New Zenith

The Monthly Newsletter of the Vectis Astronomical Society

Vol 24 Issue 9 — October 2016

When Printed, this Newsletter costs VAS at least £1

Society News

Anniversary Dinner

It seems the note on the recent booking form for this event may be confusing.

The completed form, and cash or a cheque made out to VAS should be handed to any member of the committee.

Or posted to me at:

Butterflies
Woodside Avenue
Alverstone Garden Village
Isle of Wight PO36 0JD.

It is also possible to make an electronic transfer. Rather than publish VAS bank account details here, please contact me for details - the booking form is still required though.

Norman Osborn

Mottistone Manor

The recent National Trust event at Mottistone was a great success this year - we even had half an hour or so of relatively clear sky!

About 140 visitors seemed to enjoy our talk and display and of course VAS members will benefit from the donation to Society funds.

Pavilion

As the pavilion remedial works are more or less complete, it should be much easier to access the observatory again. Whilst the building materials and fences etc have been removed from site it is still a good idea to bring a small torch when visiting the site.

Brian Curd
Editor New Zenith

VAS Website: wightastronomy.org

Submissions or letters to New Zenith are always welcome and should be sent to:

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Tel: **01983 872875** or email: **editor@wightastronomy.org**

Material for the next issue by the 6th of the month please.

The Vectis Astronomical Society and the Editor of the New Zenith accept no responsibility for advice, information or opinion expressed by contributors.

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Observatory Diary

Monday, 19.30hrs	Members Only and by arrangement Telescope and night sky training. Please contact Martyn Weaver 07855 116490
Thursday, 19.30hrs	Members and Public. Informal meeting and observing

Contents this Month

2016 Monthly Meetings

Date	Subject	Speaker
Please check **wightastronomy.org/meetings/** for the latest information		
23 Sep	Cancelled	Cancelled
28 Oct	TBC	TBC
25 Nov	Stellar population Modelling	Dr Claudia Maraston

Observatory Visits Booked

No bookings so far

It would be appreciated if members could avoid using the observatory at these times.

40th Anniversary Event

The Breeze
Island Harbour

Saturday 12 November 2016
18:30 for 19:00

Booking forms have been sent to all members by email or by post.

Please complete your order and return it, along with your payment, to any committee member.

Please note that only those who have booked meals will be able to attend

Please see the note on page 1

VAS Contacts 2014/15

President	Barry Bates president@wightastronomy.org
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Membership Secretary	Norman Osborn members@wightastronomy.org
NZ Distribution	Graham Osborne
Others	Mark Williams, Nigel Lee & Stewart Chambers

