Autumn 2016 Number 13

Kielder Observatory Newsletter

KIELDER OBSERVATORY
Infinite Inspiration

EDITORIAL

Well the last few months have seen exciting times, with our director appearing on national television and radio discussing his new book, and the observatory appearing in its own right on the BBC Breakfast show. We also now have a smart new office near Newcastle airport. In the skies, a particularly active Sun has triggered the first aurora of the season seen from Kielder. In this edition, we take a closer look at the recent discovery of an Earth-like planet orbiting the nearest star, contemplate some upcoming meteor showers, and display the winning and short-listed entries in our UK Astronomy Photographer of the Year competition.

Nigel Metcalfe

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Kielder Observatory Astronomical Society

Registered Charity No: 1153570.

Patron: Sir Arnold Wolfendale 14th Astronomer Royal

Full Membership ..... £75 per annum
Friends of Kielder ..... £25 per annum

Kielder Observatory Astronomical Society is a Charitable Incorporated Organisation. Its aims are to

* Promote interest in the science of astronomy to the general public
* Facilitate education of members of the public in the science of astronomy
* Maintain an astronomical observatory in Kielder Forest to support the above aims

http://www.kielderobservatory.org

KIELDER OBSERVATORY™
Infinite Inspiration

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DIRECTOR'S CUT

We are now entering a really exciting time of the year for the observatory with optimum stargazing conditions over the next few months.

I am pleased to say that we have enjoyed an unprecedented amount of media coverage over the past couple of months at a local, national and international level particularly since the book launch and there are some further exciting opportunities in the pipeline over the next few months ... so watch for further updates !

We have been delighted to recently announce the results of the Astrophotography competition judged by Sir Arnold Wolfendale 14th Astronomer Royal and Patron of the observatory. The competition produced some stunning submissions and we are most grateful to everyone who took part.

This term sees the start of our educational outreach work in a number of schools in Northumberland and Durham and we are excited to have the opportunity to engage with and are looking to inspire young people as well as working with teachers as to how our work fits in and supplements the curriculum in a wide range of subjects.

I would take this opportunity to pay tribute to our talented and dedicated staff at the observatory who work tirelessly to make the evening events both inspiring and informative whatever the conditions. We are also most fortunate to have the support of a team of enthusiastic volunteers and have recently welcomed a number of new faces to the team. We will be having a further volunteers recruitment day on 12 November and we are always pleased to hear from anyone who might assist with our expanding workload.
Our bookings are at a healthy level as we enter the winter months and we look forward to welcoming our guests new and returning and looking to maintain the very positive levels of customer feedback.

Thank you for your ongoing support

Gary Fildes (FRAS MSc Hon.Caus.)

KOAS NEWS

TRUSTEE NOTES

The KOAS Trustees held their quarterly meeting at the new offices in Prestwick Park on July 25th. Discussions centred on finance and in particular the need for the Charity to establish some cash reserves that will allow the organisation to cope with future liabilities and unexpected events. Future liabilities would include replacement of equipment at the end of its useful life. Unexpected liabilities could for example include loss of income during periods of bad weather that resulted in the closure of the observatory or premature and unexpected failures of equipment. It was agreed that the Charity should start to build up the cash reserves (common practice advised by the Charities Commission) and this would commence with our next budget period starting September 2016 to August 2017.

The Trustees also discussed the need for a fundraising strategy. Our vision is to create a unique educational experience and in particular to inspire people to think about the Universe and shine a light on Science, Technology, Engineering and Mathematics, and on art and design, to engage people and promote innovation in the UK. Our strategy is to build on our success and expand our capability to include a planetarium, additional observatories. an educational multi-media facility, a new and larger briefing room and enhanced access and catering facilities. This will elevate the status of Kielder Observatory in terms of capacity, reach, impact and influence, inspiring young and old alike and bringing together education, economy and enjoyment providing a launch pad for joined up action around skills, learning , personal and business development.

However, to deliver this strategy will require in excess of £10M funding and it was agreed that we should seek advice to produce a coherent and credible plan that will maximise success of this expansion project. To that end a team of Trustees and operational staff will conduct some interviews with fundraising experts as well as discussing ideas with our partners.

Finally, it was agreed that the KOAS AGM will be held on Saturday 29th October at 11:30am at the Masons Arms at Dinnington (close to the new KOAS Offices and Newcastle Airport).

Rob Little (Chair)

The BBC Breakfast show crew pause for a photo with the Kielder team while filming at the Observatory on September 5th.

Obviously the main excitement over the last couple of months has been Gary's book launch, which has created an amazing amount of publicity for us, on TV, radio and in the press. Gary was interviewed on Radio 5 Afternoon Edition on July 27th, made it to Radio 4 for Saturday Live on the morning of July 30th, before talking on the Steve Wright in the Afternoon show on Radio 2 on August 3rd. The following weekend there was also a TV appearance on Channel 5's Saturday Show. The press articles are too many to mention, but for those living in the North East there was a nice item in October's Living North magazine.

Away from Gary's book launch, the observatory had some TV coverage of its own, playing host to the BBC Breakfast Show on September 5th when additional dark sky discovery sites

OBSERVATORY NEWS

were announced. We also appeared on the BBC One Show on October 4th, with an item on photographing the Perseid meteor shower (unfortunately the weather wasn't great, but they did manage to snap a few meteors). The observatory and the Kielder area will also feature on BBC Country File Autumn Watch, which is due to be aired in late October.

Meanwhile, the winners of our UK Astronomy Photographer of the Year 2016 competition were announced on September 30th, and you can see the winning entry, together with the runners up and shortlisted photos elsewhere in the newsletter. There were some really stunning photos, and our thanks to all those who took part. Time to start thinking about next year's entry!

