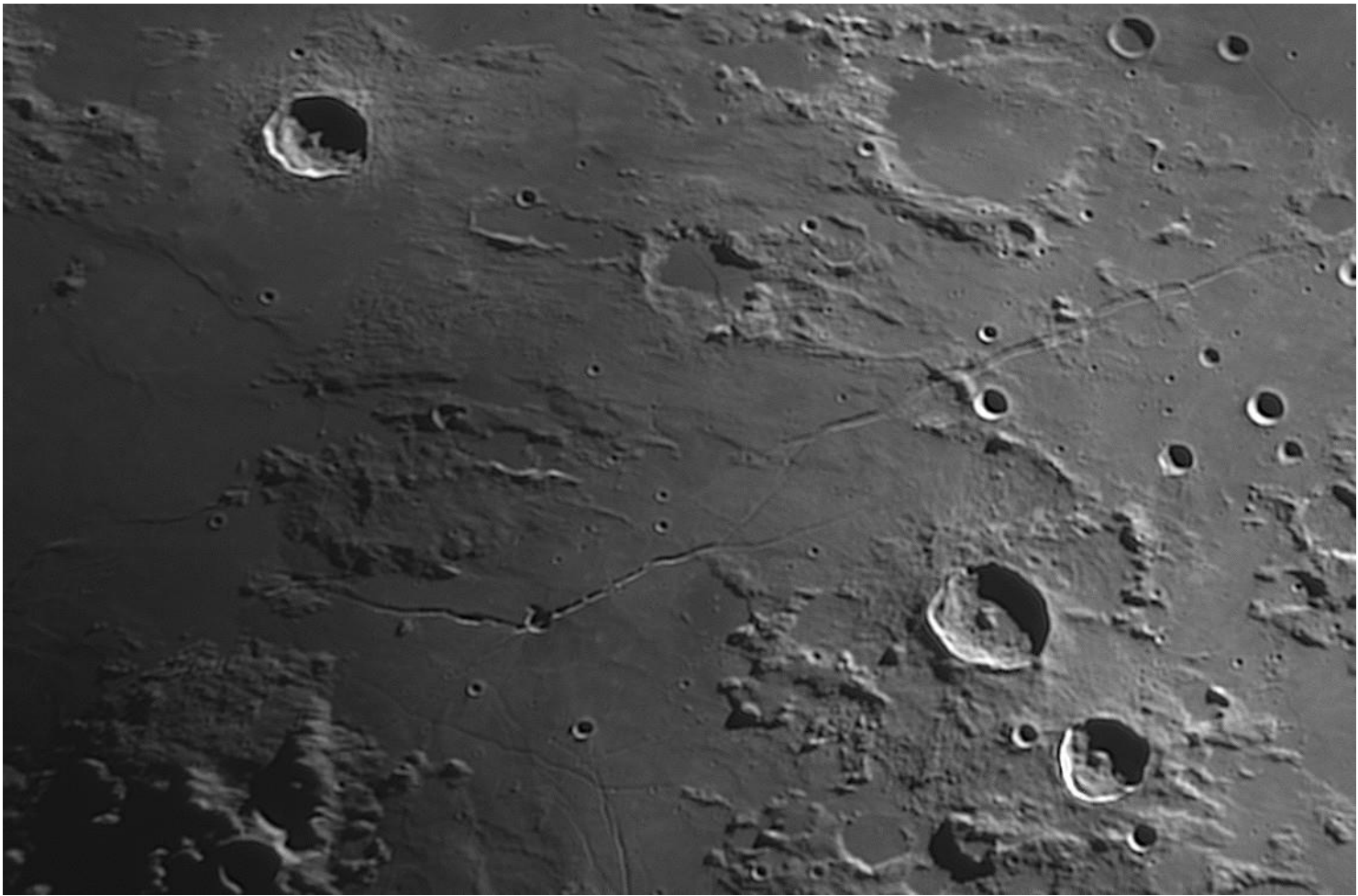


Transit

The Newsletter of Cleveland And Darlington Astronomical Society



Hyginus By David Weldrake

Next Meeting:
Friday 14th November
7:15pm
At Wynyard Planetarium
Atmospheric Optics
By Dave Newton
Sunderland Astronomical
Society



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Editorial

Welcome to the November issue of Transit.

This month we have a number of great images from some of our members (Thanks to everyone who has sent in pictures and please keep sending them in).

A couple of the images are attempts at 3D so you will need some 3D glasses to view them (The old kind with one red and one blue lense). Please let me know how you find these and if the results are positive, there may be more included in future editions.