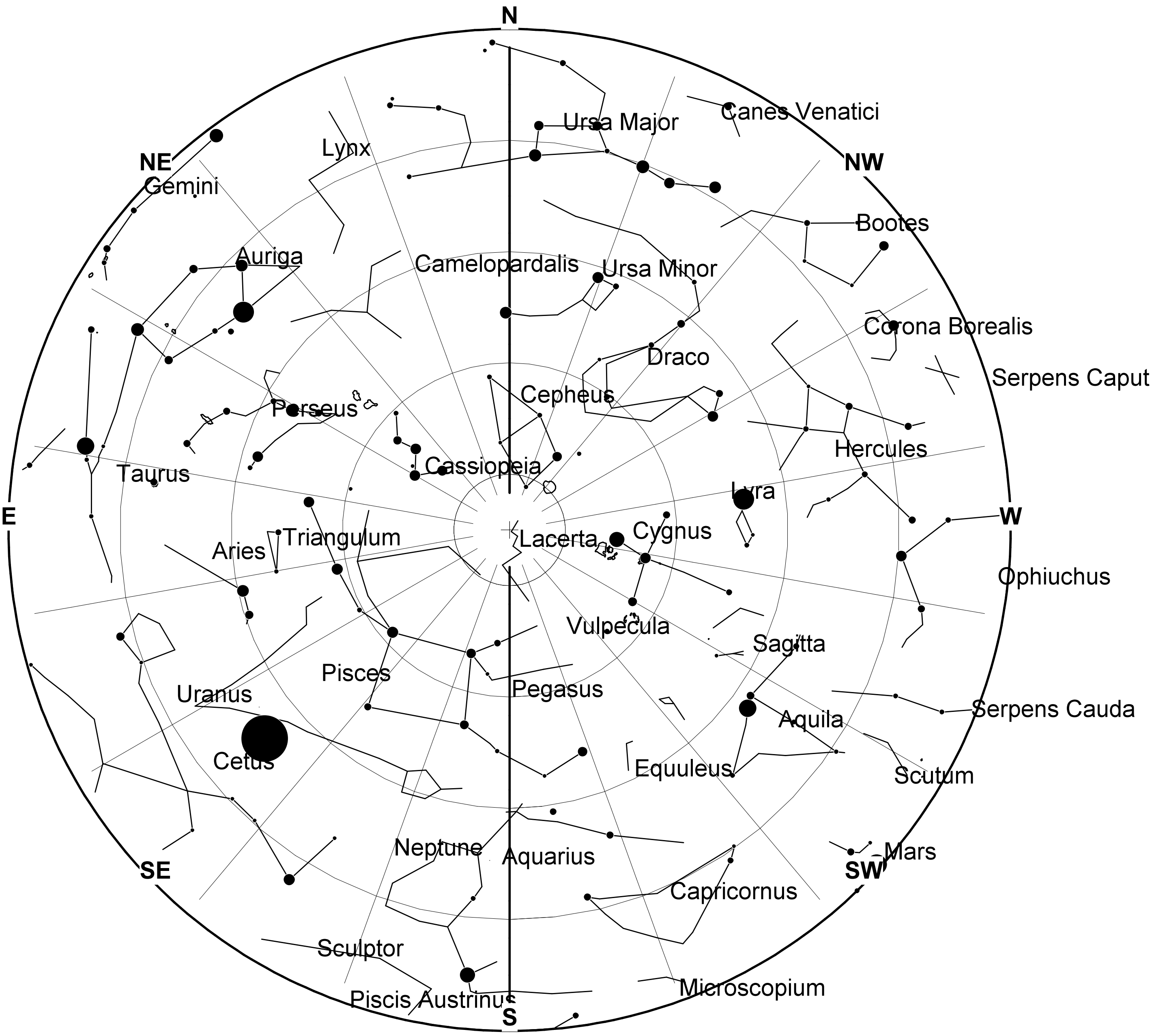
Important

Members using the observatory outside normal Thursday meetings MUST enter a line or two in the Observatory Log Book.

On several occasions,
lights, heaters and the Meade LX200 have been left on!

When leaving, please ensure all is secure and all lights, heaters and telescopes are TURNED OFF.

October 2016 Sky Map



View from Newchurch Isle of Wight UK - 2200hrs - 15 October 2016

NGC 6910, also called the Rocking Horse Cluster, possessing 16 stars with a diameter of 5 arcminutes visible in a small amateur instrument; it is of magnitude 7.4. The brightest of these are two gold-hued stars, which represent the bottom of the toy it is named for. A larger amateur instrument reveals 8 more stars, nebulosity to the east and west of the cluster, and a diameter of 9 arcminutes. The nebulosity in this region is part of the Gamma Cygni Nebula.

The other stars, approximately 3700 light-years from Earth, are mostly blue-white and very hot

*This article is licensed under the **GNU Free Documentation License**.*
It uses material from the Wikipedia article "Cygnus (constellation)".

October 2016 Night Sky

Moon Phases

New	First Qtr	Full	Last Qtr
1st/30th	9th	16th	22nd

Planets

Mercury

During the first two weeks of the month Mercury can be seen in the pre-dawn sky. It is heading quite rapidly towards the rising sun and although it is quite bright it is being observed against a brightening sky. On the 11th it is in close conjunction with Jupiter. A pair of binoculars or telescope will be needed to observe this. Mercury is about a moon width above and left of Jupiter.

Venus

Look low in the southwest just after sunset to find the Evening Star. This autumns apparition is not particularly spectacular, Venus lies only about 10 degrees above the horizon at sunset.

Mars

Mars is moving east against the stars at such a rate that its position when observed at the same time each night hardly changes while the stars steadily move tot eh west. Look for it low in the south-southwest at around 8pm. It is the brightest object in that part of the sky; that together with its distinctly red colour makes it easy to find and identify.

Jupiter

Jupiter is too close to sun for serious observation, but its position improves each day as it steadily moves clear of the horizon.

Saturn

As the sky darkens after sunset Saturn can be found low in the southwest. It is now rather too close to the horizon for any serious observation and by the end of the month will have become a difficult object.

Uranus

Uranus is can be found about half way between Epsilon and Omicron Pisciium. Both stars are the same brightness, magnitude 4.25. Using a pair of binoculars scan from Epsilon eastward towards Omicron. The first bright star you come to is Zeta Pisciium, about a binocular field away, keep going about the same distance again and the slightly dimmer object is Uranus. In clear dark skies someone with very good eyesight would be able to spot it without optical aid.

