

Society News

Committee

This issue is the last before our AGM in August. We really need extra members to join the committee.

We **urgently** need volunteers as:

1. Secretary
2. Programme Organiser
3. Dark Skies representative

and I'm pretty sure some other Committee Members could do with a break!

Please, give us a hand and help even if it's just for a year.

Garlic Festival



There will be a different regime for marshalling at the Garlic Festival this year which unfortunately means that VAS is providing just a few volunteers.

Over the last few years, marshalling the Festival has provided a substantial boost to VAS funds - *roughly equivalent to an additional 40 adult members* - so this change will have quite an effect on us.

We will still have a stand on site for both days and we need members to help with that.

Please contact me if you can spare a few hours on either day - *Saturday 15th and Sunday 16th August.*

*Brian Curd
Editor New Zenith.*

VAS Website: wightastronomy.org

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

The Editor New Zenith
75 Hefford Road
East Cowes
Isle of Wight PO32 6QU

Tel: **01983 296128** or email: editor@wightastronomy.org

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

VAS Registered Office

75 Hefford Road, East Cowes, Isle of Wight, PO32 6QU

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

Registered Charity No 1046091

Observatory Diary

Monday, 19.30hrs	Members Only by arrangement Telescope and night sky training. Contact Barry Bates 01983 872979
Thursday, 19.30hrs	Members and Public. Informal meeting and observing

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2015

Date	Subject	Speaker
24 Jul	Light - Astronomical Applications of Spectroscopy	James Fradgley
28 Aug	Astro Photography and AGM	Simon Plumley
25 Sep	Photographing the Aurora	Elizabeth Cunningham
23 Oct	EUCLID and the Expanding Universe	Tom Kitching
27 Nov	TBA	James Fradgley

Please check wightastronomy.org/meetings/ for the latest information

Telescope Training

Any member who would like training on the observatory Meade LX200 should contact **Barry Bates on 872979**

Observatory Visits Booked

None

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

Astronomers aren't anti-light

We just want:

***The right light
In the right place
At the right time***

**VAS Contacts
2014/15**

President	Barry Bates president@wightastronomy.org
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Others	Mark Williams & Nigel Lee