We recently had a big clear out of the storage area under the 16" telescope and dug out two 16" and one 12” Dobsonian. With a little help from social media we have managed to find good homes for all three telescopes, with Teesside Astronomical Science Centre taking the 12", and one of the 16"'s going to the

Jon Turner from Leeds City College shakes hands with our own John Holmes to agree the transfer of the 16" Dobsonian.

Sunderland Astronomical Society. The other 16" is going to the physics department at Leeds City College, who teach A Level physics (which includes some astrophysics) to students who might otherwise not get the opportunity to take A levels.

"My husband and I came with my adult daughter to the Aurora Night on Wednesday 24th August. Although we never saw the Aurora the cloud cleared and we had use of the telescopes to see our sky and stars so clearly. It was a fabulous experience and Gary and his team explained everything in such a way that I a total amateur could understand. It was extremely informative and a great experience. Well worth a visit."

Carol from York

The telescope will be available to all the students in the college, not just the physics students.

The more eagled-eyed of you might spot that our website (http://www.kielderobservatory.org/) has had a bit of an overhaul, which should improve its functionality. Also rather lost in all the excitement is the fact that we have moved the office to new premises at Prestwick Park, near Newcastle Airport. We have much more space here than in the old office, and it is easier to get to by car.

The new KOAS office is in the Bewick building at Prestwick Business Park.

Over August Bank Holiday weekend staff from the observatory were pleased to join with partners from the Kielder area to host a stall at the Tall Ships event in Blyth. We also held a very successful

A view of part of the interior of our new offices. We have two rooms this size.

open day for new volunteers at the observatory in September. We are planning to repeat this on the afternoon of November 12th. We are also pleased to be teaming up with the Calvert Trust to provide a couple of events for their Dark Skies Adventure weekend.

There are some upcoming events for your diary:

On Sunday November 6th we return to the Vermont Hotel ballroom in Newcastle for another of our popular evening shows (7-9:30pm). This one will be entitled "The Solar System". This will be the last one this year, so why not book a ticket and come along and let Gary and the team tell you all about our own solar neighbourhood?

OBSERVATORY NEWS

We are also pleased to announce that Professor Sir Arnold Wolfendale, the 14th astronomer Royal, and Patron of the Observatory, will give his Christmas lecture "The Great Mass Extinctions – An Astronomical Connection?" at the observatory at 7:45pm on the evening of Friday 23rd December. The talk will be followed by a tour of the observatory. Sir Arnold's talks are always very popular and highly entertaining and informative, so book early (bookings are being taken through our website in the usual way)!

Finally, with Christmas only a couple of months away, don't forget to keep an eye out at the on-line shop for our 2017 calendar - an idea gift for family and friends.

* * * *

Dan puts his night sky knowledge to work.

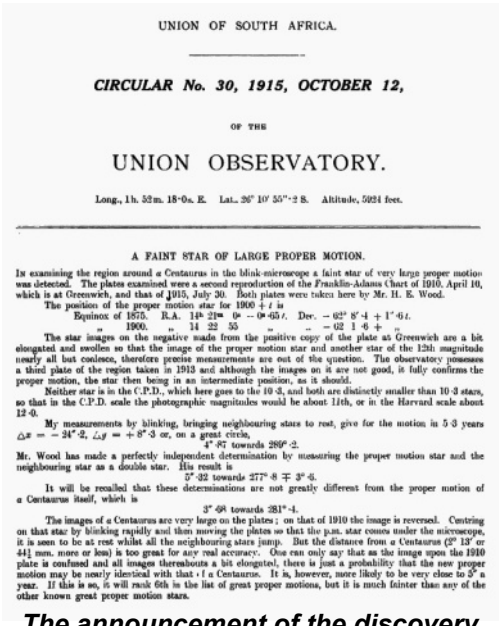
"The Space Kids was 'awesome', says my six-year-old! The approach to the observatory is a two - mile track off the main road around Kielder and, if you've never been, it's an amazing sight when the stunning wooden structure comes into view. Set high above the water, the far-reaching vistas. We'd booked the workshop especially as part of our holiday. And it was worth every penny. Children in the group were involved in the activities about space, stars and planets, and we were given a tour of the observatory, as well as being able to have a go on the huge telescopes. The session also included rocket- decorating which culminated in everyone blasting off their creations in the early - evening sun. Full stars all round. And thanks to the staff for the star treatment"

Carolyne from Bradford

Proxima Centauri

With the presence of an Earth-like planet orbiting this star announced in August we thought we would take a detailed look at our nearest stellar neighbour ...

Proxima Centauri is a rather unassuming 11th magnitude red dwarf star, far too faint to be seen without telescopic aid and, sadly, too far south to be seen from Kielder (or indeed anywhere else in the UK). However, discovered in 1915 by the Scottish astronomer Robert Innes, it has the distinction of being the closest star to our Sun, being a 'mere' 4.24 light-years away (or about 40000000000000 kilometres!).



UNION OF SOUTH AFRICA.

CIRCULAR No. 30, 1915, OCTOBER 12,

OF THE

UNION OBSERVATORY.

Long., 1h. 53m. 18·0s. E. Lat., 26° 10′ 55″·2 S. Altitude, 5024 feet.

A FAINT STAR OF LARGE PROPER MOTION.

In examining the region around *a* Centaurus in the blink-microscope a faint star of very large proper motion was detected. The plates examined were a second reproduction of the Franklin-Adams Chart of 1910, April 10, which is at Greenwich, and that of 1915, July 30. Both plates were taken here by Mr. H. E. Wood.

The position of the proper motion star for 1900 + *t* is

Equinox of 1875. R.A. 14h 21m 0s·00 + 0s·65 *t*. Dec. − 62° 8′·4 + 1″·6 *t*.

