



# TRANSIT

The October 2012 Newsletter of



## NEXT TWO MEETINGS

**Friday 12 October 2012, 7.15 for 7.30 pm  
at Wynyard Planetarium**

**Transit of Venus special**

**John McCue & Neil Haggath, CaDAS**

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**Friday 19 October 2012, 7.30 pm  
at Redwood Lodge, near Church Street,  
Durham DH1 3DQ**

**Thomas Wright Trophy competition**

**Teams from CaDAS, Durham AS and Durham  
University Students' AS**



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## Editorial

Rod Cuff



Firstly, a warm welcome to five new members this month (we're growing quite fast these days) – Christopher Cameron, Gary Haley, David Holdridge, Jonathan Mathieson and Rebecca Simpson. We hope you enjoy and make good use of your membership of CaDAS – and if you feel like penning a letter or an article for a future issue of *Transit*, please don't hesitate!

Secondly, very many thanks to Andy Fleming for editing the excellent September issue of *Transit*. It's a great relief to know the magazine is in good hands when I'm off doing strange non-astronomical things such as getting married.

Speaking of which: part of our honeymoon (in northern Italy) was spent in Verona. Being opera fans, we spent our last evening there in the enormous Roman amphitheatre that hosts Verona's [summer opera festival](#). I've always wanted to see its renowned and totally-over-the-top production of Verdi's *Aida*, the highlight of which is the [triumphal procession](#) of conquering Egyptians and defeated Ethiopians at the end of Act 2. It didn't disappoint, with over 200 people on and above stage, including scores of 'soldiers' spaced along the stone rows soaring above the stage, each holding a blazing fiery torch.

But the point of telling you all this is that there was (for me) an earlier spectacular moment as well. Waiting for the production to start, I was enjoying a long look at the last-quarter Moon shining above the open-air stage, when a stately movement in the sky caught my eye. There, sailing calmly over a largely unaware and chattering audience, the very bright International Space Station made its way over the arena and disappeared past the Moon and over the top of the ancient walls. Magic.

But to this month's issue ... Rob Peeling has been inundated with other things this month, so I've put together a Skylights guide that uses Rob's survey from October 2012 of objects in the constellation of Lyra, along with some Solar System notes culled from across the internet. Andy Fleming shows his versatility by *writing* for the mag this month – to be precise, his article on Venus is just one of the many entertaining and informative pieces he writes primarily for his [Andromeda Child blog](#), which I'm always glad to be able to feature. David Graham and Pat Duggan have sent in letters occasioned by the recent spectacular fireball; Keith Johnson has submitted another terrific image, this time of the Pleiades; and I've banged on about struggling up the astrophotographic ladder painfully slowly.

Many thanks, as ever, for contributions this month. Please keep them coming in.

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## Letters

*[You'll no doubt remember that there was a brilliant fireball on 21 September visible (cloud permitting) from huge swathes of northern England, including our area. I sent out a note soon after to accompany a call from the BAA for information on sightings. The two letters below were in response to my email. David sent the information in his letter to the BAA – many thanks, David!]*

The fireball led to a lot of discussion and analysis on the internet. For instance, there's a detailed analysis at <http://tinyurl.com/d8k76vg> that tentatively identifies the object as a small Aten asteroid (one whose perihelion lies within the orbit of the Earth and whose aphelion lies only just outside it). Another interesting discussion is at <http://tinyurl.com/8ea3963>, which concludes that the object may have entered the atmosphere, skipped out, circled the Earth and re-entered.– Ed.]

## Grandstand view

from David Graham

On Friday evening, 21 September, I was evaluating a new 120mm OG when at approximately 21h 52m UT my eye caught what I initially thought to be a low aircraft on its approach to nearby Durham Tees Valley airport, coming in from due east with a landing light on. Sky conditions were dark and clear and I quickly realised that this was no aircraft but the brightest meteor that I can remember in over three decades of patrolling the night sky.