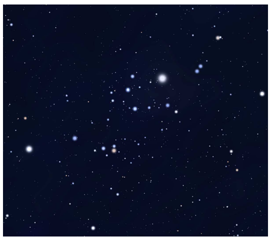
Neptune

The Ice giant Neptune is just over 2° south west of Lambda Aquarius towards Sigma Aquarius. There are no easily located guide stars nearby; Aquarius, having no bright stars is not the best know constellation and is not that easily recognised; this makes finding the guide stars almost as difficult as finding the planet itself.

Deep Sky

NGC6910 Open Cluster
RA 20h 23m Dec 40° 48'
mag 7.4

NGC6910 is a small cluster located about 0.5° north of Sadr the central star of Cygnus. The brighter members make a cluster of three short spokes.



Melotte 20 Open Cluster
RA 3h 20m Dec 49° 2'
mag 1.2

Centred on Mirfack, Alpha Persei and easily visible to the naked eye this magnificent cluster is best observed using binoculars. The view is that of a multitude of dazzlingly bright blue stars centred on the bright Mirfack. This cluster is rather too large for a telescope but ideal for binoculars.

M39 Open Cluster
RA 21h 32m Dec 48° 26'
mag 4.6

An open cluster with an apparent diameter equal to that of the full moon, it is rather sparsely populated triangular shaped grouping with around 30 magnitude 7 to 9 stars. This like many galactic clusters is an object best enjoyed through binoculars or a low powered telescope.

Peter Burgess

Street lighting, fracking and light pollution – What is facing the Island?

(The following paper has been devised around an article recently printed in the Guardian newspaper.)

Every civilisation we know of has devised a system – scientific, religious, what have you – to make sense of the night sky. The mystery of what's up there, where it came from, and what it means has been inherited and puzzled over for generations. Those questions may be the most human ones we have.

Due to pervasive light pollution – glare from excessive, misaimed and unshielded night lighting – 80% of Europe and North America no longer experiences real darkness. For anyone living near a major metropolis, a satellite image of the Milky Way seems abstract: we understand it to be a document of something true, but our understanding is purely theoretical. In 1994, after a predawn earthquake cut power to most of Los Angeles, the Griffith Observatory received phone calls from spooked residents asking about "the strange sky". What those callers were seeing were stars.

Darkness is a complicated thing to quantify, defined, as it is, by deficiency. In 2001, the amateur astronomer John Bortle devised a scale to help. His classifications range from "inner-city sky" (class 9), in which the only "pleasing telescopic views are the moon, the planets, and a few of the brightest star clusters", to a sky so dark "the Milky Way casts obvious diffuse shadows on the ground" (class 1). Most North Americans and Europeans live under class 6 or 7 skies, in which the Milky Way is undetectable and the sky has been smudged by "a vague, greyish-white hue". In that kind of night, a person can wander outside, unfold a garden chair, open a newspaper, and read the headlines, if not the stories.

"80% of Europe and North America no longer experiences real darkness"

In addition to the Bortle scale, scientists often use photodiode light sensors to measure and compare base levels of darkness by calculating the ***illuminance***[1] of the night sky as perceived by the human eye. Unihedron's Sky Quality Meter is the most popular instrument for this kind of work, in part because it is small enough to fit into your pocket and also because it connects to an online global database of user-submitted data. According to that database, ***Cherry Springs State Park*** – an 82-acre park in a remote swathe of rural Pennsylvania – presently has the second darkest score listed. On the Bortle scale, Cherry Springs usually registers between 1 and 2. In 2008, the ***International Dark-Sky Association*** (IDA), a non-profit organisation that establishes and supports dark-sky preserves around the world, designated it a gold-tier international dark sky park.

Chip Harrison, the Park's manager, said, "Most children, right now, growing up in the US, will never see the Milky Way. You come to a place like Cherry Springs, you'll see four or five thousand[2] stars, maybe more, I've seen people who are fairly serious amateur astronomers, and they can't find their way around this night sky – there are too many stars!"

Nowadays the sanctity of the sky at Cherry Springs is being encroached upon. In the last decade, a handful of energy companies have begun extracting natural gas from underneath Pennsylvania via hydraulic fracturing, or fracking, a much-reviled practice that involves the release of gas or petroleum via a high-pressure injection of fluid through a narrow shaft bored into the ground. In Potter County, where Cherry Springs is located, there are 40 active fracking sites. The work cycle in a gas field is nonstop: energy companies not only rig up colossal, stadium-style spotlights, they also burn off excess gas in open pits or through steel pipes, in a process known as flaring. From afar, a flare resembles a giant blowtorch; clusters of flares are visible on satellite images from space.

The effect that fracking is having on the skies above Cherry Springs is obvious – often gas flares and unshielded drill-site lights are compromising the Park for astronomers. Sky quality meter readings of the night sky brightness started in 2006, and since then, the skies over Cherry Springs have been getting much brighter: when fracking started, sky quality readings went very bad.