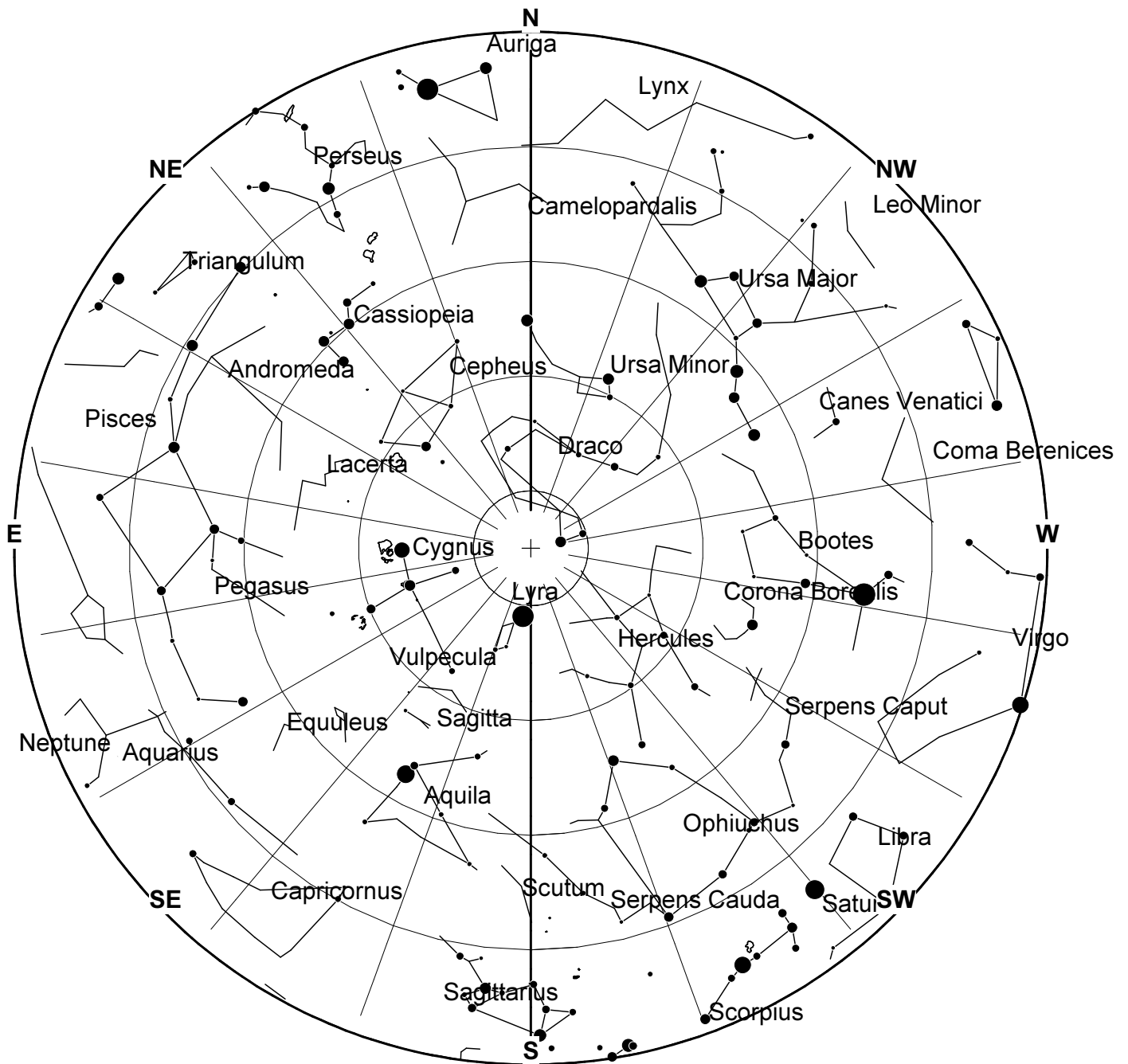
Important

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

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

When you leave the observatory please ensure it is secure and all lights, heaters and telescopes are **TURNT OFF.**

August 2015 Sky Map



View from Newchurch Isle of Wight UK - 2200hrs - 15 August 2015







Pluto (minor-planet designation: 134340 Pluto) is a dwarf planet in the Kuiper belt, a ring of bodies beyond Neptune. It was the first Kuiper belt object to be discovered. It is the largest and second-most-massive known dwarf planet in the Solar System and the ninth-largest and tenth-most-massive known object directly orbiting the Sun. It is the largest known trans-Neptunian object by volume but is less massive than Eris, a dwarf planet in the scattered disc. Like other Kuiper belt objects, Pluto is primarily made of ice and rock and is relatively small - about one-sixth the mass of the Moon and one-third its volume. It has a moderately eccentric and inclined orbit during which it ranges from 30 to 49 astronomical units (4.4–7.3 billion km) from the Sun. This means that Pluto periodically comes closer to the Sun than Neptune, but a stable orbital resonance with Neptune prevents them from colliding. In 2014, Pluto was 32.6 AU from the Sun. Light from the Sun takes about 5.5 hours to reach Pluto at its average distance (39.4 AU)

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It uses material from the Wikipedia article "Pluto".

August 2015 Night Sky

Moon Phases

New	First Qtr	Full	Last Qtr
			
Aug 14th	Aug 22nd	Aug 27th	Aug 7th

Planets

Mercury

Late summer onwards is not a good time for observing solar system objects in the evening sky. This month sees Mercury making a rather poor evening apparition; it is at best only about 5 degrees above the horizon at sunset. It has a close conjunction with Jupiter on the 6th and 7th, but because they are both so close to the horizon it will be difficult to see even with a clear western horizon and good weather conditions.

On the 16th the moon passes a few degrees to the south.

Venus

Venus is in conjunction with the Sun becoming visible again in the pre dawn sky during the last few days of the month.

Mars

Look for Mars low down in the eastern sky before dawn below the twin stars Castor and Pollux in Gemini. On the 20th and 21st it passes through the Beehive cluster M44 in Cancer.

It will remain a tiny object low in the morning sky until the end of the year.

Jupiter

From our perspective, this month sees Jupiter pass behind the Sun. It makes a re-appearance in the morning sky during September.

Saturn

Saturn is not well placed for observation this month. It can be seen low in the southwest slipping below the horizon between 2 and 3 hours after sunset.

Uranus

Uranus close to Epsilon Piscium, The finder chart opposite shows the path of the planet until the end of the year. Stars are plotted down to about magnitude 8.

Neptune

Neptune can be found using binoculars or a telescope between Lambda and Sigma Aquarii. The finder chart shows stars to about magnitude 9, noticeably fainter than Neptune.

