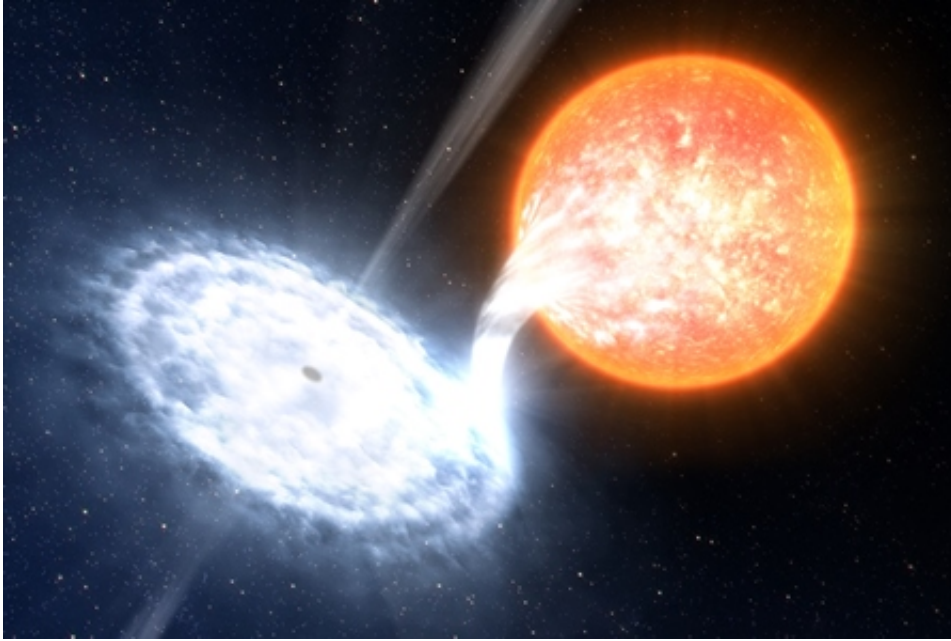


Astronomers see black hole raging red

March 17 2016



Violent red flashes, lasting just fractions of a second, have been observed during one of the brightest black hole outbursts in recent years.

In June 2015, a black hole called V404 Cygni underwent dramatic brightening for about two weeks, as it devoured material that it had stripped off an orbiting companion star.

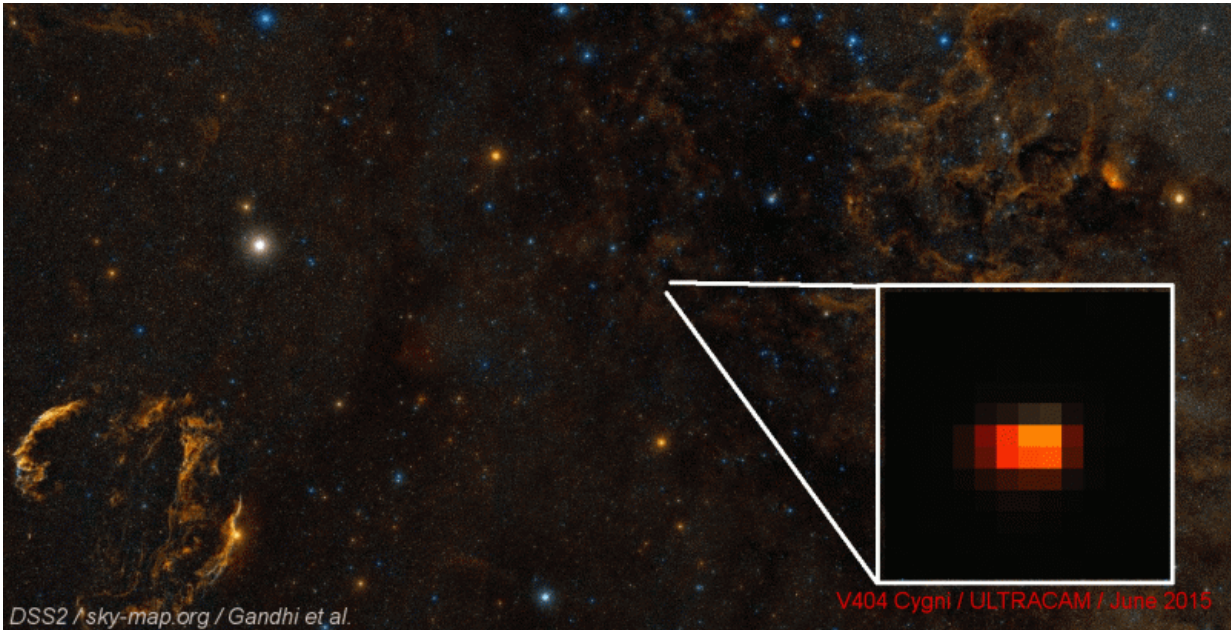
V404 Cygni, which is about 7,800 light years from Earth, was the first definitive black hole to be identified in our Galaxy and can appear