CaDAS has a collection of books from 1981 to 2002 in the series 'Yearbook of Astronomy', edited by Sir Patrick Moore, and would like to give them away to anyone interested in seeing the state of astronomy just a few decades ago, or who would like to read the many interesting general articles that always constitute a large part of each book. If you're interested in obtaining any, please contact Rod Cuff (rodcuff@sfep.net, tel. 01287 63814, mobile 07775 527530). Rod will also bring any remaining books to the next two monthly CaDAS meetings in the Planetarium, to give you a chance to browse through them and take away any that you'd like to have for yourself. Those remaining after that will go to Oxfam

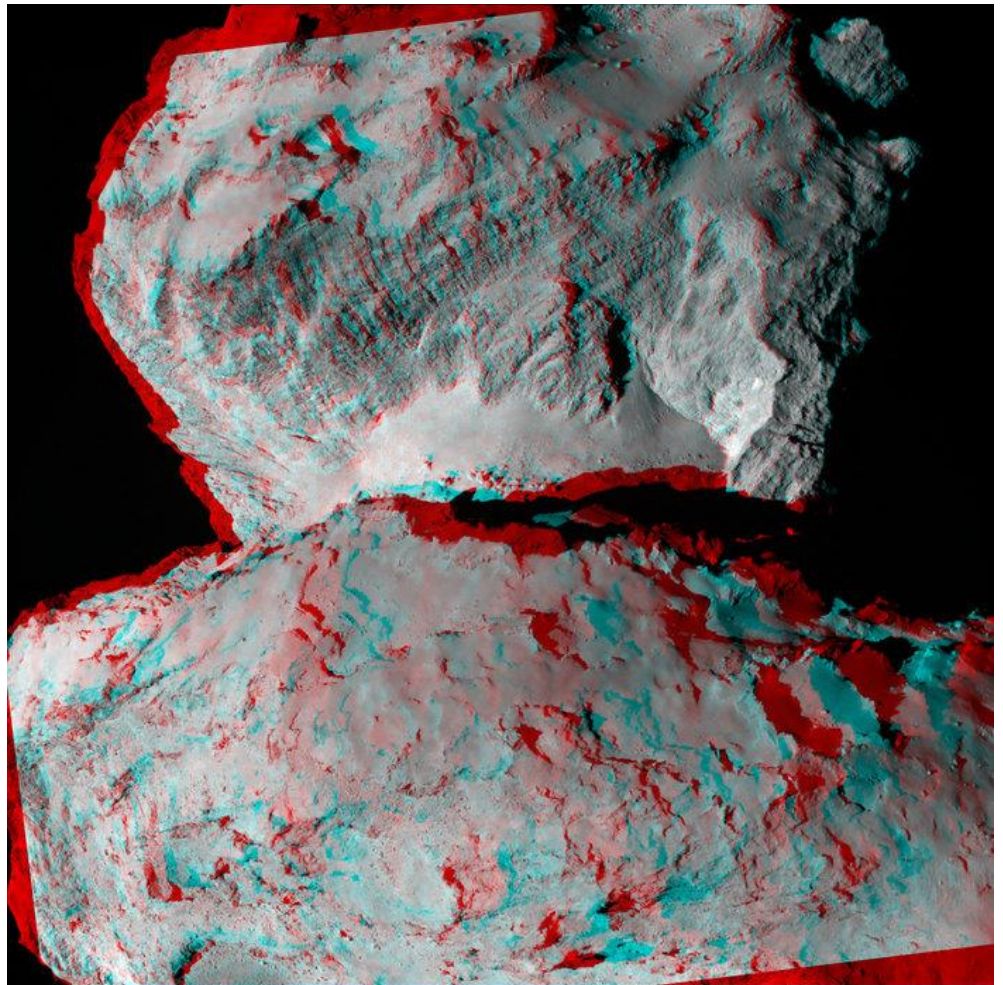
Regards

Jon Mathieson

Address: 12 Rushmere, Marton Middlesbrough, TS8 9XL Email: info@cadas-astro.org.uk

Rosetta 3D Image

For anyone who may not have already seen it, this is a 3D image built up from iamges of the comet 67P/Churyumov-Gerasimenko taken by the Rosetta spacecraft.

