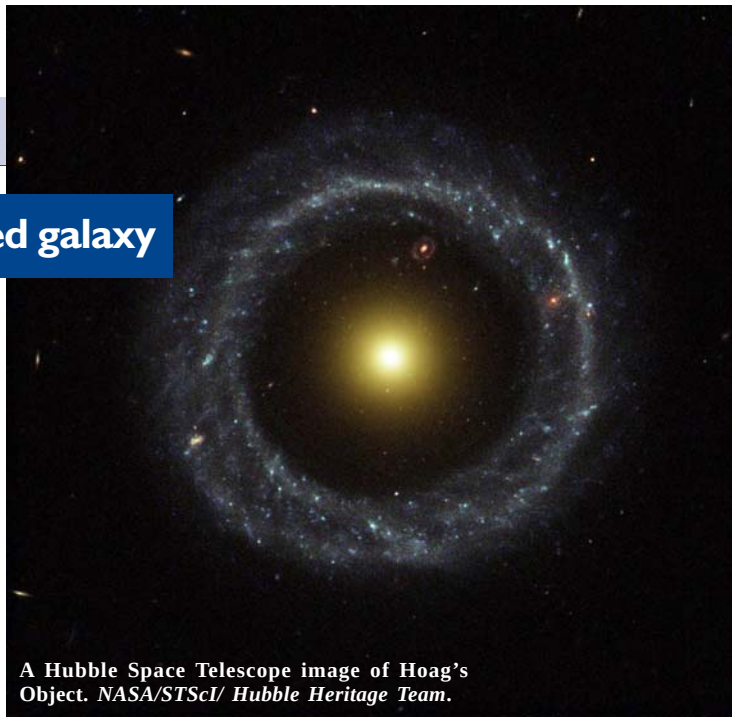
Hoag's Object: A mysterious ring-shaped galaxy



A Hubble Space Telescope image of Hoag's Object. *NASA/STScI/ Hubble Heritage Team.*

In February I was very interested to receive an image of Hoag's Object taken by Damian Peach using a remote telescope in New Mexico. It was not an object I was familiar with, and the image was very intriguing. At first sight it looks like a planetary nebula, but is in fact an unusual 'ring' galaxy.

The object was first noticed by American astronomer Arthur Hoag in 1950, and there was some uncertainty about its nature. A planetary nebula was quickly ruled out, and Hoag thought that the circular ring might be due to gravitational lensing, but measurements of the redshift of the ring and core ruled out this explanation too. Distance measures place it about 600 million light years away.

More recent studies have confirmed the galactic nature of the object. In colour images the core is distinctly yellow/red, being composed of older stars, whilst the ring comprises young blue stars. Current thinking is that the object is a result of some sort of collision or capture of a pair of galaxies. But there are many mysteries – if it was a collision, where is the second galaxy now? As the object is about 2–3 billion years old, why are there not more red stars in the ring?

Hoag's object lies in the constellation Serpens Caput – the western part of Serpens, at RA 15h 17m 14.4s and Dec +21° 35' 08". Unfortunately this is a summer object, culminating at midnight in late May, so time is short to view it in darkness from our northerly location. It is also rather faint, with a visual magnitude of around +16, and has a small angular diameter with the ring being about 17".

On searching the Deep Sky Section archive, there is only one previous report – an observation made by Grant Privett in 2007 using a 25cm reflector and Starlight Express MX716 CCD camera. So there should be no real difficulty for astro-imagers in capturing this object.

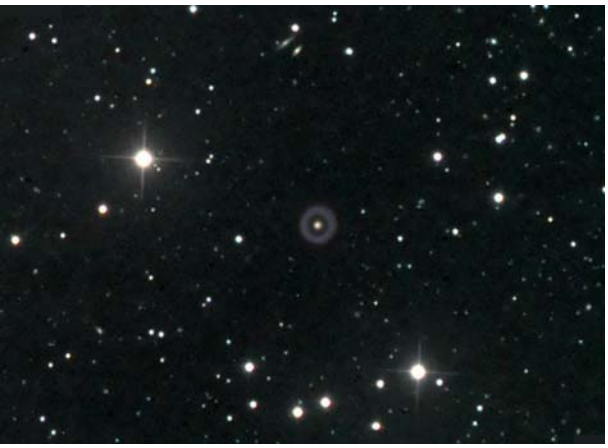
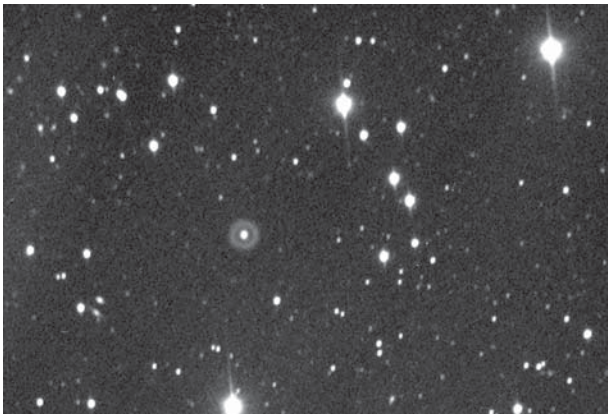


