

# Supernovae linked to gamma ray bursts

By Stuart Gary for ABC Science Online

Posted Thu Jan 28, 2010 3:59pm AEDT

Updated Thu Jan 28, 2010 4:51pm AEDT

**Scientists have discovered a new way of detecting gamma ray bursts while using radio telescopes to observe supernovae.**

The researchers say this may provide new clues in understanding how some supernovae explode and how they may be related to gamma ray bursts.

Gamma ray burst events are among the most powerful and violent explosions in the universe, emitting mostly gamma and x-rays.

Supernovae are much smaller by comparison, typically emitting light at visible wavelengths.

One group of supernovae known as type Ib/c have previously been associated with gamma ray bursts, but their optical and radio emissions have never shown evidence of travelling close to the speed of light - a true sign of gamma ray bursts.

Now a report in the journal [Nature](#) suggests long duration gamma ray bursts are a rare sub-class of type Ib/c supernovae.

## Powerful engines

Using radio telescopes, the researchers found that material ejected from supernova 2007gr - located in the galaxy NGC1058 - is moving at more than 60% the speed of light.

"These relativistic jets imply the presence of powerful central engines driving the outflows," says radio astronomer Dr Megan Argo of [Curtin University of Technology](#) in Perth.

"These central engines are thought to involve the accretion of matter either into a black hole or onto a neutron star."

Argo says the strong magnetic forces inside the neutron star tightly focus the ejected material into high energy jets, which can be measured by the radio telescopes.

"It's the same process believed to be at the heart of gamma ray bursts," she says.

According to Argo, the findings suggest that some type Ib/c supernovae may produce mildly relativistic jets.

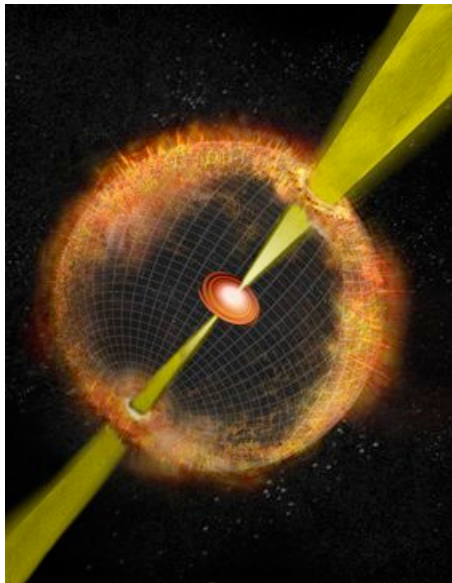
## More evidence

In another paper published in *Nature*, a team led by Dr Alicia Soderberg from the [Harvard-Smithsonian Centre for Astrophysics](#) detected radio emissions from supernova 2009bb near the centre of the galaxy NGC 3278.

"Discovering such a supernova by observing its radio emission, rather than through gamma rays, is a breakthrough," says Soderberg. "We believe we'll find more in the future through radio observations than with gamma ray satellites."

Their data showed material leaving the supernova at a velocity of 85% the speed of light, as well as energy comparable to the radio afterglows coming from nearby gamma-ray bursts.

The researchers say SN 2009bb was the only relativistic supernova found in a radio survey of 143 nearby supernovae in the part of the sky her team looked at.



*The material blasting out at close to light speed suggests a powerful central engine inside the supernova, say researchers (Bill Saxton, NRAO/AUI/NSF)*

- [Map: Curtin University of Technology 6102](#)

They believe that only 1% of type Ib/c supernovae harbour central engines, a figure they say is consistent with the inferred rate of nearby gamma-ray bursts.

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