Deep Sky

M24 Sagittarius Star Cloud

RA 18h 16m Dec -18° 43'

This object is big! Eight times the area of the full moon. It is an object full of objects, open clusters, dark nebulae and even a planetary nebula. Use any optical aid you have, binoculars for wide field views and a telescope for closer examination. This is one of, if not the best star fields in the galaxy; don't miss it.

Stock 1 Open Cluster

RA 19h 36m Dec 25° 13' mag 5.3

A little over a fingers width east of Alpha Vulpeculae lays a large misty patch of the Milky Way. This is Stock 1, a rich open cluster where the brighter stars are rather spread out floating over a misty haze of the dimmer cluster members and background Milky Way. Although this cluster is a nice sight in binoculars it does not give its best; a small telescope using magnification up to about 60 gives a much better view. The brighter stars tend to form angular patterns rather than the more 'normal' curved chains.

NGC7207 Planetary Nebula

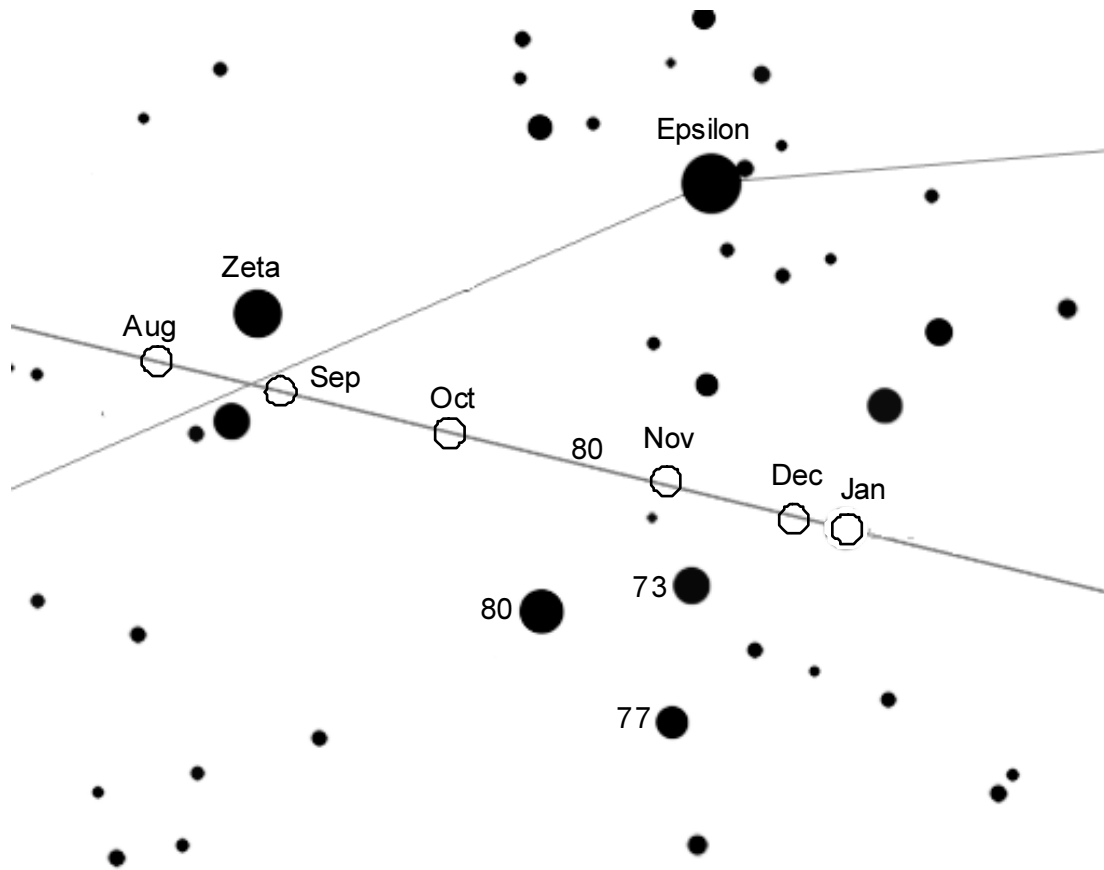
RA 21h 7m Dec 42° 16' Mag 8.5

This is a small rectangular shaped planetary nebula that is more difficult to see than its magnitude would imply. It is a better target for visual observers with larger telescopes or those with CCD cameras.