" 1900. " 14 22 55 " − 62 1 6 + "

The star images on the negative made from the positive copy of the plate at Greenwich are a bit elongated and swollen so that the image of the proper motion star and another star of the 12th magnitude nearly all but coalesce, therefore precise measurements are out of the question. The observatory possesses a third plate of the region taken in 1913 and although the images on it are not good, it fully confirms the proper motion, the star then being in an intermediate position, as it should.

Neither star is in the C.P.D., which here goes to the 10·5, and both are distinctly smaller than 10·5 stars, so that in the C.P.D. scale the photographic magnitudes would be about 11th, or in the Harvard scale about 12·0.

My measurements by blinking, bringing neighbouring stars to rest, give for the motion in 5·3 years $\Delta x = -24''{\cdot}2$, $\Delta y = +8''{\cdot}3$ or, on a great circle,

4″·87 towards 289°·2.

Mr. Wood has made a perfectly independent determination by measuring the proper motion star and the neighbouring star as a double star. His result is

5″·32 towards 277°·8 ∓ 3°·6.

It will be recalled that these determinations are not greatly different from the proper motion of *a* Centaurus itself, which is

3″·68 towards 281°·4.

The images of *a* Centaurus are very large on the plates; on that of 1910 the image is reversed. Centring on that star by blinking rapidly and then moving the plates so that the p.m. star comes under the microscope, it is seen to be at rest whilst all the neighbouring stars jump. But the distance from *a* Centaurus (2° 13′ or 441 mm. more or less) is too great for any real accuracy. One can only say that on the image upon the 1910 plate is confused and all images thereabouts a bit elongated, there is just a probability that the new proper motion may be nearly identical with that of *a* Centaurus. It is, however, more likely to be very close to 3″·5 a year. If this is so, it will rank 6th in the list of great proper motions, but it is much fainter than any of the other known great proper motion stars.

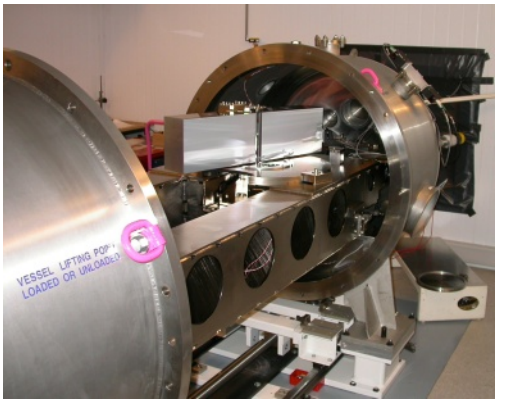
The announcement of the discovery of Proxima Centauri in 1915.

The motion of Proxima Centauri over a decade. This colour picture is composed of three photographs taken through blue, red and infra-red filters using the UK Schmidt telescope in Australia. They were taken several years apart and Proxima has moved in the meantime, resulting in separate red, blue and green images.

Credit: Digitized Sky Survey

Innes made his discovery by comparing the position of the star on two photographic plates taken 5 years apart. It soon became clear that the star shared a common distance and motion with the much brighter double star Alpha Centauri about 2 degrees away on the sky. At the time this was the closest star known to

the Sun, but Innes, on the basis of some rather uncertain measurements, was convinced his star was closer and so coined the name Proxima. In fact it was not until 1928 that Proxima was proved conclusively to be (slightly) the closer star. Whether Proxima is bound to the Alpha Centauri system is not clear - if it is the orbit will be of the order of 500,000 years, so don't expect the answer soon!



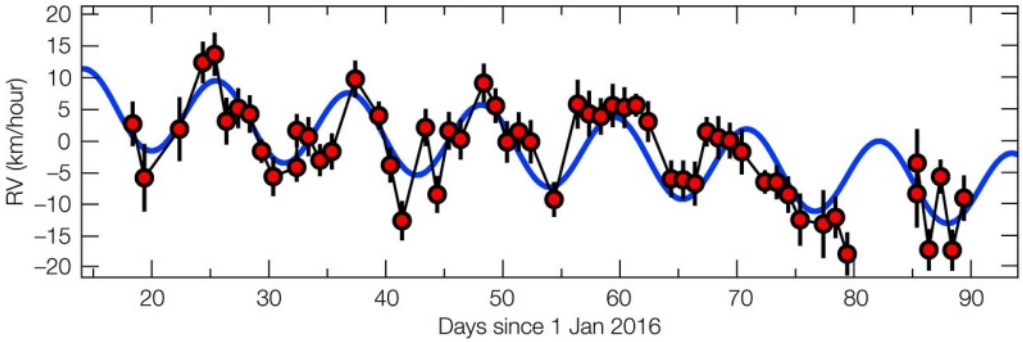
The HARPS spectrograph in Chile.
Credit: ESO

Skip forward a hundred years and Proxima is once more in news, with the discovery that it is accompanied by an Earth-like planet orbiting in the so-called 'habitable-zone'. The discovery was made with the High Accuracy Radial velocity Planet Searcher (HARPS) mounted on the European Southern Observatory 3.6m telescope in Chile, and was shared on social media as part of the Pale Red Dot campaign (https://palereddot.org/).

HARPS is designed to look for tiny changes in the velocity of stars caused by the Doppler effect when a planet swings round on its orbit. It does this by examining the spectrum of the star and looking for changes in the wavelength of the light of various features in the spectrum.

Careful analysis has shown the presence of a planet of mass at least 1.3 times that of the Earth orbiting the star every 11.2 days at a distance of 7 million kilometres. Although this is much closer to Proxima than Earth is to our Sun (150 million kilometres) - in fact it is closer than the planet Mercury - Proxima is much fainter and cooler than the Sun and it turns out that the planet is at just the right distance so that liquid water would neither freeze nor boil - the 'habitable-zone'. It is also likely to be a rocky planet like the Earth.