The object rapidly expanded to show a visible disk with a green hue, and was several times brighter than Venus, though I could not state an exact magnitude – perhaps similar to a full moon? It passed through my zenith and appeared to be trailing a succession of fragments as it did so. It was seen disappearing over the western horizon as a cluster of glowing fragments, very much like a spent firework. There was no noise and no persistent train.

Sorry I can't give a duration for the event other than it would have been seconds; it stayed visible for longer than a standard meteor does, but less than for a satellite. I would state that the track was Aries, Andromeda, Cygnus and Hercules, and that it passed due east to west, directly overhead as seen from my part of the world. I was very thrilled to have seen it.

Latitude 54° 28' 22"; Longitude –1° 38' 49"; Altitude above sea level 77 metres.

*Regards, David*

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## Space junk re-entering the atmosphere

from Pat Duggan

The 'Upcoming Re-entries' website ([www.aerospace.org/cords/reentry-predictions/upcoming-reentries](http://www.aerospace.org/cords/reentry-predictions/upcoming-reentries)) is interesting, as sometimes I look out for the objects if they are due to start their fall into the atmosphere anywhere near my location... though it's usually cloudy!



There was another fall earlier in the year that the website predicted, but it was announced on the news as a meteor! My daughter saw it, and its burst of colour would have been explainable by the type of fuel content remaining in the tank. Would the general population get scared and start a panic if it were announced as space junk? A small percentage of junk falls in an uncontrolled way and some of the videos of things twisting and tumbling are fascinating.

*Cheers, Pat*

# OBSERVATION REPORTS AND PLANNING

## Skylights – October 2012

*Rob Peeling & Rod Cuff*

*Don't forget that the clocks go back in the early hours of Sunday 28 October.*

### The Moon

	Last Quarter	New Moon	First Quarter	Full Moon
	8 October	15 October	22 October	29 October
Rise	23:48 BST	07:35 BST	14:49	16:12 GMT/UT
Set	14:28 BST	17:44 BST	00:28 BST (23 <sup>rd</sup> )	06:41 GMT/UT (30 <sup>th</sup> )



### The planets

**Jupiter** is the main planet of interest this month, rising in mid-evening and well up in the eastern sky before midnight, shining very brightly in the constellation of Taurus. It will be even more conveniently placed in the next few months, reaching opposition in December.

**Venus** is also spectacular, but in the pre-dawn sky. On 12 October it forms a triangle with the waning crescent Moon (three days before New) and Regulus ( $\alpha$  Leonis), which could make a good capture for early-rising astrophotographers.

Mercury, Mars, and Saturn aren't sensibly observable this month, though the faint **Mars** near the 3-day-old crescent Moon in the evening twilight of 18 October could be good to catch, especially in binoculars.

However, you still have a chance to find **Uranus** and **Neptune** with binoculars or a telescope close to the horizon during twilight. Last month's Skylights gave details of where to look, or of course you can use your favourite planetarium software to locate them.

### Meteors

Around 21/22 October there will be a favourable maximum of the **Orionids** meteor shower (the Moon will be at first quarter). Derived from passages of Halley's Comet, these meteors are fast, often with persistent trains. Look at any time of the night after about 9 pm; the peak **Zenith Hourly Rate (ZHR)** is about 25. The shower is active at lesser levels all month.

### Deep space

This month I'll focus on objects in **Lyra**. Let's start with the one everyone has heard of, **M57 or the Ring Nebula**. Use your finder to aim your telescope exactly halfway between  $\beta$  (beta) and  $\gamma$  (gamma) Lyrae. With a low-power eyepiece, **M57** should be visible as a tiny smoke ring. Increase the power and you should be able to see, as John Herschel did, that the ring is not empty. There is a faint mistiness filling it. Also check the shape; the ring isn't anywhere near a true circle.



The other Messier object in Lyra is [M56](#). Look with low power half-way between  $\gamma$  Lyrae and Albireo in Cygnus. M56 is a prominent circular fuzzy beside a star. High power will resolve the stars in this globular cluster (*see right*).

Now focus on [Vega](#) with high power and look for its companions, two faint stars nearly opposite each other with Vega in the middle. This is an *optical* alignment, with the companions in the distant background behind nearby Vega. The companions are listed in the [Washington Double Star Catalogue](#) (WDS) along with a gaggle of other ones too faint to detect without a CCD.