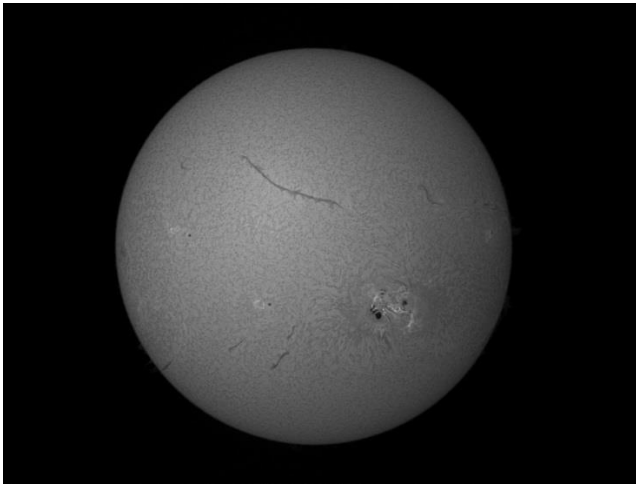


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Members Photos

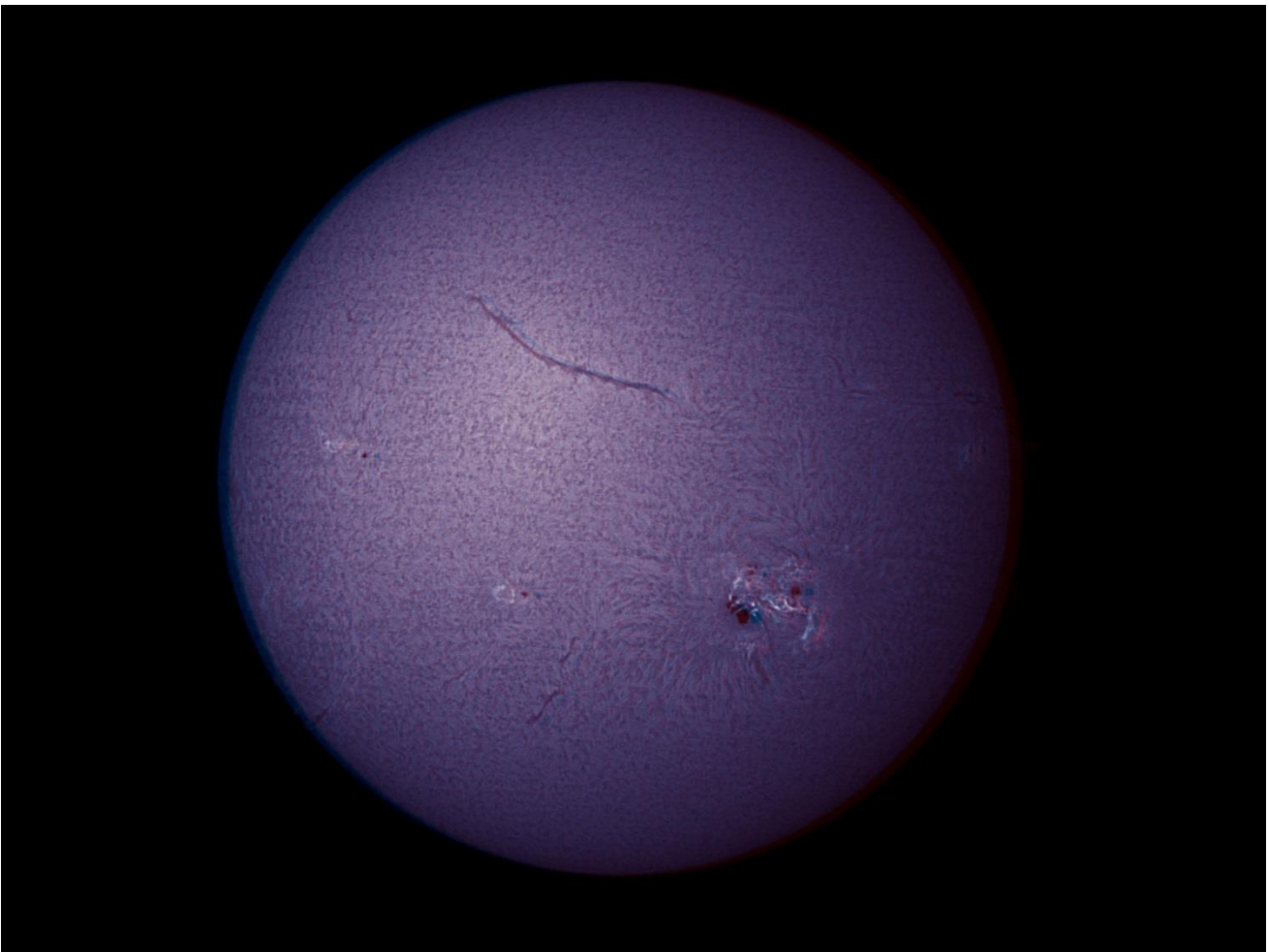
The Sun (25th October 2014) - Keith Johnson