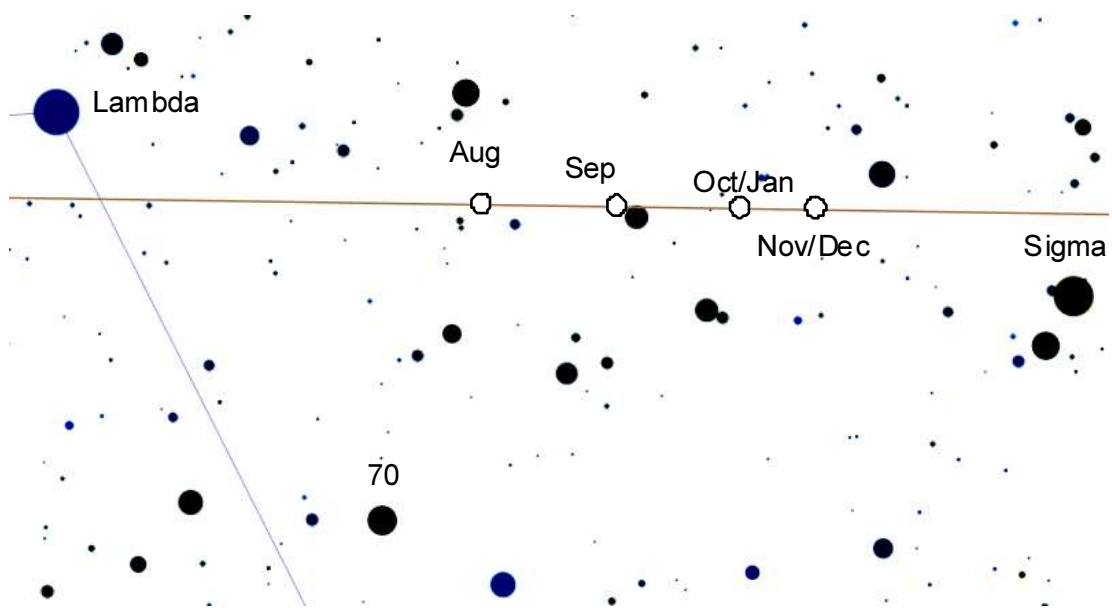
Meteors

The peak of the Perseids meteor shower is predicted to be around 0700 on the morning of the 13th. Although the night of the 12/13th should be the best night for observation a few days either side will still have more meteors than usual. They can appear anywhere but appear to radiate from a point in the sky close to the star Eta Persei. Those seen close to the radiant will be rather small, so look 45 degrees or more away to see longer trails.

Peter Burgess



Path of Uranus through Pisces August 2015 to Jan 2016



Path of Neptune through Aquarius August 2015 to Jan 2016

The Kuiper Belt and Pluto

The Kuiper belt, is a region of the Solar System beyond the planets, extending from the orbit of Neptune (at 30 AU) to approximately 50 AU from the Sun. It is similar to the asteroid belt, but it is far larger - 20 times as wide and 20 to 200 times as massive. Like the asteroid belt, it consists mainly of small bodies, or remnants from the Solar System's formation. Although many asteroids are composed primarily of rock and metal, most Kuiper belt objects are composed largely of frozen volatiles (termed "ices"), such as methane, ammonia and water. The Kuiper belt is home to three officially recognized dwarf planets: Pluto, Haumea, and Makemake. Some of the Solar System's moons, such as Neptune's Triton and Saturn's Phoebe, are also believed to have originated in the region.

The Kuiper belt was named after Dutch-American astronomer Gerard Kuiper, though he did not actually predict its existence. In 1992, 1992 QB1 was discovered, the first Kuiper belt object (KBO) since Pluto. Since its discovery, the number of known KBOs has increased to over a thousand, and more than 100,000 KBOs over 100 km (62 mi) in diameter are believed to exist. The Kuiper belt was initially thought to be the main repository for periodic comets, those with orbits lasting less than 200 years. However, studies since the mid-1990s have shown that the belt is dynamically stable, and that comets' true place of origin is the scattered disc, a dynamically active zone created by the outward motion of Neptune 4.5 billion years ago; scattered disc objects such as Eris have extremely eccentric orbits that take them as far as 100 AU from the Sun.

The objects within the Kuiper belt, together with the members of the scattered disc and any potential Hills cloud or Oort cloud objects, are collectively referred to as trans-Neptunian objects (TNOs).