The nocturnal world, of course, also generates its own light, and those deviations can affect dark-sky conditions. The National Park Service lists numerous natural sources: moonlight, starlight from individual stars and planets, the

1. *Illuminance is the amount of light striking a surface – also known as incident light, where the "incident" is the beam of light actually landing on the surface. It is calculated as the density of lumens per unit area and is expressed as lux (lumens/square metre)*
2. *Somewhat of an exaggeration since globally there are only around 6000 stars visible without optical aid magnification. From any point on the Earth's surface approximately one third of the sky is visible, hence the number of naked-eye stars will be of the order of 2000 in total.*

Milky Way (also called galactic light, or integrated starlight), zodiacal light (sunlight reflected off dust particles in the solar system), airglow (a faint aurora caused by radiation striking air molecules in the upper atmosphere), wildfire, lightning strikes and meteors. Atmospheric moisture or dust particles can refract or reflect that light, amplifying glow (deserts, for example, are low in moisture but high in dust; forests are the inverse). Air pollution makes it all worse.

In the 17th century, under the reign of the self-described Sun King, Louis XIV, tallow candles fashioned from rendered beef or mutton fat were placed in iron-framed glass boxes and strung above the streets of Paris. Lamplighters wandered the districts of the city at dusk, unlocking the boxes and igniting the wicks. Other places followed Paris's model, and candles eventually gave way to oil and then gas lamps. By 1890, more than 175,000 electric streetlights had been installed in the US; there are now somewhere around 26m, which collectively cost American taxpayers about $6bn in annual energy costs. The idea at its inception was that street lighting would help officials of the state more effectively survey and control city streets after dark. Whether streetlights actually make anyone safer remains a contentious topic among scholars and city planners. Most studies fail to demonstrate an inarguable correlation between street lighting and decreases in traffic accidents or crime, although it feels wilfully obtuse to suggest that taking the dark way home is always just as safe.

"Whether streetlights actually make anyone safer remains a contentious topic"

Street lighting is undeniably pervasive, but it isn't the only culprit of our perpetually bright skies. Light pollution is aggravated by any kind of irresponsibly aimed outdoor lighting: stadium floodlights. Proper shielding and direction can mitigate the glare of these emanations – which can be blinding – and the International Dark-Sky Association publishes guidelines for easily modifying outdoor lighting to be more dark-sky friendly. But in most places, following the association's suggestions is optional. The right to light isn't easily denied, nor circumvented.

In recent years, Chicago, Seattle, Boston, Philadelphia, Detroit and Los Angeles have been swapping the high-pressure sodium bulbs in their streetlights – which produced puddles of gassy, orange-hued light, - for comparably cost-effective LED bulbs. The temperature of sodium bulbs is usually around 2,200 Kelvin, which registers to the eye as warm. LED bulbs burn closer to 4,000 Kelvin and emit an intrusive, bluish glare. If you live in a major American city, it is now virtually impossible to spend any time at all outside and in the dark.

The new LED streetlights are almost universally described as unpleasant. New York is presently in the midst of its own retrofit, a colossal overhaul scheduled to be completed by the end of 2017. The bulbs last longer and will ultimately reduce energy use by up to 75%, according to the US Department of Energy. But after the new bulbs were installed in Windsor Terrace, a residential neighbourhood in Brooklyn, citizens reacted with disbelief. Susan Harder, the New York State representative of the International Dark-Sky Association and a board member of the Montauk Observatory in East Hampton, has been campaigning aggressively against the installation of LED streetlights in New York. "We still think that God lives in the heavens, in part because the sky was so dynamic to ancient cultures," she explained when asked to explain how the problem goes beyond the bulbs themselves. "How could you ignore a changing, moving night sky? It struck them with awe. They attributed all sorts of things to the night sky. We're going to lose that if towns and cities keep installing these LED streetlights."

Ms Harder previously had a career as an art dealer but now works full time as a dark-sky activist. She has a kind of fast-talking, no-nonsense comportment and is, by all accounts, a formidable opponent. In 2006, a New York Times reporter described her as "a virtual one-woman dark-sky mover and shaker", and characterised her particular approach to advocacy as a "combination of sweet talk, cajoling and bullying."

John Langley

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Imaging M16 and the "Pillars of Creation"

Many of us are familiar with the iconic and stunning images from the Hubble telescope and the famous "Pillars of Creation" image has to be one of the most striking.

I'm sure most of you appreciate and entertain that visual astronomy is often the satisfaction of being able to see a smudge that represents something we've seen from Hubble as more glorious and fantastical. We can experience this in real time and the challenge is often light pollution and finding our targets and the enjoyment is mentally connecting the two.

