

Lying in a galaxy called M87 more than 50 million light-years away from Earth, the first-ever image of a black hole was taken thanks to a world-wide network of telescopes called the [Event Horizon Telescope \(EHT\)](#).

“We have seen what we thought was unseeable. We have seen and taken a picture of a black hole,” Sheperd Doeleman, EHT Director and astrophysicist at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass., said April 10 in Washington, D.C., at a news conference.

“We’ve been studying black holes so long, sometimes it’s easy to forget that none of us have actually seen one,” France Córdova, director of the National Science Foundation, said in the Washington, D.C., news conference. Seeing one “is a Herculean task,” she said.

But what does this celestial step in astrophysics mean? See below for the main takeaways of this discovery.

1. Einstein’s Theory Proven Right

Albert Einstein’s general theory of relativity is a comprehensive explanation of gravity, which included his estimations of the appearance of black holes. His predictions were proven correct with the image revealing the round shape and glow around the massive black circular emptiness.

Even though Einstein is known as a genius, it is still exciting every time one of his theories is proven correct. This is because each time he is proven correct, it kills all of the other alternative theories and helps to better gain understanding of how to create an even more comprehensive theory of physics.

2. Abstract Turned Reality

Before the release of this image, scientists have only been able to reconstruct what a black hole could look like through illustrations based on theories and guess work. Scientists have known for decades that black holes exist—however, only indirectly. Three years ago, researchers heard the sound of two smaller black holes crashing together to form a gravitational wave. And now they have an image to prove it.

3. International Teamwork

This ground-breaking image comes from the hard work of over 200 scientists from around the world. The international cooperation throughout 20 countries, with a cost of \$50 million to \$60 million, were able to get eight radio telescopes on several continents, including Antarctica, to look at the same place at the same time. Once the instruments connected, they essentially created one Earth-size connected telescope.

The telescopes generated so much data and was so massive that it could not be transferred via the internet—so it had to be flown to data centers by jet. In order to get the series of pictures, the weather had to be good at all eight telescopes on the same days in April 2017.

The scientists had only 10 days to look. They luckily got four perfect weather days, with three of them at the start. It then took more than a year for the data to be processed into the first glimpse of images that the group of researchers say in summer of 2018.

4. Terrifyingly Powerful

The gravity of black holes is so extreme that nothing, not even light, can escape the edges of it, also known as the event horizon. That is why this feat of capturing an image has seemed nearly impossible before now. The mass of the black hole is 6.5 billion times that of our sun and the event horizon stretches about the same size as our solar system.

“M87’s huge black hole mass makes it really a monster even by supermassive black hole standards, said Sera Markoff, a discovery team member at the University of Amsterdam.

Outside of the fact that this black hole is bigger than anything they have researched in the past, M87 is not inactive. It converts nearby gas and matter into energy with 100 times more efficiency than the nuclear fusion that powers the stars.

Markoff went on to say that black holes like these “temporarily become the most powerful engines in the universe.”

5. No More Denying

Before the release of this image, there were still a few academics holding out their theory that black holes didn't actually exist. And now with proof, the deniers must go silent. The new image shows a glowing ring of yellow color that creates an empty circle in the middle.

"We saw something so true," Harvard's Sheperd Doeleman, director of the EHT. "We saw something that really had a ring to it if you can that phrase." He continued on to say that the team "uncovered part of the universe that was off-limits to us."

To learn more about this amazing step in the research of black holes, check out the official published results in [The Astrophysical Journal Letters](#).

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