Now try  $\epsilon$  Lyrae, which should be visible in the finder as an obvious wide double if Vega is in the centre of the field. This is the famous **double-double** and high power ( $\sim 100\times$ ) should split the two pairs for you. Note the way the pair are orientated at right angles to each other. Now look for a star between the pairs, but slightly off to one side. Look carefully near this star for two faint ones actually between the pairs. These are William Herschel's *debillisimae*. There is another, fainter one too, first seen by Lord Rosse with his 6-foot-diameter telescope, the [Leviathan of Parsonstown](#).

Now look for the wide binocular double  $\delta$  (delta) Lyrae. Even in binoculars this is a colour-contrasting pair, consisting of blue  $\delta^1$  and orange  $\delta^2$ . Look more closely with a telescope and the pair are part of a sparse but definite open cluster called **Steph 1**. Swing over to  $\zeta$  (zeta) to find that this star too is a wide double.

Using Vega and  $\zeta$  Lyrae to mark the base, look for  $\kappa$  (kappa) Lyrae in the finder to define a long, thin triangle. Aim right in the centre of the triangle and examine the area with low power. It will be frustrating initially, but suddenly you'll notice a deep-red star and wonder why you didn't notice it earlier. This is a [carbon star](#) and a long-period variable called **T Lyrae** and one of my favourite red stars.

The next target is  $\beta$  Lyrae or **Sheliak**, which is well known as a variable of the eclipsing-binary type. Compare its brightness night on night using binoculars against  $\gamma$  and  $\zeta$  to see the change. It matches  $\gamma$  at its brightest and  $\zeta$  at its faintest. In the telescope you will see  $\beta$  as a small group of four stars (all in the WDS).

Well to the north of Vega is the long-period variable **R Lyrae**. The deep yellow colour is obvious for this red giant. A slightly more challenging target to the west of R Lyrae is the galaxy **NGC 6703**. It is small but fairly bright. A far more demanding target is the open cluster **NGC 6791**, which is to the far east of Lyra near to  $\theta$  (theta) Lyrae. I can barely detect it from my garden, but it is described as rich and so may be a good bet from a dark site. If frustrated, then don't despair. Switch to  $\theta$  and  $\eta$  Lyrae instead. With a telescope, both are easy, wide doubles.



## Imaging the Pleiades

**Keith Johnson**

On the next page is my image of Messier 45, captured at Kielder Forest on 19 September 2012.

### **Equipment**

- Imaging – 80mm ED refractor with a 0.8x field-flattener/reducer
- Modified Canon 1000D DSLR
- Guiding – LVI autoguider, ZS66 ED refractor, HEQ5 Pro. Mount
- Image reduced in size by 75%.





## Notes from a determined astrophotographer

*Rod Cuff*

Last observing season was a pretty disastrous one from my perspective. The seemingly ever-present cloud only seemed to fade away when a strong and gusty wind was blowing or I was committed to doing something more sociable than standing with my feet in snow for several hours battling light pollution. None of my few attempts at astrophotography, as distinct from simply enjoying looking at starfields, double stars or the apparently boiling surface of the Moon, produced anything that I'd want to show to a two-year-old, let alone to the discerning readership of *Transit*.

I was (and am) determined to do better this season, so was full of optimism when I hauled my telescope, tripod, eyepieces, filters, cameras, heavy-duty batteries, cables, books and laptop out of their hiding places and set up in my garden on a half-decent September night. Having levelled, aligned and focused, I could see that Something Was Wrong. This quickly revealed itself as the results of having had the scope tucked away safely (as I'd thought) in my garage for six months – various accumulated knocks had misaligned OTA and finder scope, and more seriously had put the [collimation](#) of my Schmidt–Cassegrain out badly.

