November 2010
Issue 19

Look Up!

Astronomy Magazine

ISSN 1758-2210

Weapons of choice

The 6" Newtonian Telescope

Reviews

MoonLite Crayford Focuser

The Geek-o-Meter

UK Space Agency

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Top 5 Messier Objects

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Look Up!

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Look Up! e-Zine ISSN 1758-2210

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Editorial
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Submission dates:

Advertising: 17th of the month

Editorial: 20th of the month

Images: 23rd of the month

For information on advertising with Look Up! Magazine and for a copy of our Advertising Rate Card please contact the Publisher - David Woods: david.woods@iodesign.co.uk mobile: 07702 747385

For information on sending us your stories, images, reviews etc... please contact Sharon Rose: sharon.rose@iodesign.co.uk tel: 02392 617092

First Type

Welcome to the latest issue of Look Up! I hope you have missed us as we've been away for a little while.

November is a landmark month for us as it's the first time that we've published three titles – Look Up!, AstroSouth and AstroNorth directories at the same time. When HantsAstro started in March 2008, promoting astronomy was very much at the heart of what we set out to do. Less than three years later we will have achieved National coverage and a combined readership of circa 20,000.

This isn't about building empires, it's about bringing new people into astronomy who are curious to find out what astronomy groups do. More importantly, it's about getting people outside with their telescopes, looking up at the night sky.

Enjoy the read

David Woods: Editor

Cover image...

MoonFest, Alton
- Picture ©Graham Green 2009

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Look Up! Electronic Magazine is published 1st of the month ISSN 1758-2210

Contributors/behind the scenes: Graham Green, Sharon Rose, Vixen Telescopes, Iain Melville, Mel, Jones, Astronomia, SPA, INTECH, volunteers and the HantsAstro CoreTeam.
Thanks for another great magazine!

NEWS

www.hantsastro.org/latestnews.html

HantsAstro Getting it together.

But are we passing on Site Passes?

With the observing season well under way, this year's weather patterns are proving to be most favourable for observing and imaging (so far).

As we are now approaching our third year the group has become one of the largest in the south of England. This is mainly due to the free membership that we offer, but this is a double edged sword. On the one hand it's great to get more people into astronomy, but equally it's not so great for the financial health of the group!

After slashing our insurance costs by using AstroSure the specialist astronomy insurance broker, and by focusing our attention on just three sites – Butser Ancient Farm, INTECH and Butser Hill – we have been able to reduce the direct and also indirect costs of running the group.

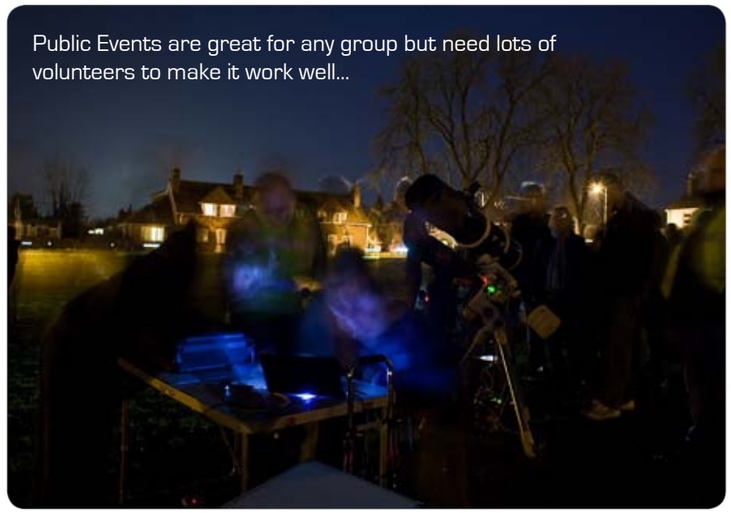
However, the Site Pass levels for Butser Ancient Farm still fall short of covering our basic costs and we have capacity for more members to utilise that site. What we do not want to do is to get into the situation whereby we have to charge a membership fee right across the board, as the insurance also needs to cover the free sites.

Early next year we will be ceasing our use of the excellent FAS insurance policy which, although having recently been upgraded, is now surplus to our requirements. 2011 will certainly be seen as the year of austerity for the UK and possibly the rest of the world, and astronomy groups will have to follow suit if their services to membership are not to be adversely affected.

Rendezvous…

The CoreTeam are currently considering and investigating regular meetings for talks and to also act as social glue for the group outside of observing sessions. Over 90% of our members ticked the 'attend meetings' box when they joined… however, because the site passes cover only the sites, any meetings held will have to be on a pay as you go basis, and if attendance proves to be poor then this service may have to be abandoned.

We would like to hear from anyone that would like to attend these talks because they will not be the usual speaker format in all cases. As you know HantsAstro and the CoreTeam have always pushed the boundaries and if we are going to do this we are going to do it very differently. Two locations have already been



Public Events are great for any group but need lots of volunteers to make it work well...

Picture: Graham Green

NEWS

highlighted in central Hampshire and we will be looking to run these at the start of 2011 – so watch this space…..

We are currently working on the December issue of Look Up! and that will contain a 'Year in Review' of everything that has gone on during the summer, from the various Star Parties to a big feature on the Shuttle Crew event that took place in June at Portsmouth. We will also be giving you a snap insight into what's happening in 2011, as well as a report on the recent StarGazing event at INTECH on the 10th November.

Page Flipping….

As you may have seen already from the website both Look Up! and AstroSouth can now be read on line courtesy of ISSUU ™ . We have been using this facility since we launched the publications but have not, until recently, embedded them in our website pages.

Doing so has increased our page number and downloads tenfold, compared to previous issues. We will be revamping the archive so that all previous issues will be available on our website in this format. Please feel free to distribute this pdf to any friends that may be interested in astronomy.

AstroNorth Directory is being launched towards the end of November and, together with AstroSouth, full coverage of the UK will then be achieved. It will follow a similar format to AstroSouth in order to keep production times sensible. Our publications and website are currently visited by people from over 50 countries and this has not changed in the past 2 years. If there is any particular subject you want to see in these publications – then please drop us a line. Feedback is always welcomed.

SheepTastic….?

Not exactly news – but we thought you would like a laugh!

We have discovered that the sheep rutting season and astronomy do not mix. This theory was proven to be correct at a recent Butser Ancient Farm observing session. It happened at about midnight after most of the group had left the very successful observing evening A few members who had travelled the most distance, stayed behind to get the most out of the night – and they certainly did!

As you are no doubt aware – Butser Ancient Farm is a working farm with rare breeds of sheep. Obviously the wind must have changed direction later in the evening and one large flock of sheep decided to break free from their paddock and embarked on an amorous pursuit of the other flock, which were two paddocks away.

The astronomers were alerted

to this when they heard the distant thunder of many hooves and looked up to see a mass of wool heading their way. Like a shoal of woolly Tuna they quickly changed direction when we shone our torches at them. Our shepherding tactics – although newly acquired – were enough to round up and contain all the sheep in one field. A quick call to a bleary eyed Simon (Site Director) at 12.30am, confirmed that we hadn't quite got it right…. "You need to separate the rams from the ewes" he said. "How do I do that?" I asked "they've all

NEWS

www.hantsastro.org/latestnews.html

Butser Ancient Farm observing sessions are now twice a month - less than a pound a visit over a season...

got horns." He told me that I would quickly see the rams as they will be the ones trying to kill each other! "Yes", I replied, "I can see them now", I said calmly.

At this point I discovered that rams are equipped with four cone shaped horns, deliberately made for goring your legs. Simon then said "There are two different breeds, so if you can, please try and separate them". He said "You need to get the brown ones away from the lighter ones, ok? But if you can't – don't worry – I will sort them out in the morning".

Horny rams do not like being separated from ewes, and the new 'astro-shepherds' spent some time attempting to do this in the dark to no avail.

Ewes also do not like being chased by rams, but I think that is for another entirely different reason and boy are they quick!

Then two made a bolt for the next paddock and we managed to close the gate on them, discovering that they were rams and the ewes were in the other field. For a minute or two these two lonely rams looked as confused as we were, because when we looked in the other field full of ewes, the other two rams were in there with them!

"I didn't remember Simon saying that there were four rams", I said to Andy and John. So now we had two happy rams and two other rams trying to break out to get into the other flock. But at least the rams weren't trying to harm each other now.

