



News

Looking for stars that vanish from the sky

by Heather Catchpole

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SYDNEY: Astronomers should look for stars that simply disappear as well as those that explode as supernovae. These could reveal a myriad of new astronomical phenomena, researchers say.

The survey would be the first of its kind and could also identify many new supernovae as well as objects never seen before, according to a recent study in the *Astrophysical Journal*.

"When you do something for the first time, you may find something you didn't expect," the study's lead author, Christopher Kochanek, of Ohio State University in Columbus, U.S., told *Cosmos Online*.

Going bang or going out

When stars die their cores collapse and they explode. Most stars release this energy as a shockwave going outwards, which ejects the outer layers of the star – a supernova. This is visible as a sudden brightening and subsequent dimming of the star.

However, some stars may simply wink out without a bang, say the researchers. Looking for these "unnova" in wide-field galactic surveys would allow astronomers to determine how common they are.

The survey would need to systematically observe sections of space of a radius of 10 megaparsecs, or 32.6 million light-years, in order to keep watch over a million supergiant stars. Since supergiants live for a million years, this should guarantee witnessing at least one die over the period of the survey.

Any vanishing stars could be detected by simply photographing the sky with a wide-field camera attached to an eight-metre diameter telescope, and pinpointing any stars that vanish between two images of the same area of sky.

Kochanek said his team had already started collecting survey data this spring using the two 8.4-metre mirrors of the Large Binocular Telescope at Mt Graham in Arizona, U.S., and intend to make regular observations over a five-year



Stellar bang: The red supergiant star V838 Monocerotis, surrounded by a cloud of dust illuminated by the exploding star. Current models of supernova formation fail to explain how such massive stars explode. Some supergiants may simply vanish instead, say U.S. researchers.

Credit: NASA, ESA, and The Hubble Heritage Team (STScI/AURA)

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period.

Making the data fit

The survey could help to resolve models of supernova formation, which have trouble making supergiant stars explode based on current models of stars' deaths, the researchers said.

In the standard model, supergiant stars (from 8 to 30 times the mass of the Sun) explode as a supernova but leave a dense, compact star called a neutron star as their remains. Stars even larger than this explode and leave a black hole. The default assumption is that they all go supernova whether they leave a neutron star or a black hole behind, said Kochanek.

"Our point is that you really have no observational basis for this assumption – we know that some explode, and we know that it is really hard to make them explode in computer models – so we are pointing out that we really ought to find out if there are black holes being formed without the dramatic signature of a supernova explosion," he said.

Stellar whimper

"This [study] makes the point that some stars may go out with a whimper rather than a bang," said astrophysicist Scott Croom from the University of Sydney who was not involved in the research. "[This is] a really nice, neat idea... that could help to shed light on models of supernova formation."

Croom noted that one possible limitation is that the survey wouldn't be able to accurately observe galaxies much further than 10 megaparsecs away.

"As you look further into space, stars start to get too faint and it gets harder to resolve individual stars," commented Croom. "In order to detect the absence of a star you need to detect individual stars of ordinary brightness, and even in nearby galaxies this is relatively challenging. If you're looking at many galaxies, this starts to be a significant undertaking."

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More information

[The study in the *Astrophysical Journal*](#)

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