However, red dwarf stars like Proxima are known for having violent UV and X-ray flares, so it is not clear whether life could have evolved on the planet's surface (although this hasn't stopped much



The apparent motion towards and away from the Earth of Proxima Centauri in 2016. The planet, with a period of 11.2 days, only causes the velocity to change by about +/- 5 km per second.

Credit: ESO

speculation!). On the plus side, Proxima is only slightly older than our Sun.

The discovery comes at just the time when the Breakthrough Starshot project (https://breakthroughinitiatives.org/Initiative/3) announced the aim of developing the technology required to accelerate tiny, sail-equipped "nanocraft" to 20 percent the speed of light using powerful lasers. Such spacecraft could make the trip to Alpha Centauri in about two decades, as opposed to thousands of years for conventionally powered probes, so maybe one day we will get to see Proxima close up.

Nigel Metcalfe

Not been to Kielder yet?

Then why not book one of our events for you or your family?

Advanced booking is essential. Weekend events can fill up several weeks in advance. Please book online at http://www.kielderobservatory.org/events/ or call us on 0191 265 5510. We can also be contacted at admin@kielderobservatory.org

SPECIAL EVENTS

Friday Dec 23rd: The Great Mass Extinctions – An Astronomical Connection? Our Christmas Lecture by Sir Arnold Wolfendale

NIGHT SKY

OCTOBER 2016 (times in BST)

Lunar phases

New moon	01/10/2016	01:12
First quarter	09/10/2016	05:33
Full moon	16/10/2016	05:23
Last quarter	22/10/2016	20:14
New moon	30/10/2016	18:38

PLANET SUMMARY

Mercury will be too close to the Sun to observe. Venus will be lost in the evening twilight. Mars will be visible low in the south west after sunset. Jupiter will be near solar conjunction. Saturn will be visible low in the south west after sunset. Uranus will be visible for most of the hours of darkness.

THE STARS AT 9PM (BST)

North – Cepheus is prominent – looks like an upside down house. Draco and the two Bears are nicely placed for viewing. Auriga is low down in the north-east.

East – Cassiopeia and Andromeda are nicely placed for viewing as is Perseus. October is a good month to searching for M31 in Andromeda and the Double Cluster in Perseus.

South – Cygnus is high overhead. Delphinus and Sagitta are nicely placed. Capricornus and Sagittarius are low down.

West – Cygnus and Lyra are high up, with Hercules [the 'Keystone'] and Corona Borealis nicely placed. Ophiuchus and Bootes are low down. Looking at Lyra - just below Vega its brightest star- is a lozenge shaped group of four stars. About half way between the two lower pair of stars is M57 – which looks like a 'smoke ring' in a telescope.

METEOR SHOWERS

The major shower this month are the Orionids, which peak on the 20th/21st October. Expect around 20-30 shooting stars every hour – the best time to see them is at around 0300 on the 21st. In 2016 there will be a last quarter Moon during this week – rising around midnight - so this may drown out all but the brightest shooting stars.

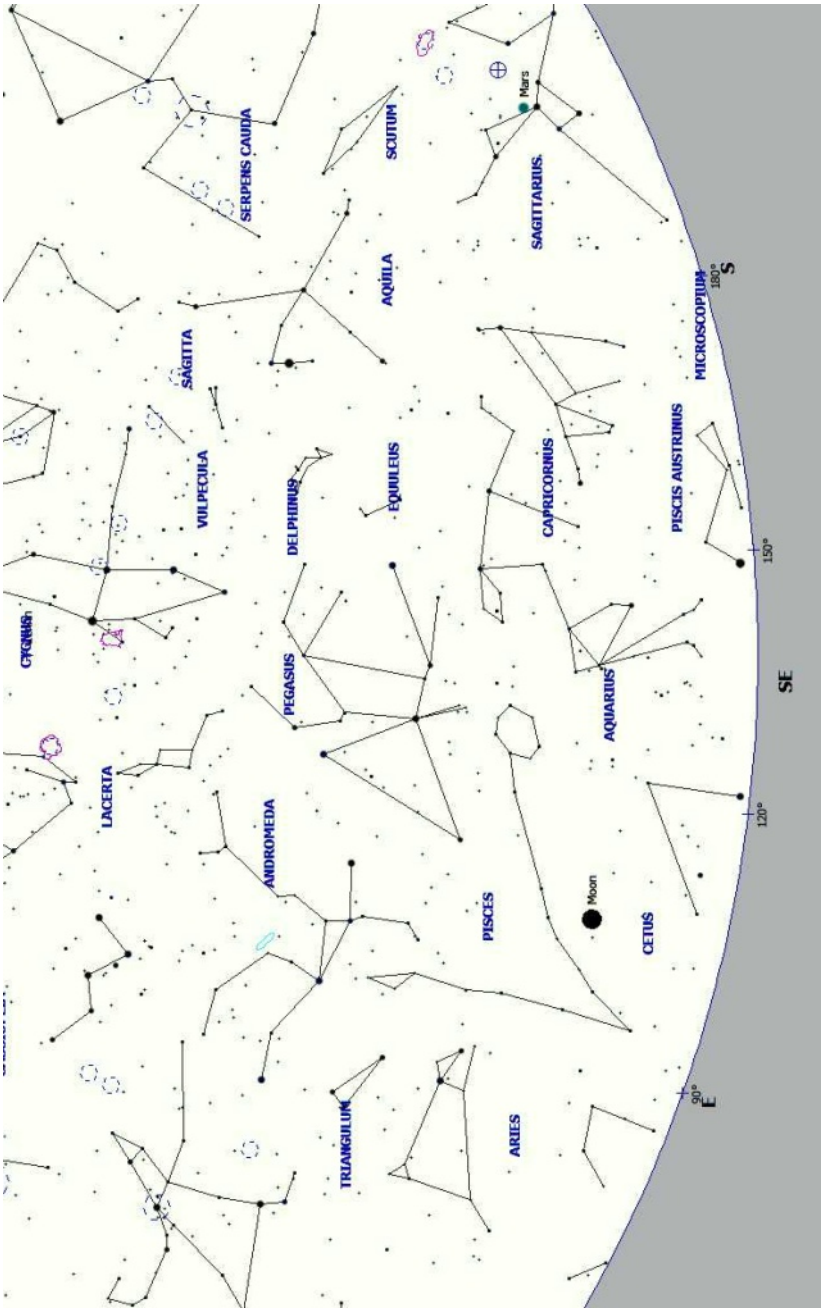
COMETS

There will be no bright comets in October.