Pluto is likely the largest and most-massive member of the Kuiper belt and the largest and the second-most-massive known TNO, surpassed only by Eris in the scattered disc. Originally considered a planet, Pluto's status as part of the Kuiper belt caused it to be reclassified as a dwarf planet in 2006. It is compositionally similar to many other objects of the Kuiper belt, and its orbital period is characteristic of a class of KBOs, known as "plutinos".

History

After the discovery of Pluto in 1930, many speculated that it might not be alone. The region now called the Kuiper belt was hypothesized in various forms for decades. It was only in 1992 that the first direct evidence for its existence was found. The number and variety of prior speculations on the nature of the Kuiper belt have led to continued uncertainty as to who deserves credit for first proposing it.

Structure

Dust in the Kuiper belt creates a faint infrared disc. At its fullest extent, including its outlying regions, the Kuiper belt stretches from roughly 30 to 55 AU. However, the main body of the belt is generally accepted to extend from the 2:3 resonance (see below) at 39.5 AU to the 1:2 resonance at roughly 48 AU. The Kuiper belt is quite thick, with the main concentration extending as much as ten degrees outside the ecliptic plane and a more diffuse distribution of objects extending several times farther. Overall it more resembles a torus or doughnut than a belt. Its mean position is inclined to the ecliptic by 1.86 degrees.

The presence of Neptune has a profound effect on the Kuiper belt's structure due to orbital resonances. Over a timescale comparable to the age of the Solar System, Neptune's gravity destabilises the orbits of any objects that happen to lie in certain regions, and either sends them into the inner Solar System or out into the scattered disc or interstellar space. This causes the Kuiper belt to possess pronounced gaps in its current layout, similar to the Kirkwood gaps in the asteroid belt. In the region between 40 and 42 AU, for instance, no objects can retain a stable orbit over such times, and any observed in that region must have migrated there relatively recently.

Pluto

The discovery of these large KBOs in similar orbits to Pluto led many to conclude that, bar its relative size, Pluto was not particularly different from other members of the Kuiper belt. Not only did these objects approach Pluto in size, but many also possessed satellites, and were of similar composition (methane and carbon monoxide have been found both on Pluto and on the largest KBOs). Thus, just as Ceres was considered a planet before the discovery of its fellow asteroids, some began to suggest that Pluto might also be reclassified.

The issue was brought to a head by the discovery of Eris, an object in the scattered disc far beyond the Kuiper belt, that is now known to be 27% more massive than Pluto.[82] In response, the International Astronomical Union (IAU), was forced to define what a planet is for the first time, and in so doing included in their definition that a planet must have "cleared the neighbourhood around its orbit". As Pluto shared its orbit with so many KBOs, it was deemed not to have cleared its orbit, and was thus reclassified from a planet to a member of the Kuiper belt.

Although Pluto is currently the largest KBO, there are two known larger objects currently outside the Kuiper belt that probably originated in it. These are Eris and Neptune's moon Triton (which, as explained above, is probably a captured KBO).

There's a lot more at: <http://wikipedia.org>

Advertising in NZ

If you would like to advertise in New Zenith, you can have a space like this for £50 per year

Only four slots are available

Artwork can be created or you can supply it.

Don't forget that member's who take the electronic version see a full colour version

Contact the Editor for information

Details on the Front Page

Totland Stargazing

We are organising a Stargazing evening for 45 Phd students from Southampton University at the Youth Hostel in Totland on Monday 21st Sept

A draft itinerary is:

7.00pm BBQ and set up scopes.

8.30pm Brian to do a start up talk and intro to the sky

9.00pm Start observing

We need lots of members with scopes, so please let me know if you are willing and able to help

Elaine Spear

elainespear1@gmail.com

August AGM

Please consider joining the VAS Committee

We **urgently** need volunteers as:

1. *Secretary*
2. *Programme Organiser*
3. *Dark Skies representative*

and I'm pretty sure some other Committee Members could do with a break!

VAS needs the full support of its members to carry on, so please consider helping, even if it's just for a year.

There is a nomination form on the other side of this page so please get involved.

**Island Planetarium
@Fort Victoria**

The Island's Telescope Professionals

Photo Perfection

TAL 200mm Klevtsov-Cassegrain OTA
£750 ono

Deep Sky & Planetary Delights

Skywatcher 180mm Maksutov OTA
£600 ono

+

EQ5 mount and drives - £200

ETX 's & various scopes

Call Paul England, VAS member

on 07771550893

VAS Officers and Committee Nominations 2015/16

For those wishing to stand for election at the AGM of the Society to be held on Friday 28th August 2015 at 7.00pm.