After finding a big gate to block the hole from where they had managed a jail-break, things calmed down a bit. The next day I went back to Butser to check up on the sheep and to see Simon. He greeted me with a bit of a smirk across his face. 'Thanks for securing the sheep" he said, "I'm glad you were there. It will be interesting to see what happens as I'm sure there will be some slightly different coloured lambs in the next lambing season"! "Great" I said. "I bet you never thought that astronomy would take you into shepherding as well" said Simon.

I replied "The closest astronomers ever get to farming is usually looking at the Plough..."

Please send any newsworthy items to sharon.rose@iodesign.co.uk

PREVIEW

Advertorial - compiled by David Woods

INTECH Astronomy Day

A great astronomy day out beckons to round off 2010 packed full of things to do and see, near Winchester.

http://www.intech-uk.com/folders/visitor_info/events/astronomy_day.cfm

Sunday 5th December Astronomy events for adults

Join us for a programme of lectures, workshops, displays and planetarium shows aimed at the keen amateur. Workshops are repeated through the day so you have a choice of times, but you must book specific time slots when paying.

Events run from 10:15am to 4:30pm; arrive at 10:00am or shortly beforehand to book *(early entry available for pre-booked Astronomy Societies - please contact your committee rep for booking)*.

Pricing: entry to INTECH + **£5 per event, or £25 for an all-day ticket (includes entry).** We regret it is not possible to pre-book your tickets for this event.

These events are intended for an adult audience, although children aged 11yr+ (8yr+ for planetarium) may also attend if accompanied by an adult.

Programme (see below for details of each event):

10:15am
A History of the Universe (lecture, 1hr inc Q&A)
Dr Robin Catchpole (Cambridge University)

Robin will take us on a trip through time right back to the big bang, describing our current understanding of how everything was created, from atoms to living creatures.

12:15pm
Amateur Radio Astronomy
(lecture, 1hr inc Q&A)
Brian Coleman

Brian is a keen amateur radio astronomer.

2:30pm
Tides in the Universe
(lecture, 1hr inc Q&A)
Prof Malcolm Coe (University of Southampton)

Tides occur at all scales. Prof Coe researches the formation of stars in the Magellanic Clouds and will focus on the effect of tidal forces on this process, first explaining how these forces arise.

1:30pm
Tour of the Night Sky
(planetarium show, 30min + Q&A)
Ninian Boyle
(BBC Sky at Night magazine)

A tour around objects visible with the naked eye or using amateur astronomy kit, describing how to locate them using constellations and asterisms as pointers. There are always clear skies in our planetarium!

3:45pm
To the Edge of the Visible Universe
(planetarium show, 30min + Q&A)
Dr Jenny Shipway (INTECH)

Taking off from Earth to fly through the Universe allows a true sense of scale and distance to be achieved. This show will include features of our planetarium software not usually seen in public events and tackle more complex concepts.

11:30am, 1:30pm or 3:45pm
Light: Messenger of the Stars
(workshop, 30/45min)
Dr Robin Catchpole
(Cambridge University)

This workshop will include a short talk but will be led by questions from the group. This is your chance to quiz Robin about the uses of the different parts of the electromagnetic spectrum in astronomy.

11:30am, 1:30pm or 3:45pm
Equatorial Mounts
(workshop, 30min)
Ninian Boyle
(BBC Sky at Night magazine)

Ninian is the BBC Sky at Night magazine's equipment expert. Get top tips for how to correctly set up this type of mount and use them to best effect.

11:30am, 1:30pm or 3:45pm
Astrophotography for Beginners
(workshop, 30/45min)
Lilian Hobbs
(Southampton Astronomical Society)

Learn how to take photos of the moon and planets using your digital camera and almost any telescope. In this workshop we will show you how to connect your camera or web cam to the telescope, how to photograph the moon and planets and then process your photos if necessary afterwards.

This will be illustrated using a Meade ETX-90 small telescope and will feature readily available accessories and free software for the PC so you can get started with very minimal cost and using a modest telescope, it doesn't even need a motor drive. This is an ideal project for anyone, especially a youngster wanting to get started in Astronomy. See how to make your own movie of Jupiter rotating. No experience is needed to attend this workshop.

Time	Planetarium	Meeting Room (upstairs)	IT suite (downstairs)	Classroom (downstairs)
10:00	Day-ticket people note you will have to choose your sessions when paying			
10:15	Dr Robin Catchpole (Cambridge University) lecture · "A History of the Universe"			
10:30				
10:45				
11:00				
11:15				
11:30	Planetarium film show "Astronaut" (21min)	Dr Robin Catchpole workshop/discussion "Light: Messenger of the Universe"	Lilian Hobbs workshop "A Beginner's Guide to Astrophotography"	Ninian Boyle workshop "Equatorial Mounts"
11:45				
12:00				
12:15	Brian Coleman lecture · "Amateur Radio Astronomy"			
12:30				
12:45				
13:00				
13:30	Ninan Boyle live planetarium show · "Tour of the Night Sky"	Dr Robin Catchpole workshop/discussion · "Light: Messenger of the Universe"	Lilian Hobbs workshop · "A Beginner's Guide to Astrophotography"	
13:45				
14:00				
14:15				
14:30	Prof Malcolm Coe (University of Southampton) lecture · "Tidal Forces in the Universe"			Ninian Boyle workshop · "Equatorial Mounts"
14:45				
15:00				
15:15				
15:30				
15:45	Dr Jenny Shipway (INTECH) live planetarium show · "To the Edge of the Visible Universe"	Dr Robin Catchpole workshop/discussion · "Light: Messenger of the Universe"	Lilian Hobbs workshop · "A Beginner's Guide to Astrophotography"	Ninian Boyle workshop · "Equatorial Mounts"
16:00				
16:15				
16:30	INTECH is now closed			

Please check the website for updated details:
http://www.inteck-uk.com
or phone 01962 01962 863791

INTECH, Telegraph Way, Morn Hill, Winchester, Hampshire, SO21 1HZ

Readers' Images

M66 & M65 - Spiral Galaxies

Type: Sb Galaxies
Mag: 9.7b, 10.3b, 10.3b
Size: 9' x 4', 9' x 2', 15' x 4'
Constellation: Leo
RA: 11h 19m 34s
Dec: +13 17' 30"

We're always looking for more great images to include in Look Up! - Get imaging and get e-mailing!

Messier 66 & Messier 65 - Iain Melville

This pair of galaxies in Leo is located at a distance of about 35 million light years.

M66 is at upper left, M65 is below it at lower right, both are normal spiral galaxies,

www.mrmelville.co.uk

EarthWatch

Pictures: NASA/JSC -ISS
Words: NASA

If you thought Light Pollution is bad in the UK, see this...

One of the fascinating aspects of viewing Earth at night is how well the lights show the distribution of people. In this view of Egypt, we see a population almost completely concentrated along the Nile Valley, just a small percentage of the country's land area.

The Nile River and its delta look like a brilliant, long-stemmed flower in this astronaut photograph of the southeastern Mediterranean Sea, as seen from the International Space Station. The Cairo metropolitan area forms a particularly bright base of the flower. The smaller cities and towns within the Nile Delta tend to be hard to see amidst the dense agricultural vegetation during the day. However, these settled areas and the connecting roads between them become clearly visible at night. Likewise, urbanized regions and infrastructure along the Nile River becomes apparent (see also The Great Bend of Nile, Day & Night.)

Another brightly lit region is visible along the eastern coastline of the Mediterranean—the Tel-Aviv metropolitan area in Israel (image right). To the east of Tel-Aviv lies Amman, Jordan.

The city lights of Paphos, Limassol, Larnaca, and Nicosia are visible on the island of Cyprus (image top).

The thin yellow-brown band tracing the Earth's curvature at image top is airglow, a faint band of light emission that results from the interaction of atmospheric atoms and molecules with solar radiation at approximately 100 kilometers (60 miles) altitude.

Astronaut photograph ISS025-E-9858 was acquired on October 28, 2010, with a Nikon D3S digital camera using a 16 mm lens, and is provided by the ISS Crew Earth Observations experiment and Image Science & Analysis Laboratory, Johnson Space Center. The image was taken by the Expedition 25 crew. The image in this article has been cropped and enhanced to improve contrast. Lens artifacts have been removed.