Astro imaging is an extension of this and bridges the gap from the unviewable to something we can capture as our own image. Whilst astro imaging means you will often see even less than visual observers, the reward comes from an image from the nights astronomy session which can be vastly superior in detail and colour than anything we could hope to see with our eyes. The advances in cameras and digital imaging have made this much more accessible to amateurs and at a relatively small cost.

Hubble has been sending us mind blowing images of the universe and the details and knowledge of amazing objects in space has been overwhelming. Many of these are simply not targets we can see visually and are often not something we can reach very well even with expensive telescopes and imaging gear especially the faint and tiny but often crazy objects.

Anyone including astronomers, not knowing too much about the "Pillars of Creation" could be forgiven if they did not know where they were in the sky and if they were actually visible or able to be imaged by mortals. When I first saw the Hubble image of them, I had not even looked through a telescope and assumed they were a Southern Hemisphere object and definitely something only Hubble could give us but of course this is not the case.

The Pillars are the central part of Messier 16 the Eagle Nebula and whilst it does rise to a much higher elevation further south on Earth, it is surprisingly achievable from the UK peaking at a dizzy 25° elevation around its transit. Astro objects do not capture so well at low altitudes due to the atmospheric "crud" so 25° would normally be in the "not worth it zone" however I wanted to see what this could yield.

Capturing M16 has additional issues, as 25° elevation is the peak so it's generally lower when you are imaging it. In addition being so low can encounter neighbouring houses, trees and for me my Observatory wall. This meant that imaging time was restricted to a total of about 1.5 hours a session, which means multiple nights to get enough data to work with. Telescope mount tracking can also be an issue as you will find the scope at near maximum balance which with the heavy equipment I was using can add extra headaches at the long focal length I was using. At a higher elevation there is no reason that enough data could not be captured in one session and with more clarity. So this represents a real investment in available clear nights.

So this is my first attempt at M16. The field of view is only as wide as 1960mm and an APS C size DSLR sensor can offer. The whole of M16 is wider than my image and has more of the Eagle wing shape, however my priority was magnification and the Pillars. Plus the small fact I only have one telescope to choose from!

The M16 region is Hydrogen Alpha light rich so the proper "natural" colour as with any astro target is always debatable but to a colour camera it's all generally very red.

The iconic Hubble Image is based on capturing the light via narrow wavelengths of light known commonly as narrow band imaging. These captures are then arranged in to the normal Red/Green/Blue colour channels needed to make a colour picture in what is referred to as the Hubble Pallet. The wave lengths used are Ha, O3 and S2.

This was initially more of a personal experiment just to see how M16 would come out and then having some fun seeing how the Pillars would compare. I was surprised at home much of the shape, brightness and features remains true and of course in the exact same places and scale.

I have shown a cropped scale comparison of the Pillars in my image with the amazing Hubble capture. I have falsely altered the colours in my image to vaguely mimic that of Hubble. I did not capture as a narrowband on this occasion.

Once you get past the obvious differences of quality I was quite pleased to find the more you look at the Hubble image and then look for the same detail on my capture (albeit it much more "smudgy") just how much is there.

Star sizes are notoriously bigger when astro imaging and the smaller the capture scale the bigger they become or "bloom" comparative to their real scale. One of the main advantages of imaging at a longer focal length is that these are kept smaller. Also when you crop an image you can notice much smaller and insignificant stars. The more insignificant stars in an image crop like this are very satisfying on a comparison as it helps when rotating the image to the same orientation and confirms some really faint light sources and that they are really there of course.

I find that the small and smudge like features on my comparative image are extremely satisfying as they are in the same place and shape contrasts etc. Whilst there is no reason to disbelieve Hubble its weirdly satisfying being able to mimic these albeit at a much less defined level.