Hydrogen-Alpha



Combined



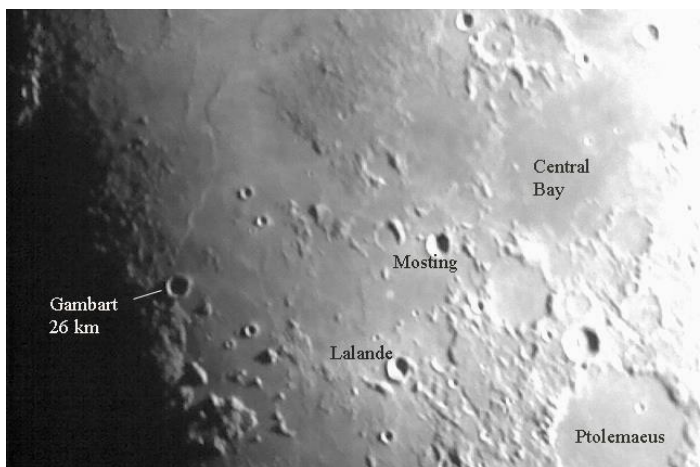
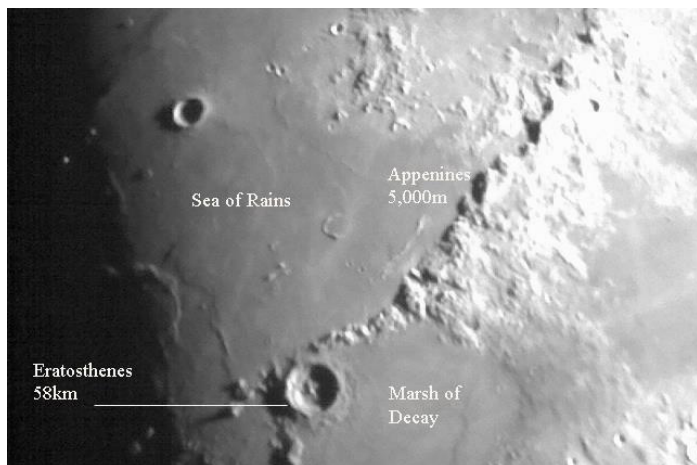
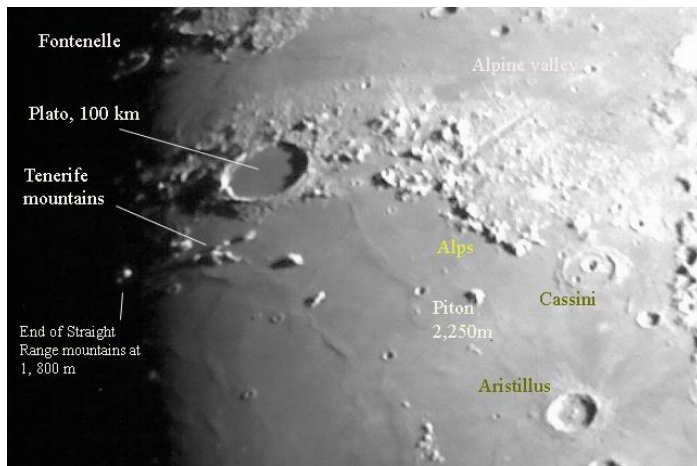
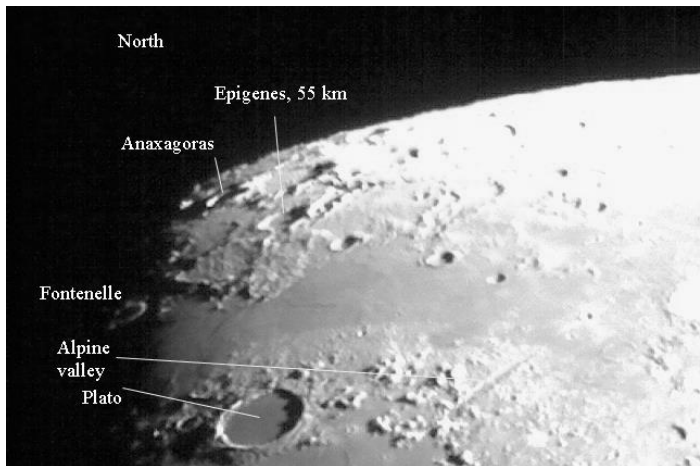
An experiment in 3D – If you have some 3D glasses (The ones with 1 red and 1 blue lense) try them on this photo



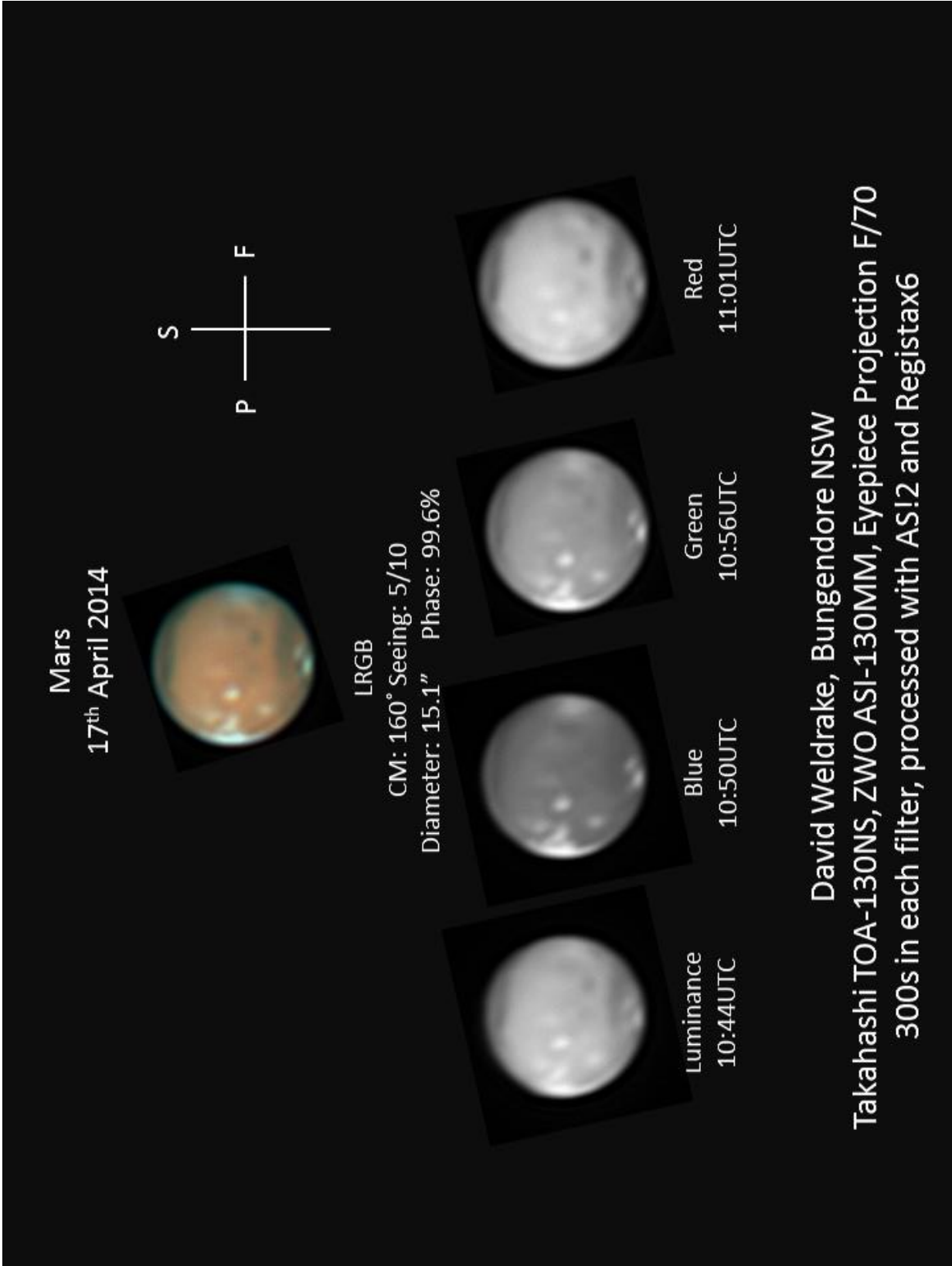
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The Moon – John McCue