Name and Address of Nominee:

Standing for

- Chairman
- Treasurer.....
- Secretary
- Observatory Director.....
- Membership Secretary.....
- Programme Organiser.....
- Committee

Proposed by:

Seconded by:

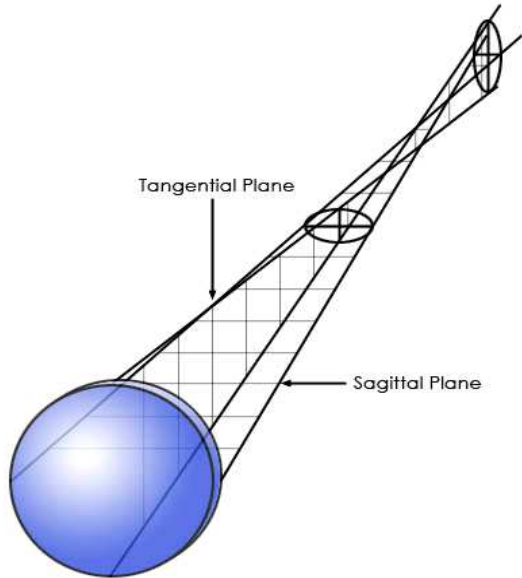
Signature of Nominee:.....

Notes

- The Committee meets once each month usually on a Thursday evening before the usual club night.
- No person can be elected to more than one position.
- Only adult fully paid-up members may stand for election (or propose or second).
- All completed nomination forms to be received by the Secretary at least 7 days before the AGM.
- The Committee consists of not less than six members.

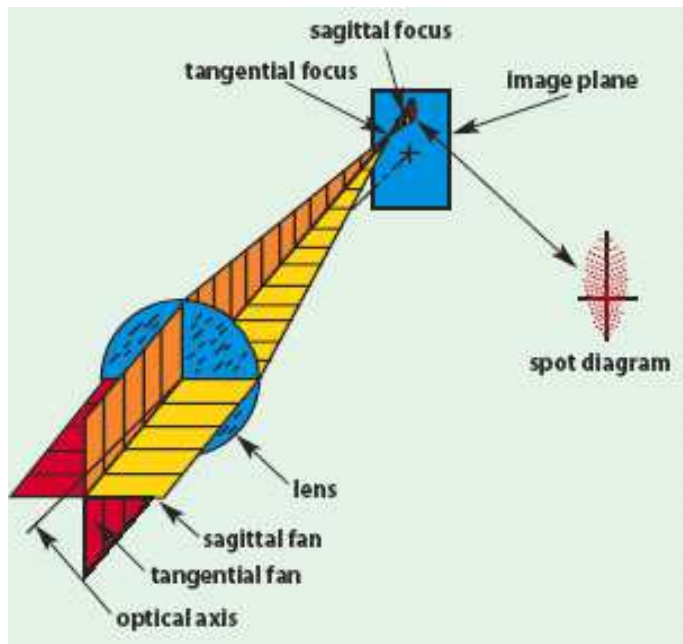
Astigmatism

Understanding how astigmatism arises can be somewhat difficult, and it is probably the most difficult aberration to correct. An optical system has two planes, the sagittal and the tangential planes - perpendicular to each other.



Astigmatism occurs when light rays entering the lens in the Sagittal plane are focused at a different place along the optical axis than light rays entering in the tangential plane.

A point of light therefore becomes spread out to some degree in the shape of an ellipse. In other words, perpendicular light rays do not have the same focal distance along the optical axis.



This manifests in the image of a point source appearing as a line or ellipse instead of a discrete point.

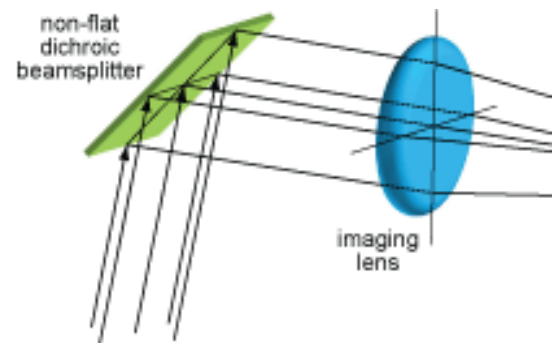
Imagine then that the telescope has a different power (focal length) in each plane. For example, the telescope may focus closer along the tangential plane and further along the sagittal plane.