extremely bright when it is actively devouring material.

In a new study published in the journal *Monthly Notices of the Royal Astronomical Society*, an international team of astronomers, led by the University of Southampton, report that the black hole emitted dazzling red flashes lasting just fractions of a second, as it blasted out material that it could not swallow.

The astronomers associated the red colour with fast-moving jets of matter that were ejected from close to the black hole. These observations provide new insights into the formation of such jets and extreme black hole phenomena.

Lead author of the study Dr Poshak Gandhi, Associate Professor and STFC Ernest Rutherford Fellow in the University of Southampton's Astronomy Group, comments: "The very high speed tells us that the region where this red light is being emitted must be very compact. Piecing together clues about the colour, speed, and the power of these flashes, we conclude that this light is being emitted from the base of the black hole jet. The origin of these jets is still unknown, although strong magnetic fields are suspected to play a role.



The inset shows one still image of a red flash observed from the black hole V404 Cygni by the ULTRACAM fast imager on the William Herschel Telescope in the early morning hours of June 26, 2015. The flashes are incredibly short and last less than one second, with some of them being even faster than 1/40th of a second. The flashes are equivalent to a luminosity of about 1,000 times the Sun's power. The background image shows a region of the sky in the Cygnus constellation, with the Cygnus Loop supernova remnant on the bottom left. Credit: DSS2 / sky-map.org / Gandhi et al.

"Furthermore, these red flashes were found to be strongest at the peak of the black hole's feeding frenzy. We speculate that when the black hole was being rapidly force-fed by its companion orbiting star, it reacted violently by spewing out some of the material as a fast-moving jet. The duration of these flashing episodes could be related to the switching on and off of the jet, seen for the first time in detail."

Due to the unpredictable nature and rarity of these bright black hole 'outbursts', astronomers have very little time to react. For example, V404

Cygni last erupted back in 1989. V404 Cygni was exceptionally bright in June 2015 and provided an excellent opportunity for such work. In fact, this was one of the brightest black hole outbursts in recent years. But most outbursts are far dimmer, making them difficult to study.

Each flash was blindingly intense, equivalent to the power output of about 1,000 Suns. And some of the flashes were shorter than 1/40th of a second—about ten times faster than the duration of a typical blink of an eye. Such observations require novel technology, so astronomers used the ULTRACAM fast imaging camera mounted on the William Herschel Telescope in La Palma, on the Canary Islands.

Professor Vik Dhillon, of the University of Sheffield and co-creator of ULTRACAM, said: "ULTRACAM is unique in that it can operate at very high speed, capturing high frame-rate 'movies' of astronomical targets, in three colours simultaneously. This allowed us to ascertain the red colour of these flashes of light from V404 Cygni."

Dr Gandhi concluded: "The 2015 event has greatly motivated astronomers to coordinate worldwide efforts to observe future outbursts. Their short durations, and strong emissions across the entire electromagnetic spectrum, require close communication, sharing of data, and collaborative efforts amongst astronomers. These observations can be a real challenge, especially when attempting simultaneous observations from ground-based telescopes and space satellites."

More information: Furiously Fast and Red: Sub-second Optical Flaring in V404 Cyg during the 2015 Outburst Peak. MNRAS Advance Access published March 14, 2016. www.ras.org.uk/images/stories/...nras.stw571.full.pdf

Provided by Royal Astronomical Society

Citation: Astronomers see black hole raging red (2016, March 17) retrieved 25 April 2024 from <https://phys.org/news/2016-03-astronomers-black-hole-raging-red.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.