I've rarely had this problem before, so I carefully followed Meade's documented procedure for 'quickly and simply' re-collimating. Hah. Over an hour later, with temper fraying, stars were finally looking like points or [Airy disks](#) and not comets. Now to try a good photography target,

I thought – only to look up and see that the patch of sky I was using to help with collimation was just about the only unclouded one left. Snarling, I packed up, mourned the absence of a cat around for me to kick, and went to bed. I felt depressed, wondering whether it was in any sense worth the hassle of this hobby, and feeling that I'd have one more try before giving serious thought to becoming solely a visual observer.

A week later the skies looked, at first glance, tolerable, and I set up again. Collimation OK; bright stars looking good; how about seeing what Meade's suggested 'Tonight's Best' tour had to offer? At first, the answer was 'Lots of interesting things behind trees'. Then up came 'M13', and everybody's favourite [globular cluster](#) turned out to be not only tree-free, but in the westernish sky – potentially good, as I remarked in an earlier article in *Transit* (June 2011) for two-minute exposures without having the star images blurred by rotation of the field of view in my [alt-az](#) set-up.<sup>1</sup>

My spirits were then immediately dampened by noting that the sky in that area was heavily light-polluted by yellowish sky-glow from industrial Teesside reflecting off what turned out to be a very thin layer of cloud. They were lifted again by the discovery that I could nonetheless see the faint patch of M13 through the scope, so I settled to taking one-minute and then two-minute exposures and darks. Encouraging images were showing on my laptop screen, despite the occasional mysterious corruption (such as the image being split in half horizontally with one section shoved leftward half a screen – I've no idea why that happened, but I've updated the software since then, so maybe I'll never see that problem again).

Processing the results the next day, I recovered my enthusiasm for astrophotography again. There's a long, long way to go, but I'm not unhappy with the results (*shown reduced in size on the next page*), given that I'd handicapped myself in several ways – fixing these should give better results another time:

- Poor sky conditions
- Low elevation (~30°) – happily, in mid-October M13 is still ~50° above the horizon when darkness falls
- Further two-minute exposures are needed to build up the number of fainter stars that can be brought out. Moreover, I could then omit a couple of the current exposures that have detectable star-trails, possibly due to wind vibration
- I forgot to include an infrared filter, thus making stars appear more bloated than necessary
- I didn't try adding a light-pollution filter
- I didn't realise until I packed up my kit that the SCT's dust cap (which I put on to produce a supposedly totally dark field when recording 'dark frames') actually had some light coming through a small area where a flap had got knocked off – as bad luck would have it, the SCT was pointing at Polaris when taking darks, and a mangled image of that star featured on all the darks ...
- Better self-education in teasing details out using Photoshop.

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<sup>1</sup> There are good discussions of this on the internet – e.g., [www.allaboutastro.com/Articlepages/fieldrotation.html](http://www.allaboutastro.com/Articlepages/fieldrotation.html) and <http://autostarsuite.net/forums/storage/19/4981/Field%20Rotation%20V3.pdf> -





**M13, imaged 22–23/9/2012.**

**Conditions:** Seeing moderate, transparency poor, considerable light pollution. Altitude approx..30°.

**Hardware:** Meade LX90 8" SCT operating at f/6.3 on its native alt-az fork mount. Meade Deep Space Imager (DSI IIIc) camera, with 4 × 2-min. and 9 × 1-min. unguided exposures, plus about a dozen dark frames but no flats.

**Software:** Captured and post-processed with [Nebulosity](#), further post-processed with Photoshop CS.

### Venus – the Earth's evil twin

*Andy Fleming*



There is always a tranche of phone calls to newspapers from unwary members of the general public when Venus is bright and on display in either our evening or morning skies, shortly after sunset or before sunrise. Especially to anyone who is driving west, it appears to move with your vehicle, and I suppose it is not surprising that, to anyone who doesn't know the night sky, it could be an unidentified flying object.

Venus is very bright – after the Sun and the Moon, it's the brightest object in the night sky with a maximum apparent magnitude of  $-4.4$ . This is of no surprise: the planet is the second rock from the Sun at only 108 million kilometres distant, and at closest opposition is only 38 million kilometres away from the Earth. These two attributes, plus its high reflectivity or albedo due to its clouds of sulphur dioxide, are the reasons for its brightness.



