

Supernova 2005ep

The Puckett Observatory

Tim Puckett owns and runs a private facility located in the mountains of northern Georgia, USA. The Puckett Observatory is dedicated to the discovery of supernovae and images over 1,500 galaxies each clear night using computer-controlled robotic telescopes.

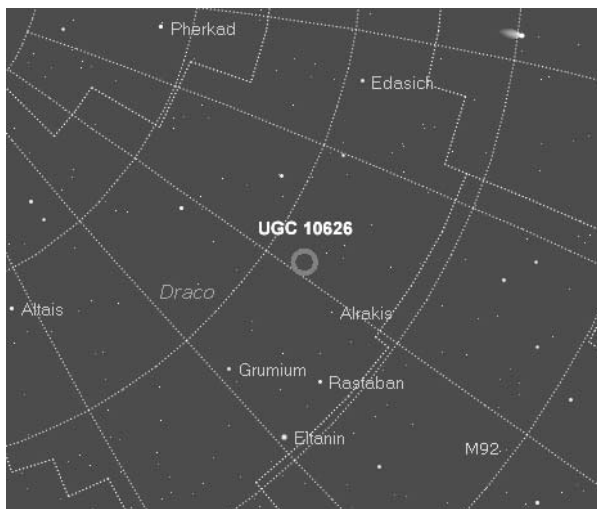
These images are analysed for supernovae and if one is found, a confirmation image must be taken, preferably from a different location. If confirmed, the Central Bureau of the IAU (the official clearing house for such observations) can be informed and once verified, the discovery is announced.

Analysing the data generated by these nightly patrols, Tim Puckett and his team has discovered over 100 supernovae to date.

Ireland's advantage

With the sun setting in Ireland five hours earlier than Georgia, we are ready to image as they are finishing their lunch. We can provide the confirmation images before night falls in the Eastern USA.

On Friday 31st September 2005, Tim contacted me with 'a hot one' – an apparent supernova in galaxy UGC 10626 in Draco. Tim had imaged the galaxy on four previous occasions in September but there was no evidence of a supernova. He imaged it again on September 30th and there was a bright 'new' star. Tim asked if I could shoot a confirmation image.



Finder chart for UGC 10626

Luckily, I received the email early on Friday evening just after I had set up my imaging system. It was cloudy but a few large breaks were evident. The wind was picking up but the AP1200 mount was an easy match for the conditions.

Getting ready

Tim sent me the co-ordinates of the galaxy and the discovery image for reference. I punched the co-ordinates into my planetarium software and slewed the scope over to them. I quickly took a one second image. The field I was looking at was not the same.



**SN2005ep discovery image
(T.Puckett/M.Peoples)**

I slewed to a nearby bright star and re-calibrated the mount. I slewed back to Tim's co-ordinates and sure enough, the star fields matched. I knew I was in the right spot but a five second image showed no hint of the galaxy.

I fired off a 90 second exposure. This image was devoid even of stars so I took a look outside – it was raining! I quickly pulled the rolling shed over the equipment and parked the mount – no major harm had become of it thankfully. It was all just a bit wet.

I waited about half an hour and the shower passed and the skies were now wonderfully clear. I had to recalibrate the mount again but once that was done, I slewed back to UGC 10626 and shot another 90 second image. I had the galaxy pretty much centred and there seemed to be a bright star at its edge. But was it the supernova?

The confirmation image

With a few rotations and flips in my imaging software, I had the two images aligned. And yes, my bright star was in the same place as Tim's. I sent the image to Tim at 22:20 local time and continued to image. 13 minutes later, Tim replied that the image confirmed the presence of the supernova and he was now writing his report.



**SN2005ep Confirmation image
(D. McDonald)**

My image had confirmed Tim's discovery. Early on Saturday 1st October, Tim sent me a copy of the electronic telegram confirming the discovery.

Further to IAUC 8605, T. Puckett and M. Peoples report the discovery of an apparent supernova (mag 18.0) on an unfiltered CCD frame taken with the 0.60-m automated supernova patrol telescope on Sept. 30.05 UT.

The new object was confirmed at mag 17.9 on an image taken by D. McDonald, Celbridge, Ireland, with a 0.2-m reflector on Sept. 30.8.

SN 2005ep is located at R.A. = 16h56m35s.49, Decl. = +58o01'30".2 (equinox 2000.0), which is 2".7 east and 12".7 south of the center of UGC 10626. Nothing is present at this location on images taken by Puckett on Sept. 6, 9, 11, and 18 (limiting mag about 20.0).

Equipment

All the equipment I use, apart from the mount, is off-the-shelf and relatively inexpensive. The setup used for the confirmation image is as follows:

- Celestron C8 OTA (200mm Schmidt-Cassegrain)
- Celestron F6.3 focal reducer
- Meade DSI (deep sky imager) CCD, unfiltered
- Astro-Physics 1200GTO GEM
- Meade Envisage CCD control software
- TheSky 6 for mount control
- Adobe Photoshop 7.0 with FITS Liberator 2 (ESA/ESO/NASA) plug-in

With this setup, I've managed to confirm imaged objects of 18.0 + magnitude. So a 17.9 magnitude supernova was pretty much at the limit of the setup. But as you can see from the image, there are apparently dimmer objects recorded.

Typical imaging session

At the start of each imaging session, the telescope is collimated and focused and polar alignment of the mount is checked using the declination drift method.

Air temperature is checked and if I don't have any applicable dark frames, I'll take a series at exposure durations from one second to two minutes. If the temperature changes significantly during the night, I change to more applicable dark frames. Currently, bias and flat frames are not used.

Once the system is ready, I calibrate the mount to a couple of known bright stars and then it's ready to go. Once centered on an object, the mount tracking is exceptional. The field-of-view with the SCT at F6.3 is about 10 x 13 arcminutes – to cover the full moon, I have to take 9 images. But within this FOV, a centered object will stay perfectly centered for at least two minutes and will stay within the entire FOV for hours on end.

The system currently allows me to take two minute unguided exposures with no discernable star trailing. With further calibration of the mount, I expect this to increase significantly.

The future

The ability to provide confirmation images is within the grasp of many amateur astronomers using their current equipment. Many more could join in with a few minor upgrades.

A clear advantage for amateur Irish astronomer is the time difference between us and the USA. Since many supernova search programmes are based in the States, we are ideally positioned to provide confirmation images very quickly – provided the weather conditions hold out.

But we also have the ability to discover supernovae. Some amateurs in Ireland already visually scan the skies for these spectacular events and post their results to the IFAS (Irish Federation of Astronomical Societies) web site – a busy forum for amateur astronomers across the island of Ireland.

I belong to an affiliated IFAS society – Kildare Astronomy Society (KAS) based just west of Dublin.

The IFAS web site is open to anyone with an interest in astronomy and we regularly swap ideas, fix problems and provide guidance and advice, especially to beginners. I've certainly been helped by the very experienced and knowledgeable folks who frequent the site.

I'm sure that one day this forum will help get interested people together and form a co-ordinated Irish supernova search programme. And who knows, it could be our friends across the pond who provide the confirmation images...

Dave McDonald 2005

Further information

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