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# SUPERMASSIVE BLACK HOLE AT THE CENTRE OF THE MILKY WAY SEEN FOR THE FIRST TIME

The Event Horizon Telescope is back with another stunning image of a supermassive black hole, but this time it's the one in our Galaxy

**The centre of the Milky Way lies in the direction of the rich star clouds in the Sagittarius constellation (above). And at the centre sits Sagittarius A*, the black hole that's been imaged for the first time (above right)**

ESO/DIGITIZED SKY SURVEY/DAVIDE DE MARTIN/S GUISARD, EHT COLLABORATION, ESO/M KORNMESSER

Astronomers at the Event Horizon Telescope (EHT) have unveiled the first-ever image of the supermassive black hole that lies at the heart of our Galaxy.

Known as Sagittarius A* (Sgr A*), the cosmic giant is four million times the mass of the Sun and is found at the centre of the Milky Way, more than 26,000 light-years away from Earth.

The remarkable image took five years to produce and comes three years after the EHT released the first image of M87*, a black hole 1,000 times more massive than Sgr A* found at the centre of the galaxy M87 around 54 million light-years from Earth.

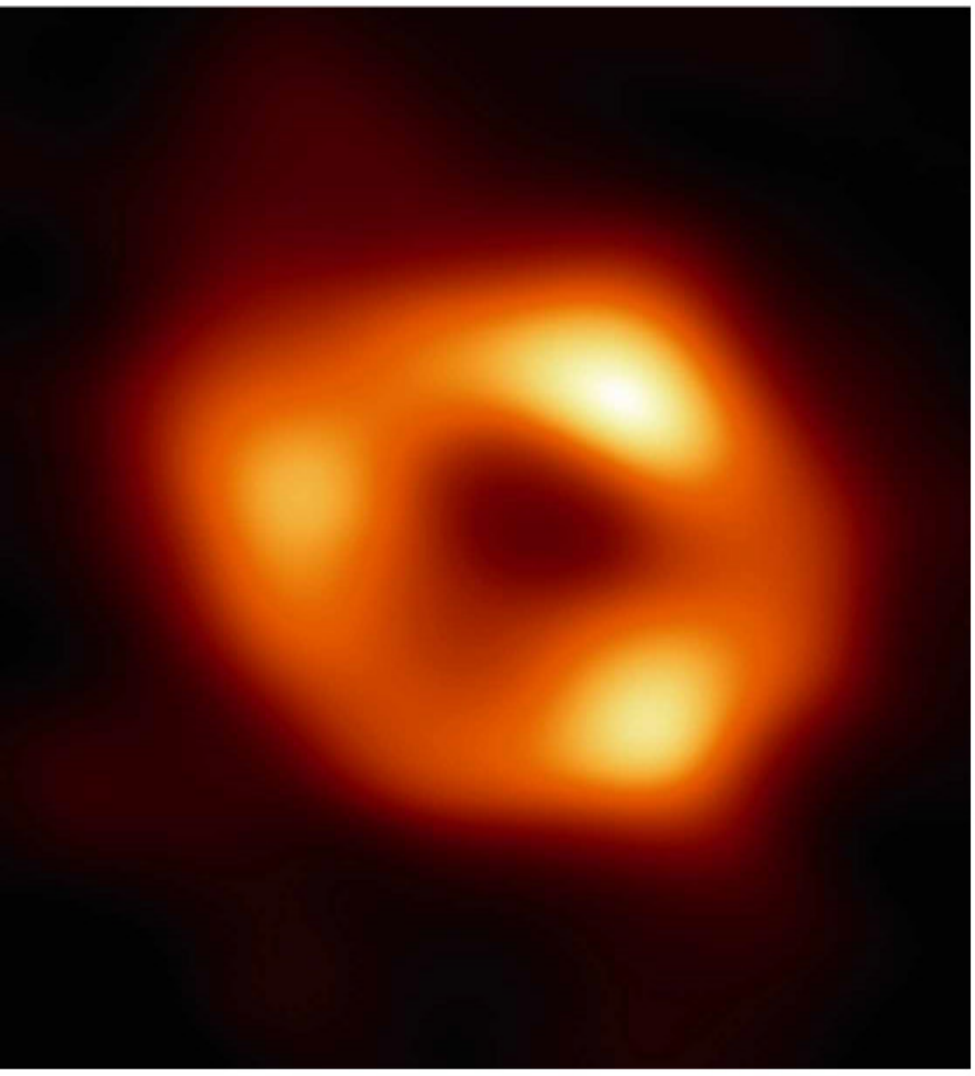
Now that they have images of two supermassive black holes, the researchers will be able to study the differences and similarities between them.

There will be new data to test theories of how gas behaves around supermassive black holes. This process is not yet fully understood, but is thought to play a key role in shaping the formation and evolution of galaxies.

"We have images for two black holes – one at the large end and one at the small end of supermassive black holes in the Universe – so we can go a lot further in testing how gravity behaves in these extreme environments," said EHT scientist Keiichi Asada, from the Institute of Astronomy and Astrophysics, Academia Sinica, Taipei.

Technically, you can't take a photo of a black hole, as no light is able to escape it. The glowing orange ring in the photo shows the matter surrounding Sgr A*, with the 'shadow' in the centre being the black hole itself.

The incredibly strong gravitational pull of a black hole drags any nearby gas and dust into orbit around



**“The remarkable image took five years to produce and comes three years after the first image of M87*”**

it. As this material swirls inwards at nearly the speed of light, it’s heated by friction and emits energy in the form of radio waves that the EHT can detect. The researchers then use supercomputers to analyse the data it collects and create the images.

“We were stunned by how well the size of the ring agreed with predictions from Einstein’s Theory of General Relativity,” said EHT project scientist Geoffrey Bower, from the Institute of Astronomy and Astrophysics, Academia Sinica, Taipei.

“These unprecedented observations have greatly improved our understanding of what happens at the centre of our Galaxy, and offer new insights on how these giant black holes interact with their surroundings.”

The EHT is currently undergoing a series of upgrades to enable it to capture movies of black holes.

## HOW DOES THE EVENT HORIZON TELESCOPE WORK?

The Event Horizon Telescope (EHT) is often referred to as an ‘Earth-sized telescope’ and as a ‘virtual telescope’. In astronomy, the bigger the telescope, the better. An amateur’s telescope with a 60mm lens will show you a decent view of the Moon’s surface or even Jupiter and Saturn, whereas the Hubble Space Telescope’s 2.4m mirror produces stunning images of nebulae and galaxies. Meanwhile, the primary mirror of the upcoming Earth-based Extremely Large Telescope is 39m across, allowing scientists to study the planets around distant stars.

But by linking together 11 telescopes around the world, the EHT can effectively create one incredibly powerful virtual telescope with a mirror the size of Earth itself.

“While Earth is rotating, all telescopes observe the same astronomical object for several hours,” says Thomas P Krichbaum at the press conference at European Southern Observatory headquarters near Munich.

“At each telescope, the data [radio waves] are recorded on hard disks and time-tagged by precise atomic clocks. The data are shipped to processing centres where they are combined in supercomputers.

“After a number of quite complex data analysis steps, this results in the high-resolution image of the radio source.”

The images the EHT is capable of producing are the interstellar equivalent of someone sitting in a beer garden in Munich, and being able to make out the bubbles in a beer glass in New York.


The sites of the telescopes that combine their ‘views’ to form the Event Horizon Telescope