Photography of Earth. Caption by William L. Stefanov, NASA-JSC.

Instrument:
ISS - Digital Camera

VIEW

Gentlemen, this isn't Pistols at Dawn.

Pictures: Graham Green/DW
Words: David Woods

WEAPONS OF CHOICE

THE 6" NEWTONIAN REFLECTOR

Weapon of choice No.1

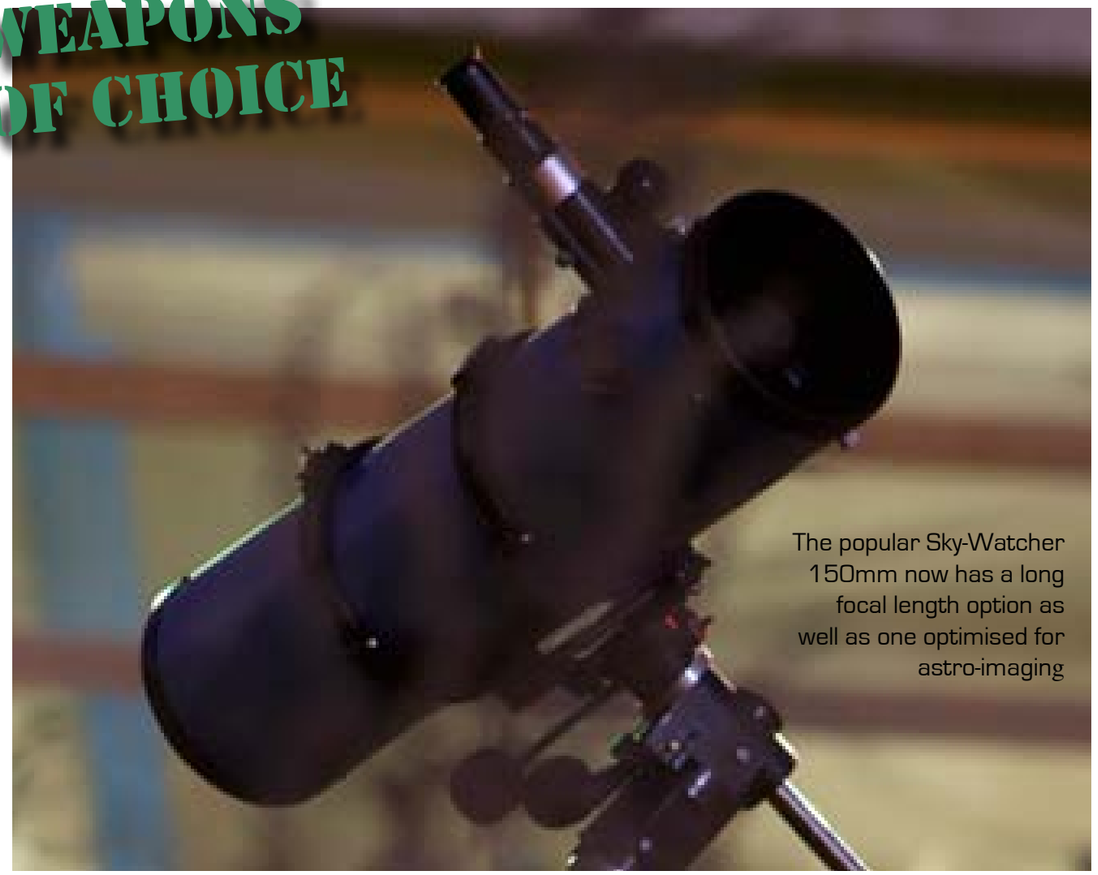
Technology is a marvellous thing, no really it is! It can make things bigger, better, faster. It can also make things cheaper, and make them sometimes to a 'squillionth' of their size. The same applies to telescopes. In this monthly series we will be looking at some of the weapons of choice used by different astronomers.

We will show you their pros and cons and the alternatives - and what makes them - Weapons of Choice.

Millimetres or inches can describe the standard 6 inch (150mm) Newtonian reflector. Sir Isaac Newton worked out that, by sticking two aligned mirrors - one at right angles in a tube with another simple focusing tube, you could see the Universe in an entirely new way. Since then the Newtonian telescope has become one of the most popular and economic ways of seeing the night sky.

Mass production has driven down the price and raised the quality and even the cheapest of telescopes will offer you fair views for less than £100. And this is the point; astronomy – in order for it to be more popular it has to be cheaper, but only up to a point. Now, whereas, an 8 inch (200mm) reflector gathers more light than a 6 inch (150mm), the same can also be said of a 6 inch and 4 inch (100mm) reflector.

WEAPONS OF CHOICE



The popular Sky-Watcher 150mm now has a long focal length option as well as one optimised for astro-imaging

So whichever way you look at it, price-wise, it offers you a really great start in astronomy. For many years this type of telescope was the weapon of choice for the serious amateur astronomer and, up until 25 years ago, was considered a high-end instrument. Modern techniques in mirror making have been one of the main components in driving down the price and making the Newtonian reflector telescope more accessible.

During the 1970s and 80s aperture fever caught hold and some truly mammoth telescopes were made. Unfortunately their size, weight and cost restricts their use to an observatory only. However, it is now possible to get Dobsonians up to 24 inches (600mm) in diameter that will fit into the back of a large estate car. In the UK, 16 inches (400mm) are the biggest and best in terms of portability. The 6 inch (150mm) reflector is ideal for putting behind your car seat along with a tripod. Nowadays they are both light and robust and are seen as good all-rounders. A move up to an 8 inch (200mm) telescope will yield you a 77% gain in light gathering, but can be nearly double the cost. Go down to a 5 inch (125mm) 'scope and you will get 30% less than a 6 inch 'scope.

In terms of large Newtonians, the sky's the limit (and so is the cost) but there is a heated debate on why anyone would want to go bigger than a 10 inch (250mm) in the UK. There are arguments in many forums both for and against this limit due to the often inclement weather we have here in the UK. The answer is simple; it's all about gathering light, not magnification. However, there is a cross over point with Newtonian telescopes and this is to do with the focal length, which directly affects the amount of magnification and apparent field of view.

Focal is Local...

You may have noticed that some telescopes come in different lengths of tube. So, right now I'll do a little science bit, but not so much as to scare myself!

VIEW

WEAPONS OF CHOICE

150mm diameter divided by 750mm focal length = f5
150mm diameter divided by 1200mm focal length = f8

Why two lengths? Using a 25mm eyepiece will yield 30x magnification in the f5 'scope, but 48x magnification in the f8 'scope due to the longer focal length. That is one reason why telescopes are often made longer. You may also be pleased to discover that the majority of telescopes are rarely physically longer than 1200mm (48 inches) in length. This is basically for cost and logistics - have you ever seen UPS trying to deliver a 16inch reflector?

Focal length is important in determining what you intend to use the telescope for. 'Astro graphs' are the latest variant that are perfectly suited to astrophotography. Some of these have tube lengths of only 600mm which equates – you guessed it – to f4. A faster focal ratio offers shorter exposure times for astrophotography as well as a wider field of view and (possibly) a brighter image. Longer ratios are better for planetary work, which is why you will see refractors with ratios of up to f17, offering pin sharp views and high magnification but at the expense of contrast. This is due to their narrower apertures.

Incidentally, the same focal length ratio applies if you are staying local or not. Based on my f8 Newtonian with a 12mm eyepiece, this will offer you 96x magnification, which is more than enough to easily see the four moons of Jupiter and the cloud bands of Saturn. About 130x magnification is basically what you need; beyond that, in this country at least, you will need clear dark skies with good 'seeing' (still air). Read very cold!

As pointed out many times before, lesser telescopes will boast magnifications of 480x or something equally outrageous. Realistically, on a 6 inch telescope a more realistic limit is 200x magnification, but this is where alignment of the mirrors (collimation), optics and a perfect UK night sky would come into play. Even seeing through our murky atmosphere would not yield a great image due to the limiting resolution of the diameter of the primary mirror.

Put simply, this is how aperture fever can start, which is the burning desire to get bigger and bigger telescopes in search of the perfect view. Yes, it can be done. But there is a price.

Sermon of the Mount....