Image obtained remotely at New Mexico with a 50cm CDK@F4.5, FLI-PL002M. L:25mins, RGB:5mins. Processed with *Maxim* and *Photoshop*. *Damian Peach*.

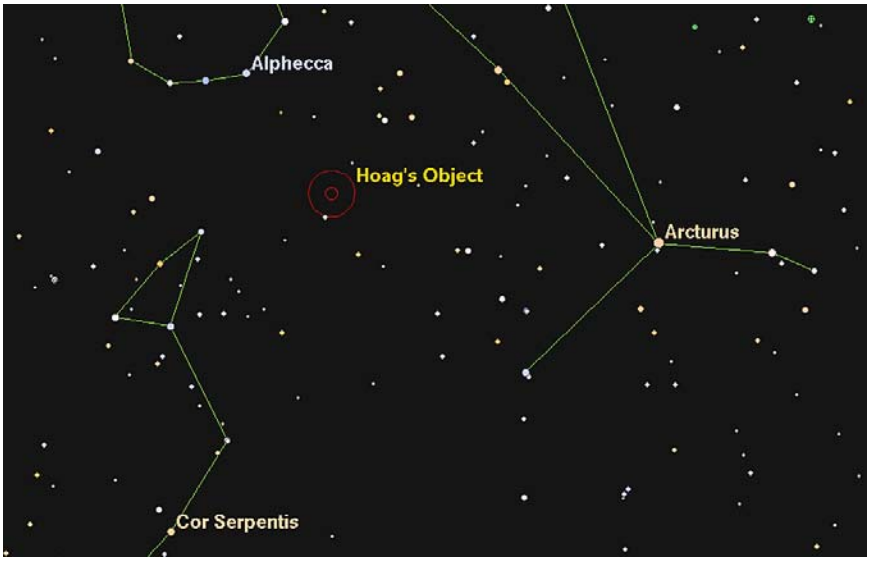


Hoag's Object imaged from the UK with a 25cm Newtonian & MX716 CCD camera, 150×30s images. *Grant Privett*.

Visual observing is rather more problematic. It seems likely that the core might be detectable with a telescope of 25cm aperture. But the ring is somewhat enigmatic, and many attempts to view with large telescopes (45cm and greater) have not been fruitful. Only those with very large telescopes (70cm or more) seem to be able reliably to detect it. But if you have access to a large telescope and the chance to observe from a dark site with good seeing it would be worthwhile giving it a try.

Another ring galaxy to observe is NGC 6028 in Hercules. It is brighter, and smaller than Hoag's Object, but may be more accessible. More such objects lie in the southern hemisphere, and would be good targets for those in the antipodes. And if you look carefully on the Hubble Space Telescope image of Hoag's Object, you will notice another ring galaxy, in the gap between the core and the ring – very remarkable.

Callum Potter, *Director, Deep Sky Section*



Location chart for Hoag's Object *(Created using XEphem).*

GRB 130427A – so near yet so far

At 07:47:57 UT on Saturday April 27 NASA's orbiting *Swift* Burst Alert Telescope (BAT) triggered and located the gamma-ray burst designated GRB 130427A. *Swift* immediately slewed to the burst while the on-board computer worked out its exact position. Some two minutes later X-ray and optical images were being recorded by the satellite. This was one of the brightest GRBs ever recorded by *Swift*.

Details of the outburst were immediately transmitted to the ground and alerts issued to ground-based observatories. At 07:50 UT the GRB was detected at magnitude 12 by a 0.45m optical telescope at New Mexico Skies operated by Russian astronomers, and a further two minutes later the Faulkes North 2m scope on Maui, Hawaii, had slewed to the reported position and recorded an R magnitude object at mag 11.5. Later in the day several metre-class telescopes reported observations of the fading GRB afterglow in Gamma-ray Coordinates Network (GCN) *Circulars*.[1]

Approximately 90 minutes after the outburst, a spectrum was obtained at Gemini-North on Mauna Kea which indicated that the GRB had a redshift $Z = 0.34$. This corresponds to a light travel time of approximately 3.75 billion years, so the burst had actually occurred not long after the formation of the solar system, and the radiation from it finally reached the Earth that April Saturday morning.