The Planets 15/10/2016

	Sun	Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus
Rise	07:35	06:39	11:01	18:14	14:55	06:08	12:15	18:04
Transit	12:53	12:23	15:06	00:13	18:23	12:00	16:15	00:56
Set	18:10	18:05	19:10	06:12	21:52	17:52	21:52	07:43

NIGHT SKY



Looking SE around 9pm BST on October 15th.

UK ASTRONOMY PHOTOGRAPHER OF THE YEAR 2016

Winner: Sarah White. Lochan of stars. "The serenity of this photograp

WINNER - SARAH WHITE: LOCHAN OF STARS

h sums up one of the attractions of Astronomy" (Sir Arnold Wolfendale).

NIGHT SKY

NOVEMBER 2016 (times in GMT)

Lunar phases

First quarter	07/11/2016	19:51
Full moon	14/11/2016	13:52
Last quarter	21/11/2016	08:33
New moon	29/11/2016	12:18

PLANET SUMMARY

Mercury is in solar conjunction. Venus is barely visible low in the west in the evening twilight. Mars will be visible low in the south west after sunset. Jupiter is a morning object in the constellation of Virgo. Saturn is not visible this month.

THE STARS AT 8PM (GMT)

North – Cepheus is overhead. Draco and the two bears are nicely placed.

East – Cassiopeia and Andromeda are high up with Perseus nicely placed. Taurus is near the horizon and to its top RHS is Aries.

South – Pegasus is nicely placed with Pisces. Aquarius is low down and you can find Formalhaut in Pisces Austrinus – a bright star that is the most southerly placed bright star we can see from the UK.

West – Cygnus dominates along with Sagitta, Vulpecula and Lyra. Low down you can find Hercules.

METEOR SHOWERS

November hosts two meteor showers:

1) Taurids – around the 1st – this is a short shower but, although few in number, the particles are quite 'large' and hence the meteors from this stream can sometimes outshine Jupiter or even the Moon, and can be slow moving and often quite colourful. The Moon will be close to New and will have set by the time Taurus has risen so it could be a good year to view this shower.

2) Leonids – on the 16th/17th/18th – this shower usually puts on a good show of 50 to 100 meteors per hour. They are fast moving and 'small' and so are quite faint. Unfortunately a near-full Moon is expected to drown out all but the brightest meteors this year, and 2016 is also predicted to be quite a weak shower.