This effectively creates two focal surfaces, one corresponding to each plane. Seen from the side, as in a normal optical diagram, the two focal surfaces are normally curved.

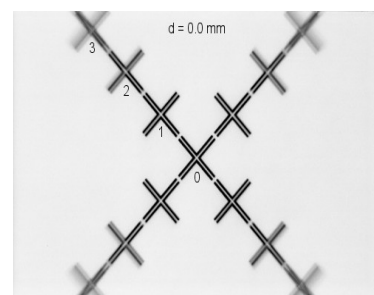
“Best focus” is located approximately midway between the sagittal and tangential focal points, and produces an approximately circular image of a point source as it contains the tangential and sagittal aberrations in equal proportions. This zone is known as the circle of least confusion, and is positioned between the tangential and sagittal line images.

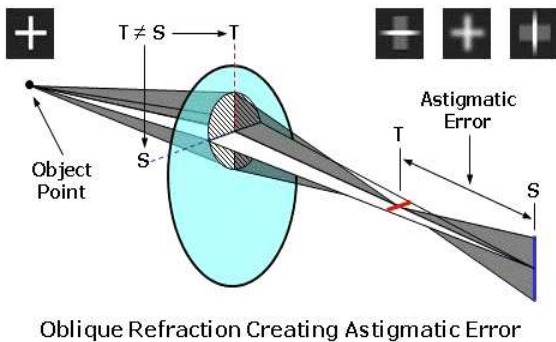


If we think of an image as a spoked wheel centred on the optical axis, the rim of the wheel is in focus in the tangential surface, while the spokes of the wheel are in focus at the sagittal surface.



Likewise if an optical system with astigmatism is used to form an image of a cross, the vertical and horizontal lines will be in sharp focus at two different distances, so one line on the cross will appear blurred.



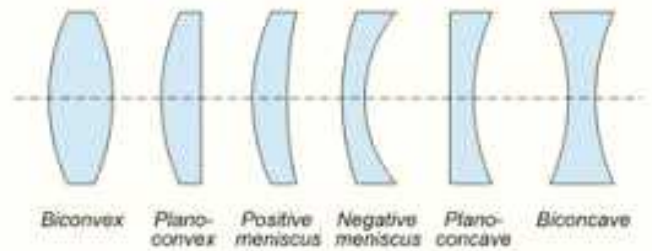


Oblique Refraction Creating Astigmatic Error

This discrepancy in focal length is a measure of the astigmatism and will depend on the inclination angle of the light rays and the lens power. As an object's light source moves further off-axis, rays enter the lens at a more oblique angle, travelling through the thick part off the lens and resulting in larger focal length differences.

differing shaped lenses (see the image below) and indices of refraction.

Many systems will need a corrector lens.



Telescope designs with Astigmatism

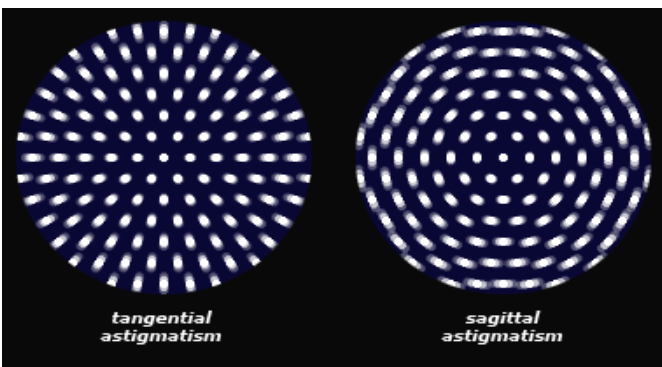
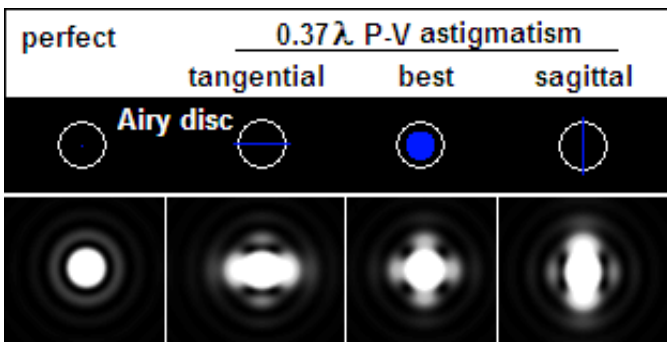
The most popular telescope with this aberration is the Ritchey-Chrétien (RC). RCs trade coma for astigmatism for the purpose of positional measurements: hence their popularity among professional astronomers. The Hubble Space Telescope and many other large professional telescopes are RCs. These designs have become popular with advanced amateur astronomers for CCD imaging, but for the purposes of pretty pictures there is little advantage to astigmatism over coma. In fact, the preference would be to not have either aberration. For this reason most RCs employ a correcting lens to eliminate the residual astigmatism.