Mars and Saturn - David Weldrake



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Saturn

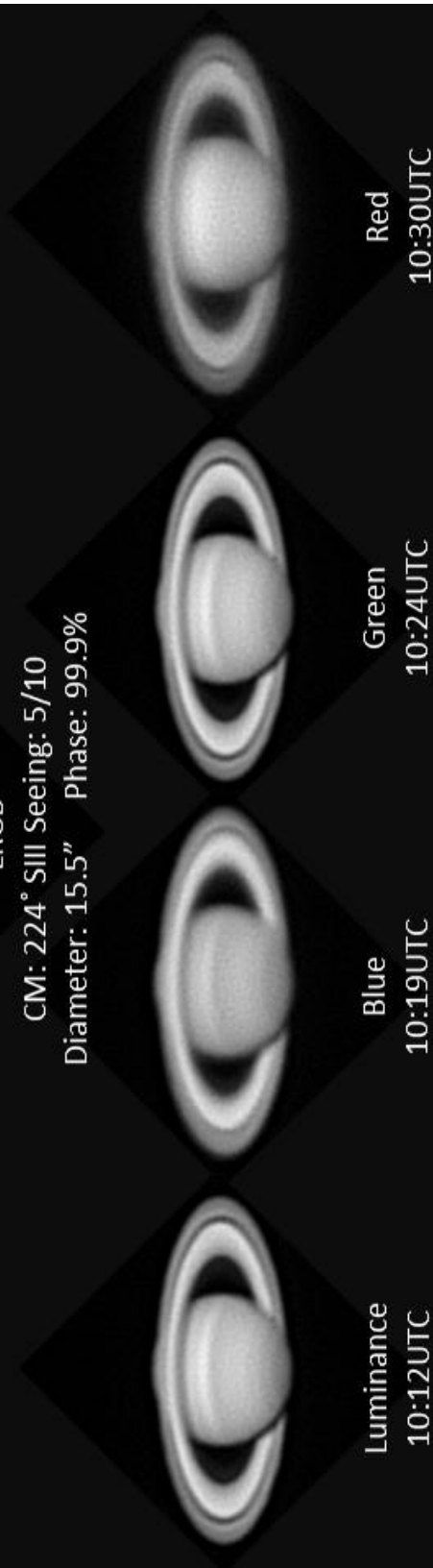
17th April 2014



LRGB

CM: 224° SIII Seeing: 5/10

Diameter: 15.5" Phase: 99.9%



David Weldrake, Bungendore NSW
Takahashi TOA-130NS, ZWO ASI-130MM, Eyepiece Projection F/70
300s in each filter, processed with AS!2 and Registax6



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Tyche, are you there?

By Ray Worthy

When Cassini, with his new telescope, far superior to that of Galileo, announced that the strange ring around Saturn was split up into discernible smaller rings, there was intense speculation about their composition. This question was the subject of a competition, won by James Clerk Maxwell, who, by using some brilliant mathematics gave a proof that the rings must be composed of small particles. Any kind of solid ring structure would break up under gravitational strain. Then the question arose, "What causes the gaps to appear between the rings?" The accepted cause is that of "Orbital resonance."

It is easy to understand this orbital resonance concept by looking at the commonplace process of pushing a child on a playground swing. Each swing has its own frequency, dictated by the length of its suspension chains. If one pushes the swing at the correct interval the amplitude of the swing increases. If however, the frequency of the push is changed then the push may not coincide with the swing going in the same direction, indeed it may even act as a brake.

