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HUBBLE SPOTS BLACK HOLE TWISTING A STAR INTO A DOUGHNUT SHAPE, THEN CHOWING DOWN ON IT

The star strayed too close and was ripped apart by the black hole's immense gravitational forces

Just call it the Homer Simpson of black holes. Astronomers using NASA's Hubble Space Telescope have observed a black hole twisting a nearby star into a doughnut shape before consuming it.

The violent cosmic occurrence is an example of a tidal disruption event – an astronomical phenomenon that occurs when a star strays close enough to a black hole to be ripped apart by its immense gravitational forces. After the star has been ripped apart, the black hole then devours the resulting gas and debris while belching out intense radiation.

Named AT2022dsb, the event is occurring nearly 300 million light-years away from Earth at the centre of the galaxy ESO 583-G004. It was first spotted on 1 March 2022 by the All-Sky Automated Survey for Supernovae (ASAS-SN), a network of ground-based telescopes that scour the sky looking for violent events.

The astronomers then used Hubble's powerful ultraviolet imaging capabilities to study the event in fine detail as it unfolded.

"Typically, these events are hard to observe. You get maybe a few observations at the beginning of the disruption when it's really bright. Our programme is different in that it is designed to look at a few tidal events over a year to see what happens," said co-researcher Peter Maksym of the Harvard and Smithsonian Center for Astrophysics, in Cambridge, Massachusetts.

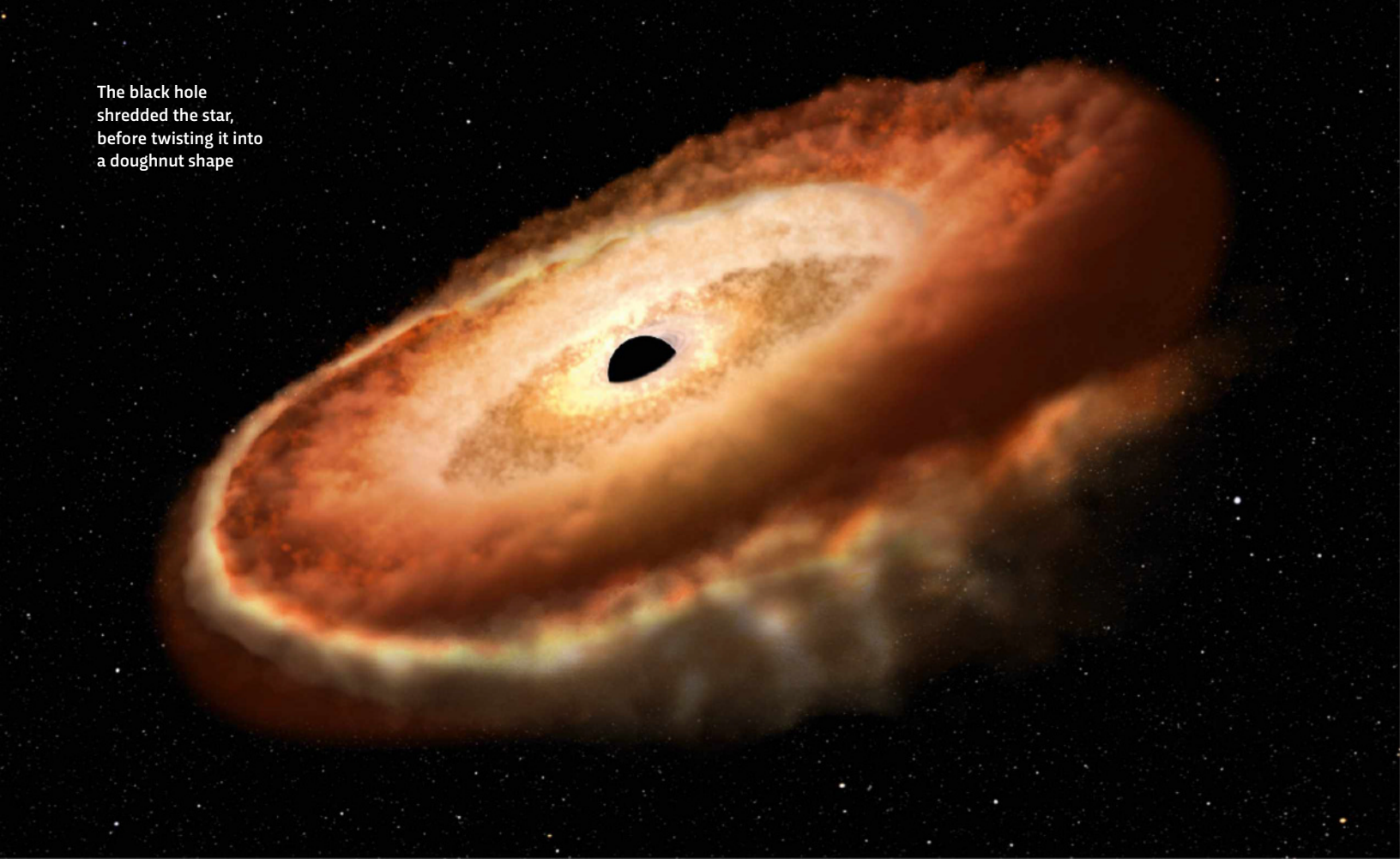
"We saw this early enough that we could observe it at these very intense black hole accretion stages. We saw the accretion rate drop as it turned to a trickle over time."

After studying the Hubble data, the researchers concluded that the remains of the star have formed a doughnut-shaped ring of gas the size of the Solar System that is encircling the black hole as it is sucked in.

The researchers hope that further study of the event, and others like it, will help them learn more about the life cycle of black holes.

"We really are still getting our heads around the event. You shred the star and then it's got this material that's making its way into the black hole," said Maksym.

"So, you've got models where you think you know what is going on, and then you've got what you actually see. This is an exciting place for scientists to be: right at the interface of the known and the unknown."



The black hole shredded the star, before twisting it into a doughnut shape