



## SCIENCE & TECHNOLOGY

# Black Holes Merge Into Unusual Size

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Black holes are becoming stranger — even to scientists who study planets and other objects in outer space.

Astronomers recently reported the discovery of the signal from a violent **collision** of two black holes. The event, which took place long ago, created a new black hole of a size that scientists had never seen before.

California Institute of Technology physicist Alan Weinstein was part of the discovery team. He noted that the finding was the “biggest **bang**” ever observed by human beings since the Big Bang.

The Big Bang is a term many astronomers use to explain the beginning of the universe.

Black holes are **compact** areas of space. They are so dense that not even light can escape. Until recently, astronomers had observed them in two general sizes.

There are “small” ones called stellar black holes. These black holes are formed when a star collapses. They are about the size of a small city.

There are also supermassive black holes. These black holes are millions, maybe billions, of times more massive than our sun.

Astronomers’ **calculations** suggest that anything in between the two sizes did not make sense. That was because stars that grew too big before collapse would generally destroy themselves, leaving no black holes.

Nelson Christensen is research director of the French National Centre for Scientific Research. He says scientists thought that star collapses could not create stellar black holes much bigger than 70 times the mass of our sun.

Then in May 2019 two sensors received a signal that turned out to be the energy from two stellar black holes crashing into each other. One was 66 times the mass of our sun. The other was 85 times the mass of the sun.

The result: The first ever discovered intermediate black hole, at 142 times the mass of the sun. The word intermediate suggests being in the middle of a process or development.

In the collision, a large amount of energy was lost. The energy was in the form of a gravitational wave, a **ripple** in space that travels at the speed of light.

It was that wave that physicists in the United States and Europe, using **detectors** called LIGO and Virgo, captured last year. After studying the signal and reexamining their work, scientists published the results this week in Physical Review Letters and Astrophysical Journal Letters.

Because the detectors receive the gravitational waves as audio signals, scientists actually heard the collision. For all the violence, the signal lasted only one-tenth of a second.

“It just sounds like a **thud**,” Weinstein said. “It really doesn’t sound like much on a speaker.”

This crash happened about 7 billion years ago, when the universe was about half its current age. It was only detected now because the collision was so far away.

Black hole collisions have been observed before. But the black holes involved were smaller to begin with. Even after the collision, they did not grow beyond the size of normal stellar black holes.

Scientists still do not know how supermassive black holes at the center of galaxies formed, Christensen said, but this new discovery may offer a clue.

I'm John Russell.

*Seth Borenstein reported on this story for The Associated Press. John Russell adapted it for VOA Learning English. George Grow was the editor.*

## Words in This Story

**collision** – *n.* an act of colliding, such as a crash in which two or more things or people hit each other

**bang** – *n.* a sudden, loud noise

**compact** – *adj.* closely or firmly joined together

**calculation** – *n.* an estimate or prediction

**ripple** – *n.* something that passes or spreads through or over someone or something; a shape having small waves

**detector** – *n.* a device that can tell if a substance or object is present; a device that measures the presence of something

**thud** – *n.* a loud sound made especially when a heavy object hits something

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