Since the visits of the various space probes which have sent back an encyclopaedia of information, we recognise that the whole system of the inner moons and the rings are responding to mutual orbital resonance. They are locked in.

Having reached this place in my discourse, I want to point out that, if in future, we discover a ring system with a gap in it, it is only reasonable to suppose that a nearby moon is responsible for the gap. Now, in your mind's eye, zoom your body away into space until you are taking in all the splendour of the whole Solar System.

What do you see? Nearest to the Sun are the rocky planets. There is an interlude which is filled in by the asteroid belt. Then come the huge gas giants. Outside of these is the region, beyond Neptune of the minor planets such as Pluto, Haumea and Makemake. In this Kuiper Belt there are millions of bodies, probably just lumps of ices with temperatures very close to absolute zero.

Sometime ago, in the last year of the last century, there was a sudden great flow of results made public by NASA.

Some enthusiastic researchers got to work on analysing a survey of the Kuiper Belt. There was a flurry of excitement when someone announced that they had found a "Wall" in the outer reaches of the Kuiper Belt. That is, they declared that they had come across a certain apparent boundary beyond which there was a space free of the Kuiper Belt bodies. In their excitement, these enthusiasts began to speculate that what they had found was a replica of a gap in Saturn's rings. Their imagination ran riot as they calculated at what distance the "Responsible body" must lie. We now know, of course that it was never found because, if they had found a new planet, the news would have been all over the front pages. If it does exist it could be anywhere in the ecliptic plane around the Sun.

All the buzz and hum gradually died down and nothing more was heard on the subject until the last year of the twentieth century.

This time around, the excitement was caused because of some pointers emanated from a study of comet tracks, and this time, the scene of action was further away in the Oort Cloud.

The Oort Cloud is situated further away from the Sun but it is not confined to the ecliptic plane but is located in a kind of spherical shell around the Sun.

The theory of the origin of comets is that one of the Oort Cloud bodies is attracted to a larger object and a fortuitous whip-lash effect steers it off towards the centre of the Solar System. We on Earth, detect it only when it comes further in than the orbit of Neptune. Of course the various space telescopes give us an amazing amount of statistics for us to work with.

Three of the people who were working with all this new material were studying the courses of newly detected comets and were struck by what they thought were the similar origins of several new comets.



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The three astrophysicists were John Matese, Patrick Whitman and Daniel Whitmire of the University of Louisiana. These three made such a high profile fuss, that the Astronomical Union coined a name for this putative new planet. The name was "Tyche", named after the Greek goddess of fortune. In the past, there had been suggestions that outside our Solar System there was a brown dwarf or some such body and it could potentially disrupt our planetary system. Because of this, it was given the name "Nemesis". Tyche was the sister of Nemesis in the pantheon of the gods.

These Louisiana University astrophysicists, in their excitement went on to calculate what size their new planet might be. They calculated that Tyche would turn out to be between two and four times the mass of Jupiter. That caught the attention of many people, (including me.)

The usual bodies in the Oort Cloud are thought to be made of ice of one sort or another with a temperature of around one degree Kelvin. However, a body as large as had been calculated would have a temperature considerably higher. Because of the gravitational crushing that would occur the temperature could be as high as two hundred degrees Kelvin. (Technically speaking, this is called Kelvin Helmholtz heating and is the reason why Jupiter is giving out more radiation than it is receiving.)

This figure is significant because it means that Tyche would radiate in the infra-red part of the spectrum. If the right instrument was used Tyche should have stood out like a sore thumb.

NASA was (and still is) running a survey by a space telescope specifically designed for this very purpose. Its name is WISE, the Wide -Field Infra-red Survey Explorer.

Gone are the days when an astronomer makes his or her reputation by looking through a telescope eyepiece. The modern astronomer sits in front of a computer and designs special software to do their desired task. NASA folk have first dibs at the mass of data from their own instrument, but, after six months the data is thrown open to the public.

Like a flock of vultures, all the universities begin to devise their software designed for their own special investigation. Thus it was that the trio from Louisiana tried to shake the world of Astronomy. After all the fuss, NASA relented a little and went back to their mass of data.

As late as March 2014, they announced that there was no Saturn sized object up to 10,000 AU and no Jupiter sized object up to 26,00 AU.

In the USA, many scientists look upon NASA as a kind of national property, which it is I supposed and the twittering and web chatter kept on with a swell of dissatisfaction. The NASA people refused to have yet another look and declared that henceforth they were devoting the work and time of their WISE telescope to the mapping of all the "Near Earth" objects.

And there the matter stays. Tyche may be there, but it may well be just another bit of "Pie in the Sky."



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The Motion of 61 Cygni – An Unusual Observing Challenge

By Neil Haggath

My apologies, folks; I should have brought this to your attention a couple of months ago, as it concerns something which is best observed in summer – but I've only just become aware of it myself, due to the backlog in reading my issues of *Sky and Telescope*!