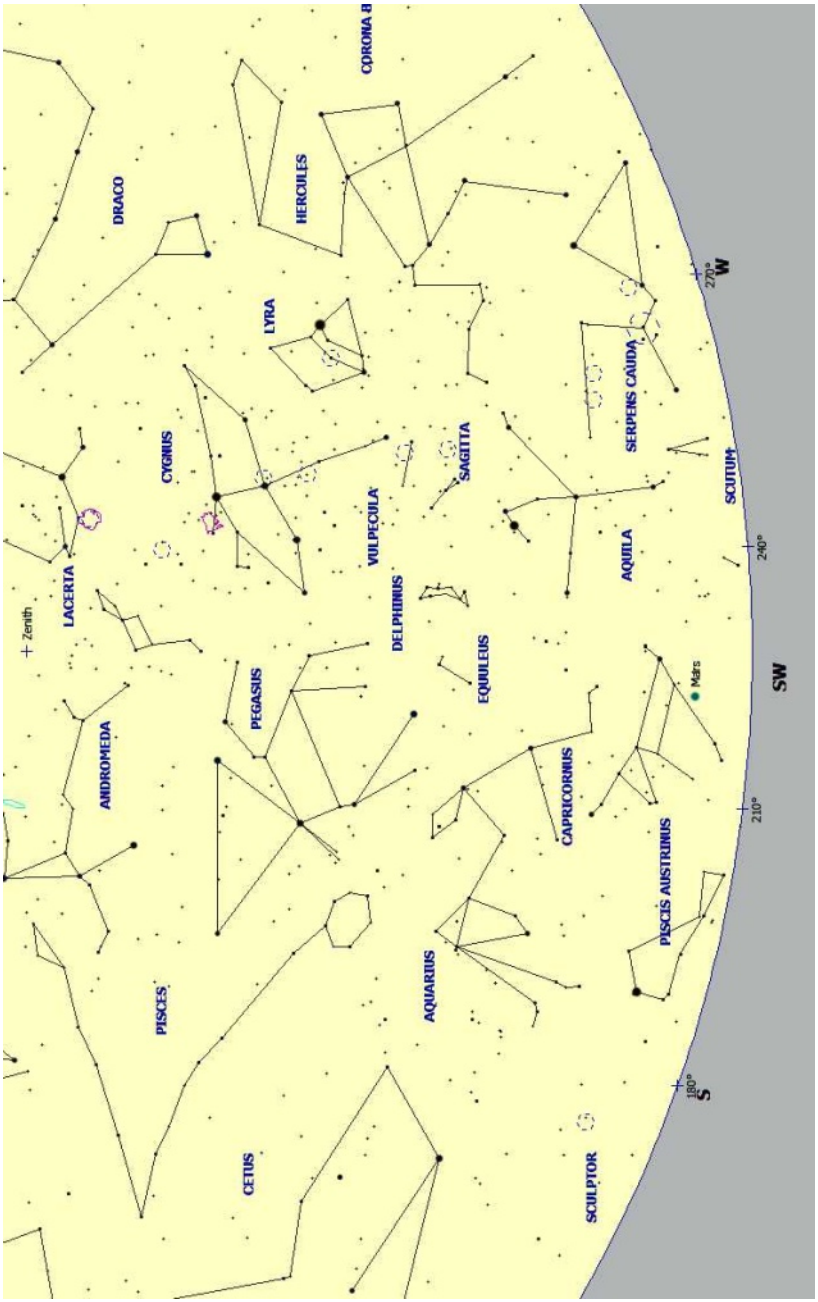
COMETS

No bright comets are expected.

The Planets 15/11/2016

	Sun	Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus
Rise	07:34	08:46	11:20	17:28	12:55	03:42	09:30	15:00
Transit	11:52	12:36	14:45	00:22	16:57	09:21	13:27	21:45
Set	16:19	16:25	18:09	08:12	20:58	15:00	17:23	04:34

NIGHT SKY



Looking SW around 8pm GMT on November 15th.

NIGHT SKY

DECEMBER 2016 (times in GMT)

Lunar phases

First quarter	07/12/2016	09:03
Full moon	14/12/2016	00:06
Last quarter	21/12/2016	01:56
New moon	29/12/2016	06:53

PLANET SUMMARY

Mercury will be a challenging object low in the west at dusk. Venus will be visible for about 1 hour at dusk. Mars is an evening object. Jupiter will be a morning object as is closes in on opposition later in the year. Saturn is at solar conjunction and Uranus will be visible until around 0130.

THE STARS AT 8PM (GMT)

North – Cassiopeia will be near the zenith, with Draco nicely placed splitting up the two bears.

East – Perseus, Auriga and Taurus are nicely placed with Jupiter near the Hyades cluster.

South – Andromeda is high up with Pisces nicely placed. Pisces Austrinus [with its brightest star, Formalhaut is near the horizon.

West – Cygnus, Vulpecula and Delphinus are nicely placed, as is Lyra. Hercules is near the horizon.

METEOR SHOWERS

December hosts a significant meteor shower, the Geminids, along with a minor shower, the Ursids.

1) Geminids – are active from early December until about the 20th with a peak on the 13th or 14th. For 2016 the Moon will be almost full at the time of the shower so this will drown out all but the brightest of the meteor particles of this storm. Expert about 30-50 per hour.

2) Ursids – are active around 23rd December. The Moon will be waning towards new so it will be a good opportunity to see this shower before midnight, with the moon rising in the early hours of the 24th.

COMETS

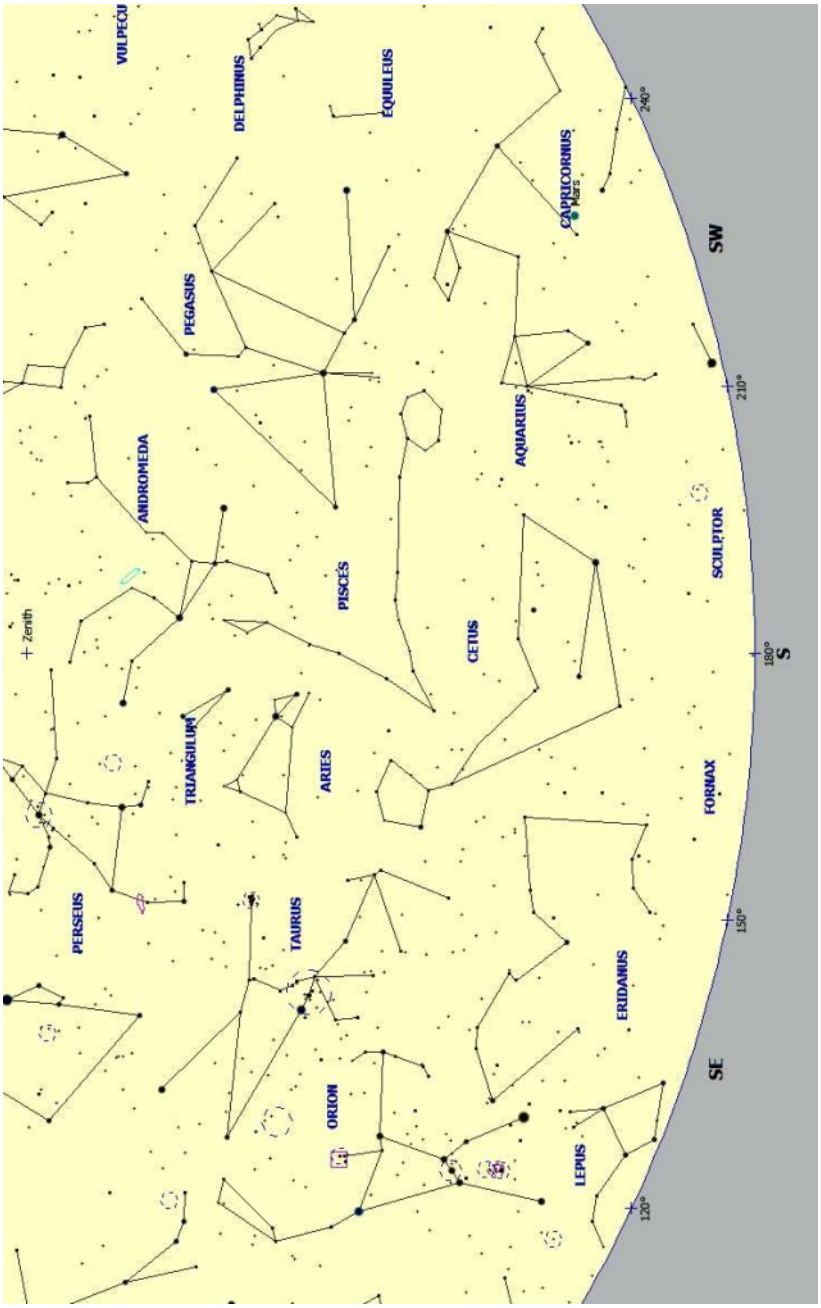
There are no bright comets expected.