Sing it like a mantra daily... the mount is all, the mount is everything! No – really. If you want great views from any telescopes - the biggest secret is a sturdy mount. This is where a lot of cheaper telescopes fall foul. But with the SkyWatcher EQ3-2 German equatorial mount, at the £200 price point, you are getting something that is quite useful.

This particular mount is ideal for adding motors to at a later date, when the budget allows. It will allow you to track an object in the sky for a longer period of time, once polar aligned. If you buy a decent mount in the first place, it will allow you to move up to a bigger telescope in time or, if you really feel like pushing the boat out, it will track more accurately and that will allow you to explore basic astrophotography. The other alternative if you wish to save even more money, (a simpler set-up) is the 6 inch Dobsonian.

Open Source Telescope...

Invented by John Dobson in the late 1960s, this far-out thinking Californian (he spent 23 years as a monk in San Francisco) helped popularise astronomy by creating his version of a Newtonian telescope simply mounted in a 2 axis box (alt-azimuth). Over the years this design has become the preferred path to large portable reflecting telescopes. For the avid DIY-er the Dobsonian box could be built in a few hours with some mdf and a few power tools.

Manufacturers such as Sky-Watcher and Meade have developed the design further by being able to package the telescope so that it can be made easier to transport. With this type of telescope you will need to know your way around the night sky. Recent developments now include 'push to' technology, whereby an onboard computer guides you to your chosen object. It is also possible to buy a rotating table to keep track of your target and there are now some motorised Dobsonians, but again they are expensive. Dob's downside is that they don't do imaging well....

The 6 inch (150mm) Newtonian is still a strong contender for a starter telescope today; its balance of cost, performance and handling makes it a sure fire winner for anyone starting out in astronomy with a £250 budget.

200mm Newt's are better, but the cost goes up considerably because of the weight, and the need for a better mount. Payload is the factor here.

That's why, for me, the 6 inch Newtonian will always be the Weapon of Choice. DW

WEAPONS OF CHOICE

The Meade LXD-75 range is often overlooked for astro-imaging. The mount has its work cut out for the 250mm OTA, but OK up to 10KG It's quite loud too... This one is the rare 150mm

Image: David Woods

150MM VS 200MM OPTICAL TUBE ASSEMBLIES (OTA)

Diameter: 150mm	**Diameter: 200mm**
Focal Ratio: f5-f8	**Focal Ratio: f4-f5**
Magnification: 300x	**Magnification: 400x**
Resolution: 13.6 Mag	**Resolution: 14.2 Mag**
OTA Weight: 5-7 KG	**OTA Weight: 8-11 KG**
33% more light than 130mm aperture	**78% more light than 150mm aperture**
Typical OTA Cost £ 150	**Typical OTA Cost £ 230**
£ 250 With Mount/Tripod	**£ 399 With Mount/Tripod**
GOTO Mount £ 499 (Sky-Watcher EQ5-Pro) Payload - 9kgs	GOTO Mount £ 799 (Sky-Watcher HEQ5-Pro) Payload - 18kgs

Out There

Point your telescope at this months targets...

Pictures: NASA/STScI/ESO
Words: David Woods

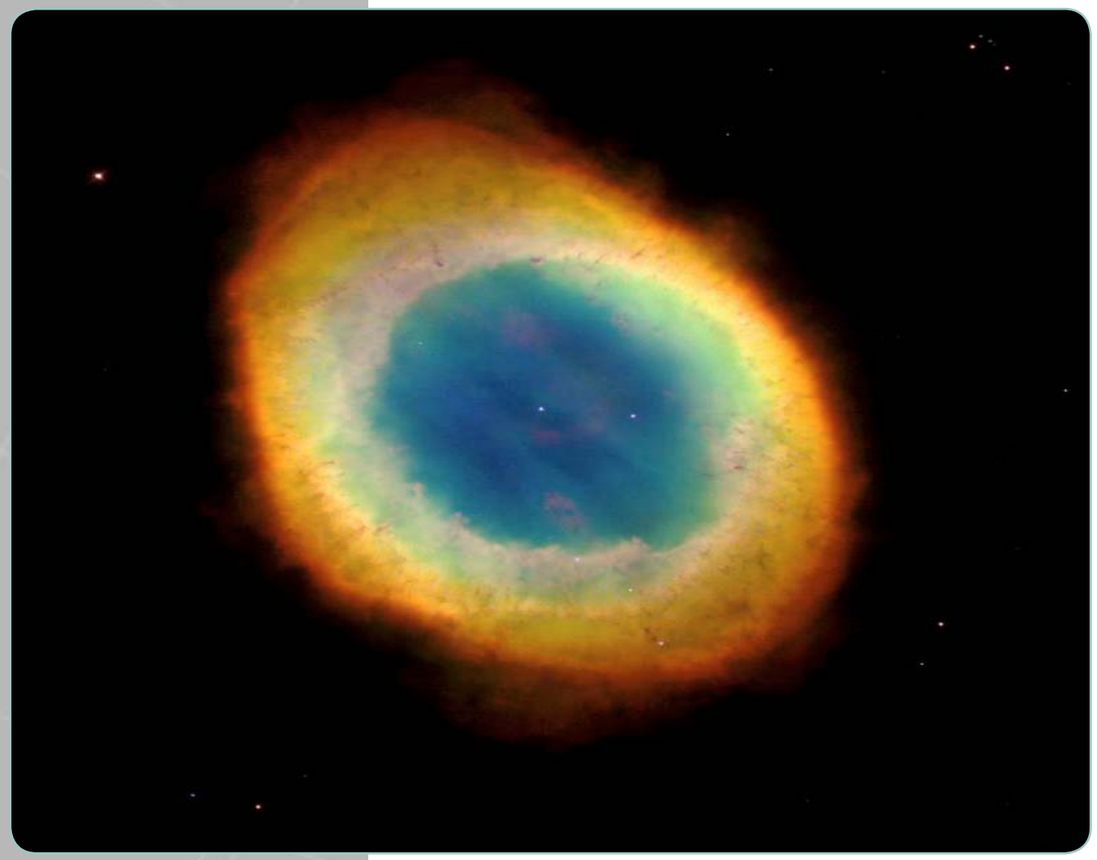


Photo: NASA/STScI

Messier 57

This is the famously named “Ring Nebula” is located in the northern constellation of Lyra, and also catalogued as NGC 6720. M57 is located in Lyra, south of its brightest star Vega. Vega is the northwestern vertex of the three stars of the Summer Triangle. You could use a 3” refractor, but looks better through an 8” telescope. This nebula was discovered by Antoine Darquier de Pellepoix in January, 1779.

FIND IT!

RA	18 : 53.6 (h:m)
Dec	+33 : 02 (deg:m)
Brightness	8.8 (mag)
Apparent Size	1.4x1.0 (arc min)

Photo: ESO

Messier 27

The Dumbbell Nebula, or NGC 6853) is a planetary nebula (PN) in the constellation Vulpecula, at a distance of about 1,400 light years.
This object was the first planetary nebula to be discovered; by Charles Messier in 1764. At its brightness of visual magnitude 7.5 and its diameter of about 8 arcminutes, it is easily visible in binoculars and small telescopes of 4-8 inches aperture.

FIND IT!

RA	19 : 59.6 (h:m)
Dec	+22 : 43 (deg:m)
Brightness	7.4 (mag)
Apparent Size	8.0x5.7 (arc min)

Out There

Point your telescope at this months targets...

Pictures: NASA/STScI
Words: David Woods

Photo: NASA/STScI

Messier 56

(also known as NGC 6779) is a globular cluster in the constellation Lyra. It was discovered by Charles Messier in 1779. M56 is at a distance of about 32,900 light-years from Earth and measures roughly 84 light-years across.

FIND IT!

RA	19 : 16.6 (h:m)
Dec	+30 : 11 (deg:m)
Brightness	8.3 (mag)
Apparent Size	8.8 (arc min)

Photo: NASA/STScI

Messier 30

(also known as NGC 7099) is a globular cluster in the Capricornus constellation. It was discovered by Charles Messier in 1764. M30 is at a distance of about 28,000 light-years away from Earth, and about 90 light-years across!

FIND IT!

Right	21 : 40.4 (h:m)
Dec	-23 : 11 (deg:m)
Brightness	7.2 (mag)
Apparent Size	12.0 (arc min)

Photo: NASA/STScI

Messier 72

(also known NGC 6981) is a globular cluster in the Aquarius constellation discovered by Pierre Méchain on August 29, 1780. Charles Messier looked for it on the following October 4 and 5, and included it in his catalog.