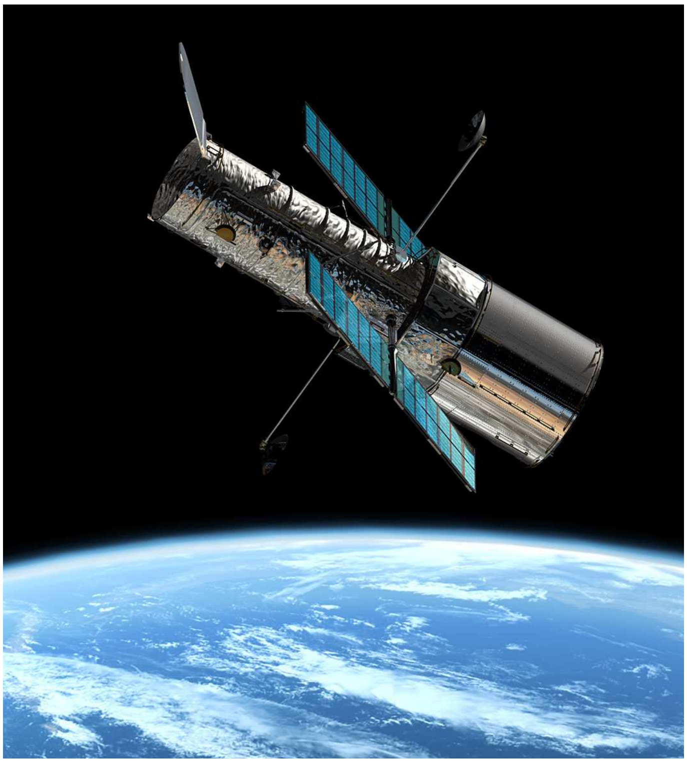
Processing has been kept as real as possible whilst at the same time trying to emphasise the details captured. The colour hues are false as explained earlier, but true in as much as the colour changes in the same places (ie I haven't simply painted them on) which I have tried to make similar purely for comparative effect. I would consider my scope to be fairly amateur and comparable to a modest amateur scope and the camera used is a Canon 700d with just the filters removed which retail at about £300.

Being able to poorly replicate this kind of image in low elevation conditions has been fun especially as the Hubble image is based on 2.5 billion dollars spend. However without the Hubble image we would not be so inspired to capture it or understand the details we can access more cheaply, but being able to capture the essence of it was satisfying.

Gear used

Celestron CGEM DX mount, Celestron HD 11" using a focal reducer F7, 1960 mm, Canon 700d (filters removed), ISO 800, guided via Lodestar X2 on an Off axis guider, 28 images stacked, 8 mins each = Approx 3.75 hours combined.

Simon Plumley
Totland Bay



Teleportation step toward quantum internet

Physicists have set a new bar for quantum teleportation: moving information from one place to another without physically sending anything between the locations.

Two separate teams managed to teleport information across several kilometres of optical fibre network in two cities.

This form of teleportation differs from that depicted in Star Trek: it involves transferring quantum states of a light particle, not Starfleet officers.

But the method offers huge promise.

Teleportation over long distances and across optical fibre networks is an important step towards the ultra-secure communications promised by quantum cryptography.

And the set-ups described in studies published in Nature Photonics journal could be seen as building blocks for a future “quantum internet”.

In one of the papers, Dr Wolfgang Tittel and colleagues describe how they teleported the quantum state of a photon, or light particle, over 8.2km in the Canadian city of Calgary.

The process by which information - the quantum state of a photon - is teleported involves creating two photons at the University of Calgary (site B in the aerial photo).

One of these photons is sent in a “classical” way along 11.1km of optical fibre to a building near Calgary City Hall (C in the photo), while the other remains behind at the university.

Meanwhile, a photon is also sent to the City Hall site from site A (located in the neighbourhood of Manchester). This all results in the quantum state of the photon from site A being transferred to the photon which remained behind at the university (B) through quantum teleportation.

More at: ***http://www.bbc.co.uk/***

What is the Speed of Light?

Since ancient times, philosophers and scholars have sought to understand light. In addition to trying to discern its basic properties (i.e. what is it made of – particle or wave, etc.) they have also sought to make finite measurements of how fast it travels. Since the late-17th century, scientists have been doing just that, and with increasing accuracy.

In so doing, they have gained a better understanding of light's mechanics and the important role it plays in physics, astronomy and cosmology. Put simply, light moves at incredible speeds and is the fastest moving thing in the Universe. Its speed is considered a constant and an unbreakable barrier, and is used as a means of measuring distance. But just how fast does it travel?

Speed of Light (c):

Light travels at a constant speed of 1,079,252,848.8 (1.07 billion) km per hour. That works out to 299,792,458 m/s, or about 670,616,629 mph (miles per hour). To put that in perspective, if you could travel at the speed of light, you would be able to circumnavigate the globe approximately seven and a half times in one second. Meanwhile, a person flying at an average speed of about 800 km/h (500 mph), would take over 50 hours to circle the planet just once.

To put that into an astronomical perspective, the average distance from the Earth to the Moon is 384,398.25 km (238,854 miles). So light crosses that distance in about a second. Meanwhile, the average distance from the Sun to the Earth is ~149,597,886 km (92,955,817 miles), which means that light only takes about 8 minutes to make that journey.

