside at the center of large galaxies but far larger than so-called stellar-mass black holes formed by the collapse of massive individual stars. An object that was discovered originally back in 2010 is indeed an intermediate-mass black hole that ripped apart and swallowed a passing star.

The star was probably roughly a third the mass of the sun. Scientists have searched for intermediate-mass black holes for four decades and fewer than 10 good examples are known, though large numbers may exist.

“So finding a new one is very significant. Also, a black hole swallowing a star happens on average only once every 10,000 years or so in any particular galaxy so these are rare occurrences,”

The supermassive black hole at the centre of the Milky Way is 4 million times the mass of the sun and located 26,000 light years from Earth. The closest stellar-mass black star is about 6,000 light years from Earth. A light year is the distance light travels in a year, 5.9 trillion miles (9.5 trillion km).

Scientists called intermediate-mass black holes the “missing link” in understanding the range of black holes.

Additional notes

What is a black hole?

1. A black hole is an object in space that is so dense and has such strong gravity that no matter or light can escape its pull. Because no light can escape, it is black and invisible.
2. There’s a boundary at the edge of a black hole called the event horizon, which is the point of no return — any light or matter that crosses that boundary is sucked into the black hole. It would need to travel faster than the speed of light to escape, which is impossible.
3. Anything that crosses the event horizon is destined to fall to the very centre of the black hole and be squished into a single point with infinite density, called the singularity.
If black holes are invisible, how can we detect or photograph them?

1. **By looking for the effects of their extreme gravity**, which pulls stars and gases toward them.
2. Also, while anything past the **event horizon is invisible**, outside that boundary there is sometimes a spiral disk of gas that the black hole has pulled toward — but not yet into — itself.
3. **The gases in that accretion disk are heated up as they accelerate toward the black hole**, causing them to glow extremely brightly. The colours they glow are invisible to us, but are detectable with an X-ray telescope.
4. **Scientists have also detected the gravitational waves generated when two black holes collide**, light surrounding the black hole right to the edge of the event horizon, which is the goal of the Event Horizon Telescope.

**How big are black holes?**

Small black holes are called stellar-mass black holes. They have masses similar to those of larger stars — about five to 20 times the mass of the sun. The other kind is supermassive black holes, which are millions to billions of times more massive than the sun. That’s the kind the Event Horizon Telescope has been trying to photograph, as bigger objects ought to be easier to see. There is some evidence that black holes between these two sizes exist, but that has yet to be confirmed.

While black holes are very massive, that doesn’t mean they take up a lot of space. Because they’re so dense, they’re actually quite small. According to NASA, a black hole 20 times the mass of the sun could fit inside a ball 16 kilometres wide — the width of the Island of Montreal at its widest point.

**Where are black holes found?**

Supermassive black holes are found at the centre of most galaxies, including our own Milky Way. The one in our galaxy is called **Sagittarius A** and is one of those the Event Horizon Telescope has been attempting to photograph.

**Sagittarius A** isn’t the only black hole in our galaxy, though. Earlier this year, astronomers discovered another 12 within three light-years of it, suggesting there could be upwards of 10,000 black holes around the galactic centre.

**Where do black holes come from?**

Supermassive black holes are believed to form at the same time as the galaxy that surrounds them, but astronomers aren’t sure exactly how.
Stellar mass black holes form when a star with a mass greater than three times that of our sun runs out of fuel. It explodes into a supernova and collapses into an extremely dense core that we know as a black hole — something predicted by Albert Einstein's general theory of relativity.

Einstein’s theory also predicts the size and shape of the black holes that the Event Horizon Telescope is trying to photograph.

The scientists at Event Horizon Telescope Project have released the first-ever image of a Black Hole (more precisely, of its shadow).

- The black hole is located in the center of galaxy Messier 87, in the constellation Virgo. It is located about 53 million light-years away from earth.
- The black hole has a mass of 6.5 billion Suns.
- The image was made possible by the Event horizon telescope (EHT).
- The EHT picks up the radiation emitted by particles in the galaxy heated to billion degrees as they revolve around the black hole close to the speed of light.

Event Horizon

- There is a region of space beyond the black hole called the event horizon. This is a "point of no return", beyond which it is impossible to escape the gravitational effects of the black hole.

Event Horizon Telescope Project

- EHT is a group of 8 radio telescopes (used to detect radio waves from space) located in different parts of the world.