*Surface of Venus, taken by the Venera 13 Soviet spacecraft.*

Just like little Mercury, although not so fast or as elusive, Venus hugs our star... that's why you only see it for a period after sunset, or for a period before sunrise. Anyone who tells you that they observed Venus in the small hours of the morning is mistaken -- it would simply be too far away from the Sun then. Venus is often very close to the Sun in the sky, making it difficult or impossible to locate.

Venus shows crescent, gibbous quarter and full phases, just like our Moon. These were first observed by Galileo, who realised that for this to happen, Venus had to be orbiting the Sun, not the Earth.

To the naked eye Venus resembles a very bright star but, as it's a planet, it doesn't twinkle; instead it shows a yellowy-white disc through binoculars. Like all the planets, Venus shows a full disc when on the opposite side of the Sun to the Earth. Seen in its full phase through a 26mm eyepiece, for example, it looks spectacular – even more so if you increase the magnification, using something like a 9mm eyepiece. If you catch it as it's about to set in the twilight, it often looks a very beautiful, glowing, orangey colour as the reflected sunlight from

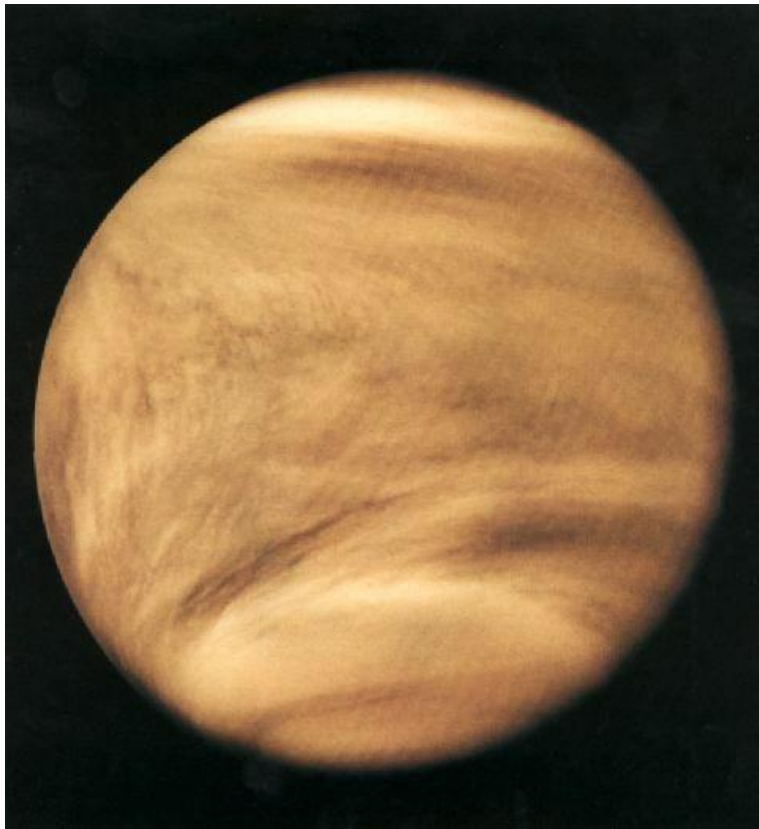
the planet is scattered in our atmosphere. Conversely, Venus has its largest angular size when it is in crescent phase (near its closest to the Earth).

Don't expect to see any features on this planet. You may be lucky and see some very faint cloud bands, but Venus is a hellish place – it is indeed the Earth's evil sister. Although roughly the same mass as Earth, the planet is enshrouded in a crushingly dense atmosphere of carbon dioxide and sulphur dioxide one hundred times the pressure of that on Earth. It's a runaway greenhouse gone mad, with temperatures of 470°C, hot enough to melt tin. It's a salutary reminder of what happens when a planetary climate goes berserk, when a planet is slightly closer to the Sun, when there are no [plate tectonics](#) and when the [carbon cycle](#) releases most of the carbon in the rocks into the atmosphere instead. The result: a desiccated, arid planetary oven where water molecules disassociate and the planet's hydrogen is lost to space.