M72 is located at about 53,000 light-years away from Earth.

FIND IT!

RA	20 : 53.5 (h:m)
Dec	-12 : 32 (deg:m)
Brightness	9.3 (mag)
Apparent Size	6.6 (arc min)

Review

Picture: MoonLite Telescope Accessories
Words: Melanie Jones

Moonlite Focuser - It's more than a bling thing.

Astronomy's weird for a girl. You start off buying a scope and the next thing you know you have lost all sight of that Prada handbag and start focusing (if you'll pardon the pun) on astro 'bling'.

For me the epitome of this is the MoonLite Crayford focuser. I originally had the Sky-Watcher supplied Crayford which worked well enough but I am a bit picky if the truth be told and having seen a MoonLite unit at a star party resolved to have one as my Christmas present. The unit I plumped for was the MoonLite CR Dual Rate tri-knob Crayford Focuser which was supplied by the estimable Steve at First Light Optics.

I'd recommend that if you're going to buy one of these you take some advice about what to buy as MoonLite do a bewildering range of options. Mine was ordered up in the all black colour rather than the standard red. There's no charge for colour options and MoonLite do these in a range of colours that would gladden any woman's heart. You'll also need a fitting kit to attach it to your choice of telescope. The whole package cost £275 from First Light Optics and for a time I agonised about how many pairs of shoes I could buy for the same money.

When I opened up the packaging on Christmas day I found possibly the most beautiful object I could have imagined. The focuser was frankly astounding in its quality and I marvelled at how MoonLite could turn them out at the price they ask. The machining was perfect and the fit and finish was simply amazing. The black anodising was absolutely flawless and every single part breathed perfection.

Fitting the unit to my Sky-Watcher 200 proved niggle-some more than difficult. The MoonLite's fittings didn't quite match perfectly to the holes left behind by the Sky-Watcher unit which required me to file two of the holes out to a slightly larger size. The MoonLite comes with its base plate pre-drilled for a range of scopes and it was a bit tricky at first to work out which ones were the right ones for the Sky-Watcher. This was more a case of experimentation rather than a real problem and patience as ever paid dividends. Once attached the unit looked great and gives the scope a real touch of class.

Performance wise the MoonLite simply can't be faulted. It can pull the heaviest of eyepieces with ease and even its coarse controls are better than most focusers' fine controls. The fine control on the MoonLite is smoothness itself. One of the great advantages is the unit's ability to handle almost any eyepiece, small or heavy, with no real effect on its 'feel' as you use the unit to focus. The focuser tension can be adjusted using some allen headed bolts under the focuser although I can't imagine many eyepieces would require this.

The unit also has collimation screws to adjust the focuser's angle to the tube if required and as an option a focus lock can be supplied. I passed on this as I do only observational astronomy.

The tri-knob version has three knurled knobs which control the tension of the compression ring and will hold any eyepiece to a perfect centre. The unit was supplied with a 2" to 1.25" adapter which, like the focuser, quietly screams quality at you.

The drawtube is machined with ridges to neutralise any stray reflections and just enhances the overall quality feel of the product.

The quality of the MoonLite focuser really comes to the fore during collimation where whether using a laser or a Cheshire you will find collimation is more consistent and easier to achieve as the dreaded focuser 'slop' is simply removed from the process.

It may look like 'astro bling' but the MoonLite is a superb piece of engineering that will make focusing a dream. No more scope wobble as you can precisely focus with the fine rate knob which is so smooth there's no reason for your telescope to get the jitters.

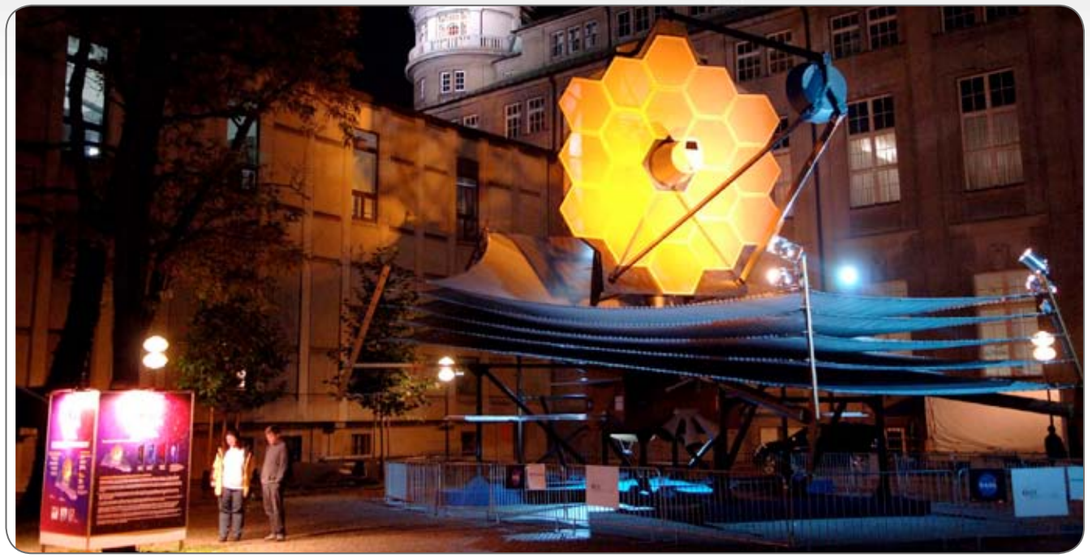
Alexander Pope wrote in his Essay on Criticism "Whoever thinks a faultless piece to see, thinks what never was, nor is, nor ever shall be". But then he didn't own a MoonLite focuser which is simply – poetry.

Equipment supplied for review by Steve Graham at First Light Optics www.firstlightoptics.com

James Webb Space Telescope

Pictures: NASA
Words: David Woods

Bigger is most definitely better.



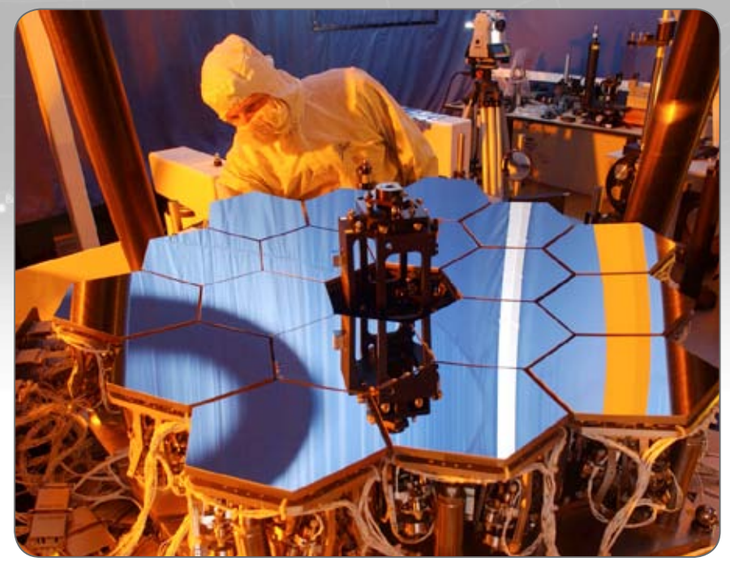
Big is always better, and then, bigger is better than that! For the past twenty years the Hubble Space Telescope has done more for mankind in opening up the wonders of the Universe since Galileo and Sir Isaac Newton figured out how to make a telescope.

Aperture is what it's all about ultimately and the James Webb Space Telescope (JWST) will have a large 6.5 meter (21.3 feet) diameter mirror and a sunshield the size of a tennis court. The Hubble's mirror is just 2.4 meters (8 feet) in diameter and as you can see from the photographs, the JWST is on a completely different scale to the Hubble.

Engineering wise, it's a feat on many levels. In order to get something so large into orbit it's been designed to unfold and open up in outer space. At an orbit of a million miles from Earth at one of the five lagrangian points of the Sun-Earth system, the JWST will be located where the Sun and the Earth will be behind it at all times. Unlike the Hubble it will be difficult to service once in orbit as it will be nearly 4 times the distance from the Earth to the Moon. Its gold-coated beryllium mirror segments will capture distant light at infrared wavelengths from the very edge of the Universe without any heat interference and, like amateur astronomy and astro imaging, there are direct parallels to some of the technologies used.