Cygnus is of course best observed in summer, but it's still fairly high in the sky during autumn evenings, soon after dark – so it's not too late to start this observing challenge this year. (61 Cygni is in fact circumpolar from the latitude of Cleveland, but only just; at its lowest, it's a mere 2° above the horizon.)

61 Cygni is a pretty modest star, just visible to the naked eye. It is in fact a double, easily split with a small telescope; it consists of two orange K-class stars, of magnitudes 5.2 and 6.0, separated by 31 arc seconds. It's quite easy to find; as shown in Fig. 1, it forms a parallelogram with α (Deneb), γ and ϵ Cygni, three of the bright stars of the Northern Cross.

But this unassuming pair of very ordinary stars played a vitally important part in the history of astronomy. They were the first stars ever to have their parallax, and therefore their distance, measured – the first vital step in measuring the scale of the Universe. Astronomers had been trying and failing to measure stellar parallaxes since the 17th Century, but it wasn't until the 1830s that telescopes and measuring instruments improved enough to measure the tiny angles involved. In 1838, the

German astronomer Friedrich Wilhelm Bessel successfully measured the parallax of 61 Cygni, and calculated its distance as 10.3 light years. That wasn't bad for the first attempt; the modern accepted value is 11.4.

So what led Bessel to choose such an insignificant star for that honour? Well, in 1804, Giuseppe Piazzi had found that 61 Cygni had a proper motion – its actual motion with respect to other stars - of 5 arc seconds per year. That was by far the greatest proper motion of any star then known (the discovery of Barnard's Star was still 78 years in the future at the time of Bessel's measurement, and E. E. Barnard himself was yet to be born), and the star was nicknamed "Piazzi's Flying Star!". So Bessel guessed, correctly, that such a large proper motion indicated that the star was especially close.

Over the next few years, those of us with even modest amateur telescopes have a chance to actually observe the proper motion of 61 Cygni for ourselves. This is because 61 Cygni A, the brighter star of the pair, is passing very close to another star which can be seen in small telescopes – so comparing their relative positions from year to year will reveal 61's proper motion.

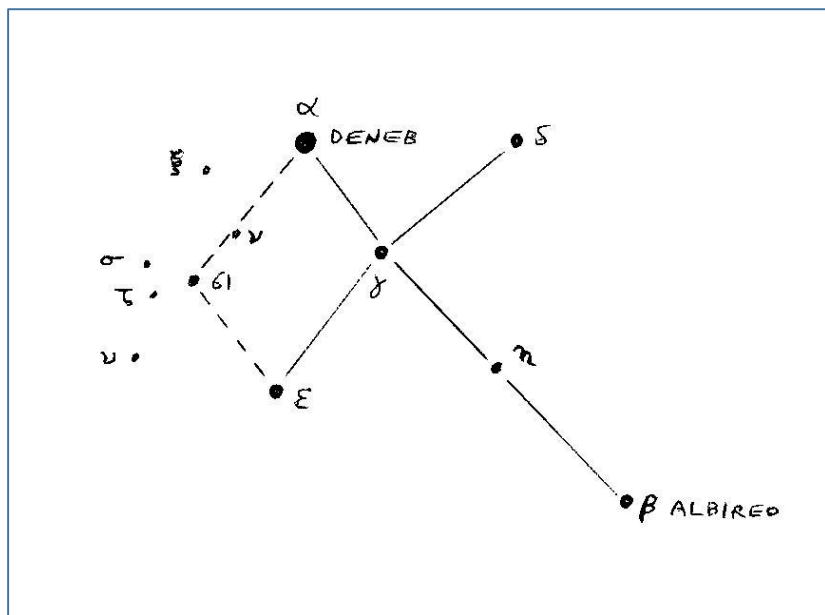


Figure 1

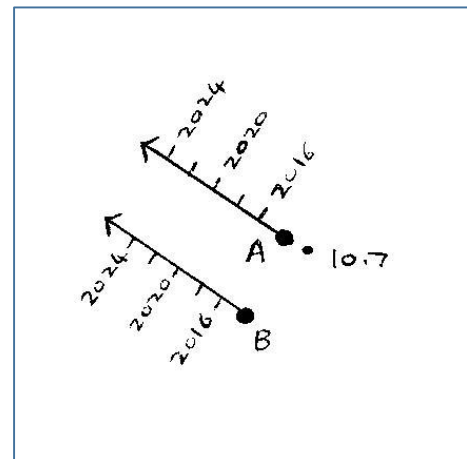


Figure 2



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If you look at the double under high magnification, you'll see a star of magnitude 10.7, just 10 arc seconds from 61 Cygni A, as shown in Fig. 2. (North is up in the diagram.) In a year's time, that separation will have increased to 15", and in two years' time, it will have doubled to 20".

Fig. 2 shows the stars' relative positions in August this year. The arrows show the direction of the proper motion of the two components of 61; the tick marks show their positions at two-year intervals, in August of each year. (The orbital period of the binary is over 300 years, so the motion of the components with respect to each other is imperceptibly slow.) If you draw the positions of the three stars each summer or autumn for the next few years, the changing shape of the triangle will make 61's proper motion quite obvious. You'll be seeing stars move with your own eyes!