Night Sky credits: Lunar and planetary data sourced from Cybersky 5

The Planets 15/12/2016

	Sun	Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus
Rise	08:17	09:53	11:12	18:00	11:40	02:13	07:50	13:01
Transit	12:03	13:30	15:18	01:05	16:27	07:42	11:43	19:45
Set	15:48	17:07	19:24	09:13	21:16	13:10	15:37	02:33

NIGHT SKY



Looking S around 8pm GMT on December 15th.

OBSERVERS' SLOT

Meteor Showers

Robert Williams takes a more detailed look at the meteor showers visible over the next few months ...

During the year shooting stars can be seen on most clear nights – more especially so on those nights where the Moon is quite 'new' – between last quarter and first quarter – when the brightness of the fuller Moon would otherwise drown out most of the brightest of meteor particles.

Between October and February there are four of the major annual meter showers, along with few more subdued showers, and in 2016 the sky may be Moon-free enough to observe some of them under potentially good conditions.

October is the month for two showers:
a) The Draconid Meteor Shower of the 10th October – which in 2016 coincides with the Moon being at first quarter and setting at around 1am on the 11th. Draco is a circumpolar constellation as seen from the UK – i.e. never sets – so this shower can easily be observed during the early hours of the 10th and 11th of October – expect around 10 meteors per hour – some of which can be quite bright. The Draconid shower is associated with Comet P/Giacobini-Zinner.

b) The Orionid Meter Shower – which starts on the 16th October, reaching a peak on the 20th/21st October and concluding on the 27th October. In 2016 the near-last quarter Moon will rise at around 9pm on he 20th October, so only the brighter shooting stars of this shower will be visible. Particles of this shower often give bright, colourful and 'slow moving' [relatively!] meteor trails. This is because the particles are catching up with Earth and are – for meteors - quite 'large'. This shower is associated with Comet P/Halley (the famous Halley's comet). You can expect up to 20-30 per hour.

Moving into November and again we have two meteor showers. In this case these two showers show the most variable activity of all of the showers as the years go by.

c) In early November, and with a shower that spans from 20th October through to 30th November with a peak anywhere between 1st and 10th November, there is the Taurid Shower – often split into Northern and Southern sub-showers

with separate maxima dates, although both belong to the same stream associated with Comet Encke. They can, in some years, have very little activity and then in other years have amazingly bright activity.

My most memorable view of a Taurid fireball was in November 1999, when I was viewing the Leonid Meteor Storm of that year from the Sinai Desert. I vividly remember a Taurid that appeared as bright as the full Moon [Magn. ~-10] and left a visible trail that lasted over 30 minutes – it literally burnt the sky. With a waxing Moon during the shower in 2016 it may be a challenge to see all but the brightest of this relatively spare shower – expect around 5-10 per hour.

A lone meteor heads towards the Kielder horizon.

d) On and around the 17th November we have one of the most familiar showers of the year – the Leonids. This shower has been extensively studied and modelled by McNaught and Wilson, who have provided predictions of both when and where to be on any particular yearly return of the Leonids to see the best view. So far their

"Myself and my husband visited the observatory on Friday 16th September - we have always wanted to visit as we both have a fascination of the night sky and also we were celebrating our silver wedding anniversary so thought this was an ideal time to fulfil a dream. I have to say that this was the most amazing experience and one that the memories will stay with me forever. Your staff were absolutely brilliant, so I wanted to say thank you to Dan, Matt, Becky and Hayden."

Lisa from Burton on Trent

OBSERVERS' SLOT

predictions of the past 15 years or so have been quite accurate. The last major shower was in 1999 and the next will be in 2031, 2032 or 2033 – this is because this shower is associated with Comet P/Temple-Tuttle which has a 33 year orbit around the Sun. 2016 is likely to be the weakest return of recent years for this shower – as the Comet will be close to aphelion (furthest from the sun) - but still expect up to 60 fast moving shooting stars every hour. Although the Moon will be waning it is still likely to interfere with observing this shower.

e) On December 13th the Geminid Meteor Shower is active. Unlike all other showers, apart possibly from the Quadrantids, the Geminids originate from an asteroid – 3200 Phaethon - not a comet. This asteroid has the distinction of having an orbit which takes it closer to the sun than any other named asteroid. Active from the 7th to the 16th with a maximum on the 13th December, this is a regularly performing shower. In 2016 there will be a full Moon in Taurus so this will drown out most of the meteors. 2016 will therefore be a difficult year for observing this shower.

f) On 4th January we come across what is possibly the most unusual meteor shower – in that the constellation the particles appear to originate from – i.e. the radiant point – no longer exists. Quadrans Muralis – the Quadrant Circle - was a constellation created by the French Astronomer Lalande in 1795. During that era a number of other constellations were adopted with names from – as then – modern devices, such as Telescopium. The Quadrant Circle was demoted by Bode in 1801 and then sometime later it was amalgamated into the neighbouring constellation of Bootes – the Herdsman – but the meteor shower name lives on. The Quadrantids have tentatively been associated with the minor planet 2003 EH_1, which is believed to be an extinct comet.