The JWST will host four science instruments; a near-infra red camera (NIRcam), a near IR multi-object spectrograph, a mid-IR instrument and a turnable filter imager. It will be able to see deeper than the Hubble, to about a few hundred thousand years after the Big Bang. The European Space Agency (ESA) is involved in this project, very much like it was with the Hubble. Between now and the launch date of 2014, a lot of work will be completed at certain stages and we hope to regularly report on these milestones when they occur.

ESA is contributing to the mid-IR instrument, which is a sensitive imager/spectrograph that covers a wavelength range of 5-29 micrometers, along with NASA's Jet Propulsion Laboratory. This instrument is cryo-cooled down to about 7 kelvin. The other instrument is the near-IR spectrograph and this operates at 1-5 micrometers and uses a unique micro shutter cell technology which allows just one portion of the sky to be scanned individually. This also means that it can obtain simultaneous spectra of more than 100 objects in a 9 square arc minutes field of view. This instrument is currently undergoing testing at the NASA Goddard clean room.

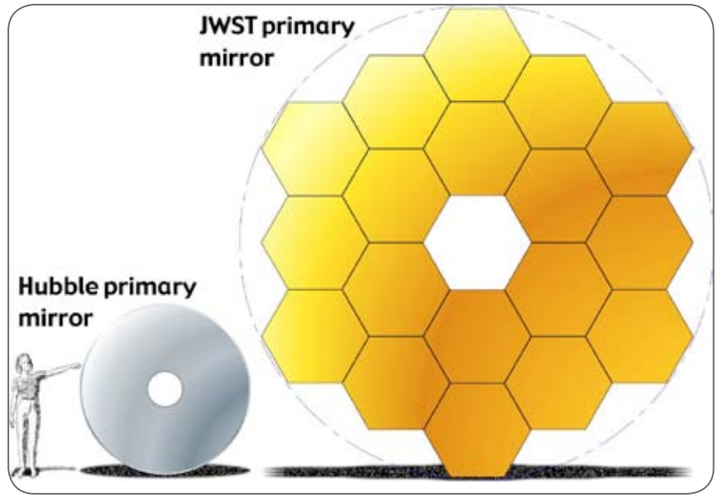


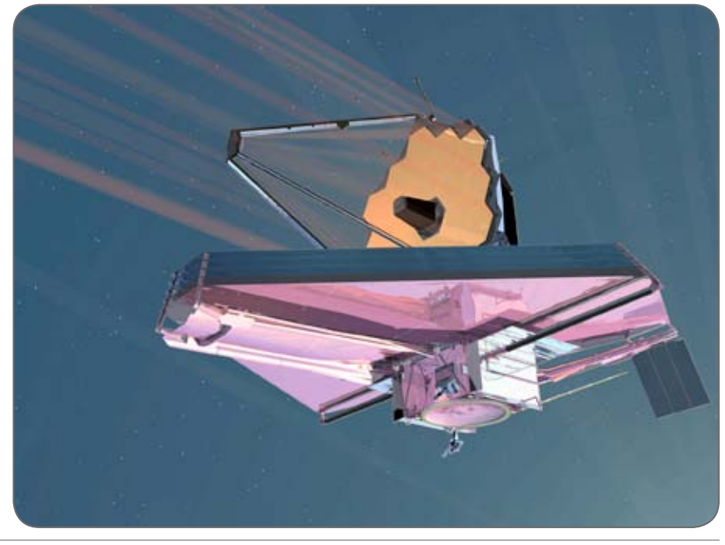
Other instruments, such as the guider and filter, are provided by the Canadian Space Agency and the near-IR camera is provided by the University of Arizona. Overall, seventeen countries are involved in this massive project.

The James Webb Space Telescope in essence takes a plethora of existing technologies and focuses its attention on the non-visible part of the spectrum. It's a bit like suddenly having night vision with your car and seeing far beyond the headlamps. What's really exciting is just how much of this technology will trickle down to us amateur astronomers, so that we can continue to contribute scientifically and provide more insight into what's happening in the night sky.

Next month we will be exploring some future imaging technologies.

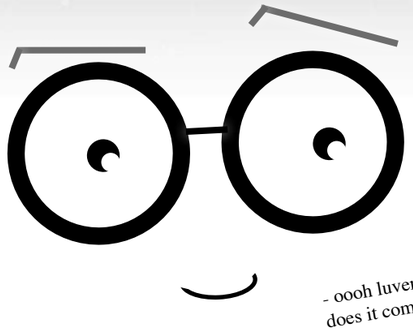
DW

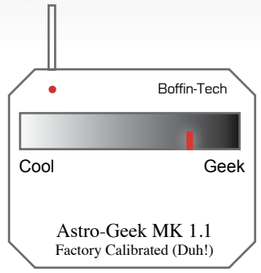




The Geek-O-Meter

Are astronomers the chic of geek? By David Woods





Astronomy was often the pursuit of scholars, theologians and scientists of old. As our knowledge of the Universe grew the pursuit became more factual and scientific and a little over 400 years ago the first proper telescopic devices which we see today, were invented. At the time, this technology was a bit like the Keck Telescope in Hawaii; very expensive and cutting edge for its time. In the UK in the 1700s and 1800s astronomy was considered a wealthy man's pursuit and much of what we see today bears this out, such as the Norman Lockyer Observatory in Sidmouth. All of our astronomy ancestors were, in fact, clever and rich people for their time who were able to pursue astronomy.

Nowadays with mass production, go-to telescopes and a plethora of media resources, astronomy is becoming an everyman (and woman) activity. So, in comes our new virtual device – the Geek-o-meter. This actually came about during a conversation at the IOW Star Party earlier this year.

The guy sitting opposite me, called Dan, asked me what I did for a living, so I told him about the magazine and my exploits regarding underwater imaging for shipwrecks. I thought I was pretty geeky. Then I asked him what he did, a chemist he said, but the rest of us grew a little suspicious. What sort of chemist? was the next question, and then the real revelation – "Well actually", he said, "I grow Carbon Nanotubes in a lab and am looking at different ways of developing this new technology". OK, I was out-geeked.

His Geek-o-meter score was a very solid 9.5 out of 10. I think mine worked out at a 6.5 out of 10.

We carried on this game across the table to discover that most of us had some form of academic or scientific background. One, we discovered, was actually sponsored by NASA – that's a 9 out of 10 – who, at the end of the PhD, moved back to the UK from USA – that's a 4 out of 10. (Well, not really). Experimenting with hydrochloric acid whilst geeked up in a rubber suit, scored a solid 9.5 (such is my vivid mental imagery she must have looked either like Barberella or Boil-in-the-Bag, in this case I'd go with Barberella...). Then on we went; an author 8, a satellite technologist 8.5, various NHS administrators 4 to 7.5 and IT consultants 7 to 9.9.

I think now you get the picture..?

It doesn't actually matter if you stack shelves in a store, that doesn't make you a 4. The common denominator here is that insatiable appetite for learning and discovering. Some are lucky enough to get paid for doing it.

Unlike some of the Edwardian rich kids with their giant telescopes, the 21st century astronomer has a different set of attributes, which are not solely reliant on the cost of technology. In many respects stargazing is a great leveller.

So try out the Geek-o-meter yourself at your own astronomy group and find out what other people do for a living. It may just give you an insight into the mind of an amateur astronomer.

DW

PREVIEW

Compiled by: David Woods

Learn more about the Universe by visiting a Planetarium.
Please visit their websites for latest information.