Venus also rotates in retrograde motion, which means the sun rises in the west. Because Venus rotates so slowly, its atmosphere moves in global-scale weather patterns, producing distinctive U-shaped clouds. Ferocious winds in the upper atmosphere reach speeds of 370 kilometres per hour.

At the moment Venus is in the pre-dawn skies in the east, and it's a good time to observe the planet. As a bonus, the waning crescent Moon will couple up with the planet on Friday October 12, 2012.

So go out and enjoy Venus in October's pre-dawn skies... but remember as you view from our comparative Earthly heaven, you're looking at planetary hell!



*NASA's Pioneer Venus Orbiter captured this ultraviolet image of Venus in 1979.*

*Credit: NASA/JPL*

## THE TRANSIT QUIZ

### Answers to September's quiz

1. Name the Martian crater where NASA's latest Mars rover, the Mars Science Laboratory 'Curiosity' successfully landed on August 6, 2012. **GALE CRATER**
2. Where in our solar system would you find a large impact crater called Caloris Basin, also known as Caloris Planitia? **MERCURY**
3. In which constellation would you find M57, the Ring Planetary Nebula? **LYRA**
4. Name the European Space Agency's unmanned spacecraft that flew past and studied Halley's Comet in 1986. **GIOTTO**
5. Name the unit of distance astronomers use that is defined as the average distance between the Sun and the Earth. **ASTONOMICAL UNIT (AU)**
6. What is the name of the brightest star in the northern constellation Canes Venatici? It is in fact a double star system located approximately 110 light years from the Earth. **COR CAROLI**
7. He was the lead Soviet rocket engineer and spacecraft designer in the Space Race during the 1950s and 1960s and was the anonymous and secret opposite number of NASA's Wernher von Braun. A Member of the Soviet Academy of Sciences, overseeing the early successes of the Sputnik and Vostok projects, his R7 rocket derivatives are still used to this day. What was he called? **SERGEI KOROLEV**
8. Name the NASA spacecraft launched in June 2001 with the aim of providing a detailed all-sky survey of the differences in temperature of the relic radiation of the Big Bang, the Cosmic Microwave Background Radiation (CMBR). **WILKINSON MICROWAVE ANISOTROPY PROBE (WMAP)**
9. What is the name and Messier number of this beautiful Deep Sky Object?  
**SOMBRERO GALAXY, M104**



*Image credit: NASA*

10. Who was the first British Astronomer Royal, who catalogued over 3,000 stars? The catalogue bears his name and he was also honoured with a lunar crater and asteroid named after him. **JOHN FLAMSTEED**

### October's quiz

1. What name has been given to the point at which the Mars Curiosity mission landed in Gale Crater?
2. There's been a lot of excited speculation this month about the discovery of a comet, still far out, that could be a spectacular naked-eye object in November 2013. What's the comet's name?
3. Recent measurements show that the Sun is much rounder than expected – something is countering the centrifugal force from its rotation, which should make the equator bulge out, as the Earth's does. If the Sun was scaled down to the size of a beach ball, the difference between its pole-to-pole and equatorial diameters would be less than the width of – what common comparison object?
4. Who first discovered, in 1913, that the 'Andromeda Nebula', as it was then called, was approaching us, at about 300 km per second?
5. Viewed through a telescope, Neptune appears to be what colour? And Uranus ...?
6. M76, nicknamed the Little Dumbbell Nebula, is in Perseus. But what constellation holds the (bigger!) Dumbbell Nebula?
7. This month, 'Space for Human Safety and Security' is the official focus of ... what?
8. What is the nickname, given to it by Sir William Herschel, of the very red star  $\mu$  (Mu) Cephei?
9. What can you say about these 'pairings'? Gamma Aurigae and Beta Tauri; Gamma Scorpii and Sigma Librae; Delta Pegasi and Alpha Andromedae?
10. What is the name of the brightest star in the Pleiades cluster (see Keith's lovely picture of the cluster in this issue)?