The Quadrantids are one of the most fickle meter showers in that their activity can be unpredictable year on year – some years see a small number of super-bright blue-coloured fireballs – other years see almost no fireballs and very faint shooting stars. In 2017 the first-quarter Moon will set at around 10pm on the 3rd January so there is a fair chance of seeing this – potentially spectacular – meteor shower in the early hours of the 4th January.

Robert Williams

UK Astronomy Photographer of the Year 2016

We dedicate this gallery to the results of our astrophotography competition. We were honoured to have Sir Arnold Wolfendale, 14th Astronomer Royal and Patron of the Kielder Observatory, as judge. We'd like to take this opportunity to say a huge thank you to everyone who took part, we were blown away by some of the images which made judging them a difficult decision. The winning entry is displayed as the centre spread on pages 14 and 15. Now here are the runners up and shortlisted pictures. I hope you enjoy them as much as we did ...

Runner up: David Wills. M45 The Pleiades. "A famous stellar group photographed in excellent definition." (Sir Arnold Wolfendale)

GALLERY

Third place: Jordan Whipps. Milky Way. "A nice juxtaposition of the Great Milky Way with the elegant tracery of a terrestrial 'denizen'." (Sir Arnold Wolfendale)

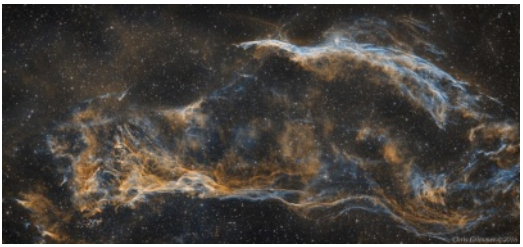
In no particular order, here are the other seventeen shortlisted candidates ...

Christopher Marr: Perfect Loch Lomond.

Christopher Watkins: The Luna Tree.

GALLERY

Chris Grimmer: The Heart Nebula.



Chris Grimmer: The Veil Nebula.

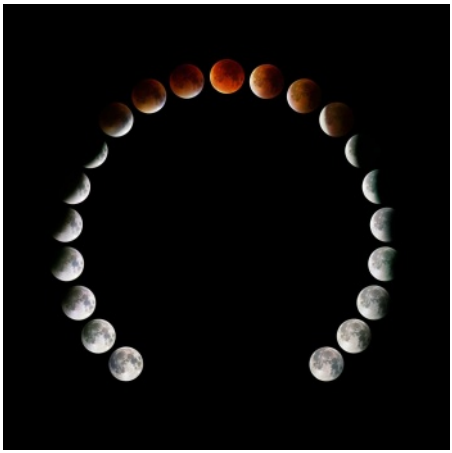
Christopher Marr: Winter In Glencoe.

Jesse Beaman: Morning Crescent.

James West: Just Passing Through.

GALLERY

Kris Williams: Full Spectrum.



Jez Hughes: Horseshoe Blood Moon.

Jaspal Chadha: Whirpool Galaxy.

Sarah White: Winter skies Glen Coe.

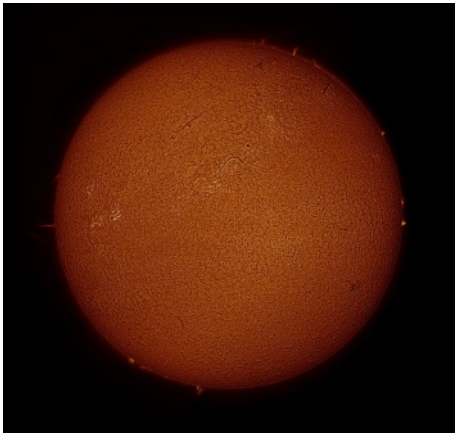
Kris Williams: Mothers Day aurora.

GALLERY

Paul Appleby: Lindisfarne Milky Way panorama.

Shaun Reynolds: The tadpoles of Auriga.

Jesse Beaman: Upstream.



Tony Bateman: The Sun.

Sarah White: Guiding Light.

The Solar System & Beyond...

Bringing Kielder Observatory to Newcastle

KIELDER OBSERVATORY
Infinite Inspiration

Starring: Gary Fildes, Director Kielder Observatory

Kielder Observatory is coming to the Vermont Hotel in Newcastle once again to bring alive the wonders of our universe.

Our Solar system started with the formation of our star the Sun formed out of a rotating cloud of dust and gas, it collapsed under the influence of gravity and formed our sun and its retinue of planets. Tonight Gary and the team will explain with stunning visuals the nature and relevance of the planets, then armed with this knowledge you can go off and find them for yourself.

This will be followed by a Q & A session and the Observatory team will be on hand to show you images, talk telescopes as well as astronomy.

- The Solar System & Beyond
- Physics with Dr Fred
- Telescope Workshop
- Finding and locating objects in the night sky

VENUE: Ball Room at The Vermont Hotel, Newcastle upon Tyne, NE1 1RQ.

DATE: Sunday 6th November 7:00pm – 9.30pm

TICKETS: £16.50

FIND OUT MORE AND BOOK ONLINE:

www.kielderobservatory.org/events/kielder-observatory-comes-to-newcastle/

OR CALL US: 0191 265 5510

"Oh My!!! We only saw the Northern Lights, at the 'Aurora night' talk. Guys were very good presenters and night was just getting underway with the tour when all hell broke loose (or should I say Heaven) and the Aurora arrived! Didn't think we'd even see the stars as very rainy night - but it cleared up suddenly and we were blessed. Can thoroughly recommend this lovely place for all ages.

So good, funny and informative. Lovely, intelligent people. Good at making hot chocolate too.

Just awesome"

Kate from Nottingham

KOAS: Your Window to the Universe

http://www.kielderobservatory.org

KIELDER OBSERVATORY
Infinite Inspiration