Greenwich Planetarium, London - www.nmm.ac.uk/visit/planetarium-shows/

November/December Shows	Royal Observatory, Greenwich Blackheath Ave, SE10 8XJ London +44 (0)20 8858 4422	
Saturday & Sunday	11.00	Space Safari 20 mins
	11.45	We Are Astronomers 30 mins
	12.45	Sky Tonight Live 25 mins
	13.30	We Are Astronomers 30 mins
	14.30	Meet the Neighbours 25 mins
	15.15	We Are Astronomers 30 mins
	16.15	Sky Tonight Live 25 mins
Week days	visit website	Various

INTECH Planetarium, Winchester - www.intech-uk.com

November/December Shows	INTECH Planetarium and Science Centre. General Enquiries: 01962 863791 Telegraph Way, Morn Hill, Winchester, Hampshire, SO21 1HZ	
Monday-Friday	10.00am-2pm	School shows.
Monday-Friday	2pm-4pm	Various - visit website
Saturday & Sunday	visit website	Black Holes
	visit website	Flight through the Universe
	visit website	Secret of the Cardboard Rocket
	visit website	We are Astronomers
	visit website	Flight through the Universe
	visit website	Astronaut

The South Downs Planetarium, Chichester - www.southdowns.org.uk/sdpt/

November/December Shows	The South Downs Planetarium. Tel: 01243 774400 - Sir Patrick Moore Building Kingsham Farm Kingsham Road Chichester West Sussex PO19 8RP	
Sunday, November 14th	3.30 pm	The Hunt for Planets and Life
Friday, November 19th	7.30 pm	The Stars This Month
Saturday, November 20th	10.00am-4.30 pm	ONE DAY COURSE: Our Spaceship Earth
Sunday, November 21st	3.30 pm	The Stars This Month
Friday, November 26th	7.30 pm	Our Violent Sun
Friday, December 10th	7.30 pm	The Night Sky This Christmas
Sunday, December 12th	3.30 pm	The Night Sky This Christmas
Tuesday, December 21st	7.30 pm	The Star of Bethlehem

2011 - UK Events

Astronomy and star-gazing treats night and day.

One of the largest star parties in Europe -
The Kelling Heath Spring Equinox 31Mar - 04 April 2011.
http://www.starparty.org.uk

One of the great things about the International Year of Astronomy (IYA 2009) is the growing popularity of Star Party events being held around the country. The question that often arises on most Forums is, how does one go about getting one started? HantsAstro has a growing reputation for organising and taking part in various events across the South of England.

Over the past few years, more and more events are springing up across the UK and there has never been a better time to get into astronomy. We have been to most of these events and they are a real asset to the world of amateur astronomy.

10 November 2010 & 26 Jan 2011 - INTECH StarGazing Event Formerly known as the Telescope Amnesty is now entering its third year and is held at one of the most advanced planetariums in the UK.
During the year INTECH hold a series of lectures on astronomy which is well worth checking out on their website. http://www.intech-uk.com

MoonFest by HantsAstro
As part of their DNA, IYA2009 kick started these free public events across Hampshire and will be running Oct 2010 - May 2011, and then starting again as from October 2011 to the following year.
Over 300 people visit each of these events sponsored by Astronomia of Dorking and Vixen Telescopes.
Please visit HantsAstro's website for details. http://www.hantasastro.org/moonfest

04-05 February 2011 AstroFest, London
Run by Astronomy Now magazine, this London based 2 day event kicks off with some world-class seminars. Trade stands and talks create a very busy event.
http://www.astronomynow.com/astrofest/

Guildford Astronomical Society, Surrey
Due to the overwhelming success of their free public events at Newlands Corner, Guildford, Surrey - Guildford AS will be holding more of these observing sessions throughout 2010-11. Please visit their website. http://www.guildfordas.org.uk

03-07 March 2011 – Isle of Wight Star Party
This event is a real treat with some of the darkest skies in the South. At the Brighstone Holiday Centre you can either rough it in a tent or benefit from the creature comforts of a warm chalet. With lots of talks and things to do, it's one of the highlights of the astronomy calendar.
http://www.iowstarparty.org
www.twitter.com/iowstarparty

31 Mar- 04 Apr 2011 - Kelling Heath Spring Equinox
One of the first big star parties of the year. Main weekend 3-4 April
http://www.starparty.org.uk

(May onwards) Summer 2011 – Royal Observatory Greenwich
This is effectively the centre for astronomy during the summer with lots of events, and with their new planetarium there (part of a £17.7m development) will also be some amazing shows on offer.
http://www.nmm.ac.uk/places/royal-observatory/

TBA August 2011 – Norman Lockyer Observatory
Every year they run the **South West Astronomy Fair** with some very eminent speakers, a planetarium show, trade stalls and many activities on site. It also gives you the chance to wander around their large site imbibing the history and technology dating back over 130 years. http://www.normanlockyer.org/

TBA- August 2011 Salisbury Star Party
2009 was a breakthrough year for this new star party. It has been taken over and will be run by StarGazers Lounge. Please visit their forum for more details. http://www.stargazerslounge.com

02-04 Sept 2011 Herstmonceux Astronomy Festival, Hailsham
3 days of talks and all things astronomical from a splendid science centre, with some big telescopes.
http://www.the-observatory.org

19-30 Sept 2011 Kelling Heath Autumn Equinox
These gatherings in September are often quoted as the largest star parties in Europe. They are predominantly run and organised by Loughton and Norwich Astronomical Societies. With over 1000 astronomers pouring in from all over Europe, your reservation has to be booked well in advance. For further details go to their website. http://www.starparty.org.uk

This list is not exhaustive and is just a preview of some of the events to come in 2011. If you are a society or event organiser and wish to add your events to this list – then please email me
david.woods@hantsastro.org

AstroSouth.org

Nov'10 - Jan 2011

Planetarium shows and events take place across the South of England. Please check relevant web site for updates and contact details.

Southdowns Planetarium Chichester, West Sussex
Various Monthly Shows
Check site for details + times and booking
Cost - £6 Adults
£4 under 16s
www.southdowns.org.uk/sdpt

INTECH Science Centre + Planetarium Winchester, Hants
Located near Winchester, Hampshire, INTECH has a massive 17m tilted dome which makes it one of the largest planetariums in the UK. Launched in 2008, they use the latest digital projection technology to give a truly immersive experience. Featured on international TV and media, the planetarium is a new addition to the INTECH hands-on science centre.

Dr Jenny Shipway
01926 863791
jennyshipway@intech-uk.com

Island Planetarium and Dr. Robert Hooke Exhibition
Fort Victoria Country Park, Westhill Lane, Yarmmouth, Isle of Wight, PO41 0RRA
Evening Astronomy Lectures/ Shows, Stargazing Evenings and Courses. See web site for full details
phone:0800 1958295
or 01983 761555
www.islandplanetarium.co.uk
email:enquiry@islandastronomy.co.uk

ShuttleWatch

Pictures: NASA
Compiled by: David Woods

Our monthly review of what is way over our heads.

Robonaut 2 (R2) will stay aboard the ISS and may assist with future EVA's. It's eyes are in the head but its brains are in its torso. It is not expected to return to Earth...

Photo: NASA

Mission: STS 133 - Nov2010 - Discovery's last flight and R2's.

This time around, Discovery will carry a crew of six to and from the space station – Lindsey, Pilot Eric Boe, and Mission Specialists Alvin Drew, Tim Kopra, Michael Barratt and Nicole Stott – as well as what used to be the Leonardo Multipurpose Module on a one-way trip. It's now called the Permanent Multipurpose Module, and rather than returning, it will stay attached to the station's Unity node to provide extra storage for the space station.

Still, if that doesn't grab your attention, perhaps what it carries inside will: In addition to a host of new science experiments and hardware, there's Robonaut 2, the first dexterous humanoid robot in space. Although its first priority will be to test its operation in microgravity, upgrades could eventually allow it to fulfill its ultimate purpose of becoming an astronaut helper on boring or dangerous tasks.

"I think it will be interesting to get it hooked up and start playing with it, seeing what it can do," Lindsey said. "What I know from my years of flight tests and being around airplanes and watching them evolved is, I'm pretty sure that everybody's preconceived notions of what we're going to use this for are wrong. But by putting it on station, working with it, we'll learn what the best use of it is. And that's the whole purpose."

"The shuttle has provided an amazing capacity for this country to gather data," Lunney said. "I think we're still sorting through a lot of it, trying to figure out what all we've learned from it. This chapter in our space history known as the space shuttle has been incredible."

The Shuttle's new scheduled launch date is 30 Nov if all goes well. It will be the first of the Shuttle fleet to retire after serving 352 days in Space.

The end of an era is beginning.