It later transpired that the first detection of the GRB was by three RAPTOR full-sky persistent monitors at Maui and Los Alamos, which detected a magnitude R~7.4 optical source at the GRB position 50 seconds before the *Swift* BAT trigger.

I returned home from the excellent BAA meeting at Chichester on April 27 to find TA *Electronic Circular* 2909 about the GRB issued earlier in the day by Guy Hurst. It was a clear night so I started imaging at the reported position using my 0.35m SCT with a SXVR-H9 CCD camera. I had little expectation of seeing anything 14 hours after the outburst since my previous experience of imaging a GRB afterglow[2] had found it fainter than mag 19 just 4 hours after the burst. I was therefore surprised to see a 17th magnitude object at the reported position of the GRB (RA 11h 32m 32.81s, Dec 27° 41' 56.3").

A good run of clear nights enabled me to follow its slow decline to fainter than mag 20 one week after the outburst. Its great brightness and protracted visibility is largely a result of its relative proximity in cosmological terms.

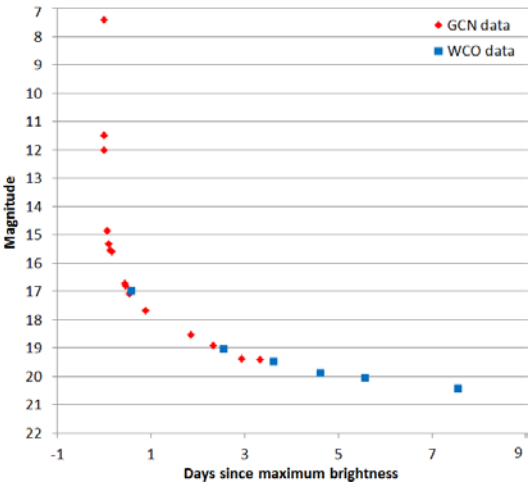


Figure 1. Observations of the GRB reported in GCN *Circulars* issued following the outburst (red) together with measurements made at West Challow Observatory (blue).

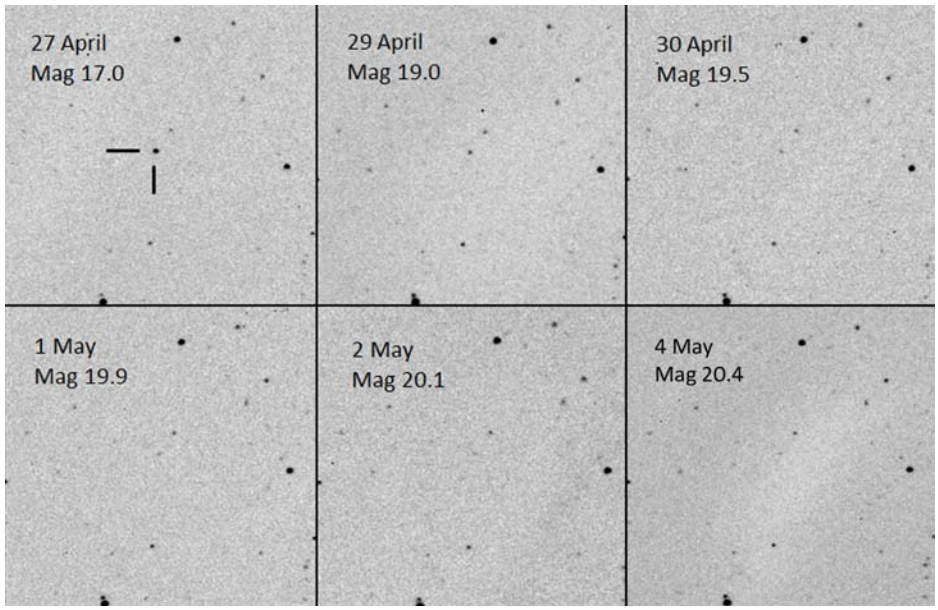


Figure 2. The author's images of the fading GRB afterglow. These are each stacks of between 8 and 12 one minute exposures.

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1 http://gcn.gsfc.nasa.gov/gcn_circulars.html
2 *J. Brit. Astron. Assoc.*, **121**(3), 175 (2011)

Partial lunar eclipse of 2013 April 25

Alan Tough imaged the small lunar eclipse on the evening of April 25 from Lossiemouth, Moray, Scotland with his Canon EOS 60D and Sigma EX 150–500mm lens. *Alan C. Tough*.