Interesting Software - Space Engine

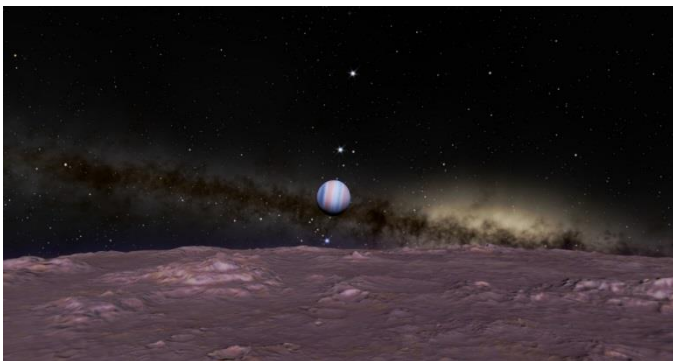
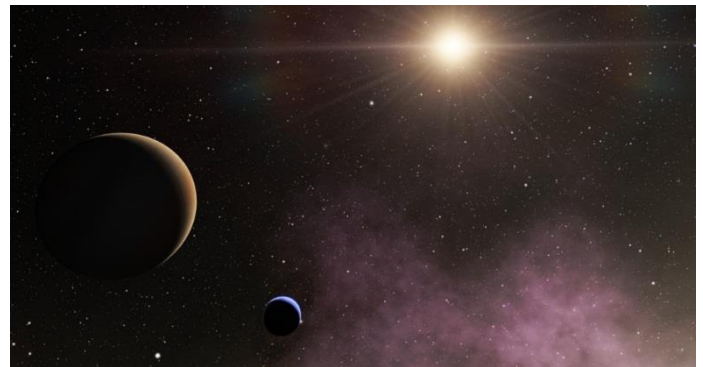
<http://en.spaceengine.org>

Space Engine is a free space simulation program that allows you to explore the universe in three dimensions. It allows you to fly anywhere, exploring galaxies, Solar Systems, Planets, etc.

The Universe that it depicts is based around the Hipparcos star catalog plus additional information from various sources, and some of the gaps have been filled in by the author, so it can't be relied upon to be completely accurate, but it is certainly an impressive piece of software.

One word of warning though. This software requires that you have a fairly powerful computer, or you will experience issues with it slowing down, and occasionally freezing up.

It is visually impressive and certainly worth a look if you have a reasonably powerful computer.



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The Quiz

This month all of the answers begin with the letter T.
As usual, they are in roughly increasing order of difficulty.

1. The common name of M20.
2. The discoverer of the planet which no longer is one!
3. The common name of the multiple star Theta Orionis.
4. The region containing Mars' four huge volcanoes.
5. Two groups of asteroids, clustered around the L4 and L5 Lagrangian points of Jupiter's orbit.
6. The comet which was deeply impacted in 2005.
7. The first person to go into space, who was not a serving military officer.
8. The site of a huge explosion in 1908, believed to have been due to the impact of a small comet.
9. The common name of the star which was the Pole Star around 3000 BC, and with which the Great Pyramid is aligned.
10. A small crater, near the centre of the Moon's visible hemisphere, associated with an extensive system of rilles and clefts.



Answers to Last Months Quiz

1. The Sombrero Galaxy.
2. Sagitta, the Arrow.
3. Stephan's Quintet.
4. The late Walter Schirra.
5. The Schwarzschild Radius.
6. Spörer's Law.
7. Sosigenes.
8. Supernova 1987A.
9. Stickney. It was the maiden name of Mrs. Chloe Angeline Hall, whose husband Asaph discovered the satellites of Mars. He believed that Mars must have satellites, and was systematically searching for them. Legend has it that after the n th long, cold night without success, he was ready to give up, but Mrs. Hall implored him to "Get back out there and find those moons!" And that very night, he did!
10. The Struve family:
 - Wilhelm (1793-1864)
 - Otto (1819-1905) – son of Wilhelm
 - Karl (1854-1920) and Gustav (1858-1920) – sons of Otto
 - Otto II (1897-1963) – son of Gustav

The first four were all directors of various observatories in Germany and Russia.

Otto II settled in the USA, where he became Director of Yerkes Observatory, and later founded McDonald Observatory.



[Meeting Calendar \(2014-2015\)](#)

All meetings are held at the Wynyard Planetarium (with the exception of the AGM).
Doors open at 19:15 for a 19:30 start

14th November 2014

Atmospheric Optics

Dave Newton of Sunderland Astronomical Society

12th December 2014

X-Raying the Universe

(The Hot and Violent Sky)

Dr Tim Roberts of Durham University

9th January 2015

Your First Telescope

Dr Jurgen Schmoll, CaDAS Chairman

13th February 2015

Astrophotography

Keith Johnson, CaDAS

13th March 2015

Title to be confirmed

Gary Fildes of Kielder Observatory

10th April 2015

One Small Step

(A Celebration of Apollo)

Neil Haggath, FRAS, CaDAS

8th May 2015

Title to be confirmed

Paul Money FRAS, FBIS

12th June 2015

CaDAS Annual General Meeting and Social Evening

Venue to be confirmed