National Aeronautics and Space Administration

Remaining Space Shuttle Missions

Below are the approved target dates for the launches remaining in NASA's Space Shuttle Program

STS-133

Launch Target: Nov. 30, 2010, at 4:02 a.m. EST
Shuttle: Discovery
Duration: 11 days

Crew:
Commander Steven Lindsey
Pilot Eric Boe
Mission Specialists Alvin Drew, Michael Barratt, Tim Kopra and Nicole Stott

Mission: Deliver Express Logistics Carrier 4, Permanent Multipurpose Module and critical spare components to the International Space Station.

Info: Attach the Permanent Multipurpose Module, or PMM, to the station. The PMM is the modified Leonardo multi-purpose logistics module that will be left aboard the station. This will be the 35th shuttle mission to the station.

STS-134

Launch Target: Feb. 27, 2011, at 3:35 p.m. EST
Shuttle: Endeavour
Duration: 14 days

Crew:
Commander Mark Kelly
Pilot Gregory H. Johnson
Mission Specialists Michael Fincke, Greg Chamitoff, Andrew Feustel and European Space Agency astronaut Roberto Vittori

Mission: Deliver Express Logistics Carrier 3 and the Alpha Magnetic Spectrometer to the International Space Station.

Info: Deliver spare parts, including two S-band communications antennas, a high-pressure gas tank, additional spare parts for Dextre and micrometeoroid debris shields. This will be the 36th shuttle mission to the station and the 134th and final scheduled shuttle flight.

Space Shuttle Commemorative Patch

The Space Shuttle Program selected Blake Dumesnil's design as the winner in the Space Shuttle Program Commemorative Patch Contest. Dumesnil, of Hamilton Sundstrand at NASA's Johnson Space Center in Houston, also received the highest percentage of votes in an internal NASA People's Choice poll. A panel of NASA judges selected the winning patch from 85 entries submitted by NASA employees and contractors. The patch flew on the STS-132 mission.

Out There

Picture: Graham Green

The night sky this month by Graham Green

Comet 103P/Hartley is fading this month as it heads towards Hydra. Image by Graham

The Planets

Mercury will not be visible to observers in northern latitudes this month.

Venus passed through inferior conjunction at the end of October and can now be seen in the eastern morning sky. Venus brightens from magnitude -4.1 to -4.7 and by the end of the month the planet can be seen more than three-and-a-half-hours before sunrise!

Mars is inconveniently placed for observation this month.

Jupiter can still be seen for much of the night. The planet fades from mag -2.8 to -2.5 as its distance from Earth increases.

Saturn is visible low in the eastern sky just before dawn at mag+0.9. Its rings are now beginning to open.

Uranus is still easily found if you use Jupiter as a guide. The distance has now increased to about 3° east of Jupiter. The planet is very faint to the naked eye at Mag +5.8.

Meteors

The Taurid Meteor shower began way back in September but peaks twice this month. The Moon will be new on the 6th making both the 30th October to the 7th of November and the second peak on the 4-7th favourable. The ZHR of 1-3 is low but these could be bright fireballs radiating across the sky from Taurus.

Comets

Comet 103P/Hartley can still be seen this month but is becoming increasing faint and low in the early morning sky. On the 29th the comet at mag +6.9 passes between the open star clusters M46 and M47 in Hydra.

The recently discovered Comet Ikeya-Murakami can be seen in Virgo 'scraping' past the west of Saturn on the 8th and heading south this month. Comet Ikeya-Murakami is currently around mag 7.5 and can be seen with binoculars.

Moon - Watch

New Moon: 6th November
Full Moon: 21st November

The nights of the first third of the month will be 'Moon free' while the Moon heads towards the Sun. On the 5th the fine waning crescent Moon can be found in the eastern morning twilight sky by the brilliant planet Venus by almost 50 arch seconds but beware, the Sun isn't too far below the horizon! On the 16th the Moon lies close to Jupiter. The Pleiades open cluster lies just 2° to the north of the Moon on the 21st.

Compiled by Graham Green

Out There

Watch it from your PC - www.HantsAstro.org/videostream.html

courtesy of spaceflightnow

NASA TV Nov/Dec 2010

NASA TV Daily Schedule – all times are US Eastern Time Zone (GMT-5)

ALL PROGRAMS MAY BE PRE-EMPTED OR RESCHEDULED WITHOUT ADVANCE NOTICE

NASA TV Daily Schedule: All Times are Eastern Time Zone

November 15, Monday
9 a.m. - 12:30 p.m. - ISS Russian Spacewalk Coverage (Spacewalk scheduled to begin at 9:25 a.m.; will last about 6 hours) – JSC (Public and Media Channels, except during the Chandra Science News Conference, which puts the spacewalk on the Public Channel only for the duration of the news conference)

November 18, Thursday
9:50 a.m. - ISS Expedition 25 In-Flight Event with the "Rick and Bubba" Syndicated Radio Program - JSC (Public and Media Channels)
1 p.m. - EPOXI Science Press Conference - HQ (Public and Media Channels)

November 22, Monday
9:55 a.m. - ISS Expedition 25 In-Flight Interview with the Neil deGrasse Tyson "StarTalk Radio" Program - JSC (Public and Media Channels)

November 23, Tuesday
10:05 a.m. - ISS Expedition 25 Educational In-Flight Event with the U.S. Department of Education - JSC (Public and Media Channels)

November 26, Friday
12 p.m. - Video File of the ISS Expedition 26 Crew News Conference at the Gagarin Cosmonaut Training Center, Star City, Russia and Visit to Red Square in Moscow, Russia – JSC (Public and Media Channels)

November 29, Monday
6:30 p.m. - ISS Expedition 25/Soyuz TMA-19 Undocking Coverage JSC (Undocking scheduled at 6:53 p.m. EST.) – JSC (Public and Media Channels)
9 p.m. - ISS Expedition 25 Crew Deorbit Burn and Landing Coverage (Deorbit burn scheduled at 9:27 p.m. EST, landing scheduled at 10:19 p.m. EST) – JSC via Kazakhstan (Public and Media Channels)

November 30, Tuesday
10 a.m. - Video File of ISS Expedition 25/ Soyuz TMA-19 Landing in Kazakhstan, Post-Landing Activities and Interviews with Expedition 25 Commander Doug Wheelock and Flight Engineer Shannon Walker – JSC (Public and Media Channels)

December

December 3, Friday
12 p.m. - Video File of the ISS Expedition 26 Crew Departure Ceremonies at the Gagarin Cosmonaut Training Center, Star City, Russia – JSC (Public and Media Channels)

December 10, Friday
12 p.m. - Video File of the ISS Expedition 26 Crew Activities in Baikonur, Kazakhstan – JSC (Public and Media Channels)

December 13, Friday
12 p.m. - Video File of the ISS Expedition 26 Crew Activities in Baikonur, Kazakhstan, Soyuz TMA-20 Vehicle Mating and Rollout to the Launch Pad – JSC (Public and Media Channels)

December 14, Tuesday
5 p.m. - Video File of the ISS Expedition 26 State Commission and Final Pre-Launch News Conference in Baikonur, Kazakhstan – JSC (Public and Media Channels)

December 15, Wednesday
12:30 p.m. - ISS Expedition 26 Crew Pre-Launch Activities in Baikonur, Kazakhstan – JSC via Baikonur, Kazakhstan (Public and Media Channels)
1:15 p.m. - ISS Expedition 26/Soyuz TMA-20 Launch Coverage (Launch scheduled at 2:09 p.m. EST.) – JSC via Baikonur, Kazakhstan(Public and Media Channels)
4 p.m. - Video File of ISS Expedition 26/ Soyuz TMA-20 Pre-Launch Activities and Launch from Baikonur, Kazakhstan – JSC (Public and Media(Public and Media Channels)

December 17, Friday
3 p.m. - ISS Expedition 26/Soyuz TMA-20 Docking to ISS Coverage (Docking scheduled at 3:27 p.m. EST followed by post-docking news conference) – JSC via Korolev, Russia(Public and Media Channels)
6 p.m. - ISS Expedition 26 Hatch Opening and Welcoming Ceremony (Hatch Opening scheduled at approximately 6:30 p.m. EST.) – JSC via Korolev, Russia (Public and Media Channels)
4 p.m. - Video File of ISS Expedition 26/ Soyuz TMA-20 Docking to ISS, Hatch Opening and Welcoming Ceremony – JSC (Public and Media(Public and Media Channels)

All times Eastern. Programs may be pre-empted without advance notice.

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