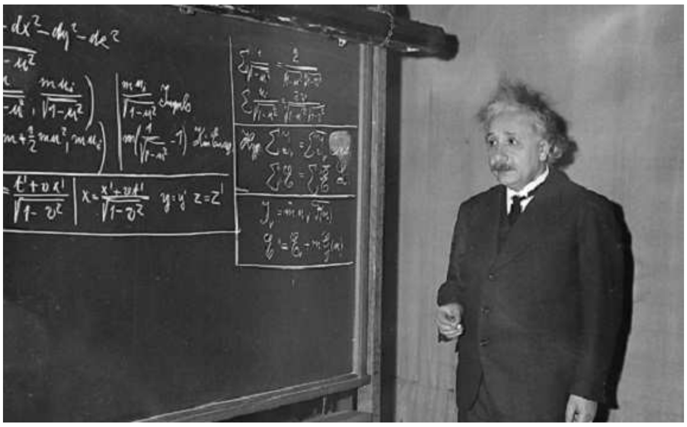
Little wonder then why the speed of light is the metric used to determine astronomical distances. When we say a star like Proxima Centauri is 4.25 light years away, we are saying that it would take – traveling at a constant speed of 1.07 billion km per hour (670,616,629 mph) – about 4 years and 3 months to get there. But just how did we arrive at this highly specific measurement for "light-speed"?

History of Study:

Until the 17th century, scholars were unsure whether light travelled at a finite speed or instantaneously. From the days of the ancient Greeks to medieval Islamic scholars and scientists of the early modern period, the debate went back and forth. It was not until the work of Danish astronomer Øle Rømer (1644-1710) that the first quantitative measurement was made.

In 1676, Rømer observed that the periods of Jupiter's innermost moon Io appeared to be shorter when the Earth was approaching Jupiter than when it was receding from it. From this, he concluded that light travels at a finite speed, and estimated that it takes about 22 minutes to cross the diameter of Earth's orbit.

Prof. Albert Einstein uses the blackboard as he delivers the 11th Josiah Willard Gibbs lecture at the meeting of the American Association for the Advancement of Science in the auditorium of the Carnegie Institute of Technology Little Theater at Pittsburgh, Pa., on Dec. 28, 1934. Using three symbols, for matter, energy and the speed of light respectively, Einstein offers additional proof of a theorem propounded by him in 1905 that matter and energy are the same thing in different forms.



Prof. Albert Einstein delivering the 11th Josiah Willard Gibbs lecture at the Carnegie Institute of Technology on Dec. 28th, 1934, where he expounded on his theory of how matter and energy are the same thing in different forms.

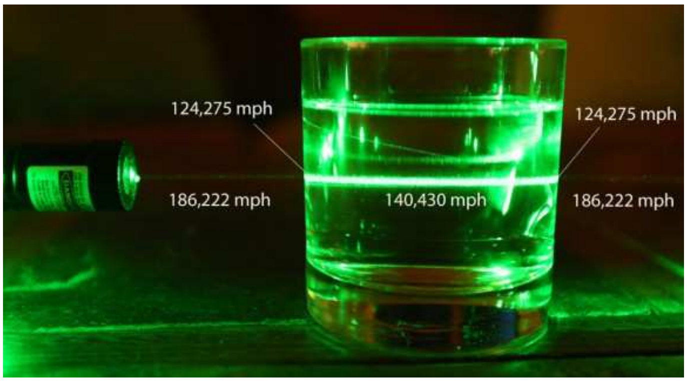
Christiaan Huygens used this estimate and combined it with an estimate of the diameter of the Earth's orbit to obtain an estimate of 220,000 km/s. Isaac Newton also spoke about Rømer's calculations in his seminal work Opticks (1706). Adjusting for the distance between the Earth and the Sun, he calculated that it would take light seven or eight minutes to travel from one to the other. In both cases, they were off by a relatively small margin.

Later measurements made by French physicists Hippolyte Fizeau (1819 – 1896) and Léon Foucault (1819 – 1868) refined these measurements further – resulting in a value of 315,000 km/s (192,625 mi/s). And by the latter half of the 19th century, scientists became aware of the connection between light and electromagnetism.

This was accomplished by physicists measuring electromagnetic and electrostatic charges, who then found that the numerical value was very close to the speed of light (as measured by Fizeau). Based on his own work, which showed that electromagnetic waves propagate in empty space, German physicist Wilhelm Eduard Weber proposed that light was an electromagnetic wave.

The next great breakthrough came during the early 20th century/ In his 1905 paper, titled "On the Electrodynamics of Moving Bodies", Albert Einstein asserted that the speed of light in a vacuum, measured by a non-accelerating observer, is the same in all inertial reference frames and independent of the motion of the source or observer.

A laser shining through a glass of water demonstrates how many changes in speed it undergoes - from 186,222 mph in air to 124,275 mph through the glass. It speeds up again to 140,430 mph in water, slows again through glass and then speeds up again when leaving the glass and continuing through the air.



A laser shining through a glass of water demonstrates how many changes in speed (in mph) it undergoes as it passes from air, to glass, to water, and back again.

Using this and Galileo's principle of relativity as a basis, Einstein derived the Theory of Special Relativity, in which the speed of light in vacuum (c) was a fundamental constant. Prior to this, the working consensus among scientists held that space was filled with a "luminiferous aether" that was responsible for its propagation – i.e. that light traveling through a moving medium would be dragged along by the medium.

This in turn meant that the measured speed of the light would be a simple sum of its speed through the medium plus the speed of that medium. However, Einstein's theory effectively made the concept of the stationary aether useless and revolutionized the concepts of space and time.

Not only did it advance the idea that the speed of light is the same in all inertial reference frames, it also introduced the idea that major changes occur when things move close the speed of light. These include the time-space frame of a moving body appearing to slow down and contract in the direction of motion when measured in the frame of the observer (i.e. time dilation, where time slows as the speed of light approaches).

His observations also reconciled Maxwell's equations for electricity and magnetism with the laws of mechanics, simplified the mathematical calculations by doing away with extraneous explanations used by other scientists, and accorded with the directly observed speed of light.

During the second half of the 20th century, increasingly accurate measurements using laser inferometers and cavity resonance techniques would further refine estimates of the speed of light. By 1972, a group at the US National Bureau of Standards in Boulder, Colorado, used the laser inferometer technique to get the currently-recognized value of 299,792,458 m/s.

More info at: ***http://www.universetoday.com/***

China space station to fall to Earth in 2017

China's first space station is expected to fall back to Earth in the second half of 2017, amid speculation authorities have lost control of it.

The Tiangong-1 or "Heavenly Palace" laboratory was launched in 2011 as part of an ambitious Chinese plan to catch up with other space powers.

However, a senior space official has said the lab had "comprehensively fulfilled its historical mission".

The lab is currently intact and orbiting at 370km above ground.

Speaking at a press conference last week, Wu Ping, deputy director of the manned space engineering office, said: "Based on our calculation and analysis, most parts of the space lab will burn up during falling."

More at: ***http://www.bbc.co.uk/***

THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

Alien life? Maybe not, but NASA says there's 'surprising activity' on Europa

NASA will hold a press conference Monday (26th Sept) on what is being billed as "surprising evidence of activity" — and the possible discovery of a subsurface ocean — on Europa, one of Jupiter's moons. While details are scant, a team of researchers is expected to unveil a set of images taken by the Hubble Space Telescope showing this activity.

While there has been speculation that this might be an announcement of the discovery of alien life, it likely is not. The presence of a subsurface ocean would definitely move Europa to the top of the list of potential candidates for the presence of such life, however.

Astronomers have long speculated that if there's any chance of life in our solar system, it's likely to be found on one of Jupiter's moons. Europa's icy crust has long led scientists to suspect a liquid ocean underneath, but Saturn moon Titan — the only moon known to have a dense atmosphere — is certainly another candidate.

Square Kilometre Array prepares for the ultimate big data challenge

The world's most powerful radio telescope will collect more information each day than the entire internet. Major advances in computing are required to handle this data, but it can be done, says Bernie Fanaroff, strategic advisor for the SKA

The Square Kilometre Array (SKA), the world's most powerful telescope, will be ready from day one to gather an unprecedented volume of data from the sky, even if the supporting technical infrastructure is yet to be built.

"We'll be ready – the technology is getting there," Bernie Fanaroff, strategic advisor for the most expensive and sensitive radio astronomy project in the world, told Science Business.

Construction of the SKA is due to begin in 2018 and finish sometime in the middle of the next decade. Data acquisition will begin in 2020, requiring a level of processing power and data management know-how that outstretches current capabilities.

More at: ***http://www.sciencebusiness.net/***

China's giant space telescope starts search for alien life

The world's largest telescope will be completed this week in China and it has scientists very, very excited.

With a whopping 1,640 ft (500m) wide dish the size of 30 football fields, the telescope will able to detect radio signals - and potentially signs of life - from distant planets.

More at: ***http://edition.cnn.com/***

Observatory

When visiting the VAS observatory, for your own safety, please bring a torch. Also, please make sure you close and lock the car park gate if you are the last to leave - if you need the combination to the lock, please contact a member of the committee.

Articles Needed

New Zenith needs letters, articles, reviews or pictures related to astronomy. Contributions to the Editor at the email or postal address on the front page.

"What's the matter?
What's the antimatter?
Does it antimatter?"
Wes Nisker

"What does what we know or don't know have to do with the laws that govern the world?"
Carlo Rovelli

"Time becomes meaningless without memory"
Jon Edgell

"Light brings us the news of the Universe"
William Henry Bragg