Astigmatism aberrations are found at the outer portions of the field of view in uncorrected lenses, and cause the ideal circular point image (Airy pattern) to blur into a diffuse circle, elliptical patch, or line.

Telescope designs free from Astigmatism

Most good quality telescope designs are free from noticeable astigmatism. Parabolic mirrors such as those used in Newtonians do not suffer from astigmatism. Also, most two-mirror Cassegrain telescopes are designed specifically to eliminate astigmatism; however, these designs suffer instead from coma.

Many eyepiece designs, especially inexpensive wide-field designs, suffer from fair amounts of astigmatism. Often the poor edge quality seen in many wide-field eyepieces is attributed to coma in the telescope design, while it is actually the result of astigmatism in the eyepiece. Fancier wide-field designs eyepieces are designed to minimize eyepiece astigmatism and hence sharpen stars at the edge of the field.



Astigmatism causes stars to appear as lines, crosses, or squares at the edge of the field. It is the most significant problem with wide-angle eyepieces, especially with low-f/number telescopes. Using a Barlow lens with the eyepiece will often suppress astigmatism dramatically.

In less expensive telescopes, astigmatism is often the result of poorly centred, misaligned or misassembled lenses. The correction of astigmatism is often accomplished by precise spacing of a lens system of

Elaine Spear

Next Month: Distortion

Getting older

The summer evenings are, for the most part, very pleasant however they do emphasize a vision problem that we older astronomers all seem to suffer from.

“Floaters” are a pain and they seem to show up much more clearly against a plain blue sky. I decided to find out a little more about them:

Floaters are deposits of various size, shape, consistency, refractive index, and motility within the eye's vitreous humour, which is normally transparent. At a young age, the vitreous is transparent, but as one ages, imperfections gradually develop. The common type of floater, which is present in most persons' eyes, is due to degenerative changes of the vitreous humour. The perception of floaters is known as myodesopsia, or less commonly as myodaeopsia, myiodeopsia, myiodesopsia. They are also called *Muscae volitantes* (Latin: “flying flies”), or *mouches volantes* (from the French). Floaters are visible because of the shadows they cast on the retina or refraction of the light that passes through them, and can appear alone or together with several others in one's visual field. They may appear as spots, threads, or fragments of cobwebs, which float slowly before the observer's eyes.



Simulated image of floaters against a blue sky

Signs and symptoms

Eye floaters are suspended in the vitreous humour, the thick fluid or gel that fills the eye. The vitreous humour, or vitreous body, is a jelly-like, transparent substance that fills a majority of the eye. It lies within the vitreous chamber behind the lens, and is one of the four optical components of the eye. Thus, floaters follow the rapid

motions of the eye, while drifting slowly within the fluid. When they are first noticed, the natural reaction is to attempt to look directly at them. However, attempting to shift one's gaze toward them can be difficult as floaters follow the motion of the eye, remaining to the side of the direction of gaze. Floaters are, in fact, visible only because they do not remain perfectly fixed within the eye. Although the blood vessels of the eye also obstruct light, they are invisible under normal circumstances because they are fixed in location relative to the retina, and the brain “tunes out” stabilized images due to neural adaptation. This stabilization is often interrupted by floaters, especially when they tend to remain visible.

Floaters are particularly noticeable when looking at a blank surface or an open monochromatic space, such as blue sky. Despite the name “floaters”, many of these specks have a tendency to sink toward the bottom of the eyeball, in whichever way the eyeball is oriented; the supine position (looking up or lying back) tends to concentrate them near the fovea, which is the center of gaze, while the textureless and evenly lit sky forms an ideal background against which to view them. The brightness of the daytime sky also causes the eyes' pupils to contract, reducing the aperture, which makes floaters less blurry and easier to see.

Floaters not present at birth may disappear within weeks or months. They are not uncommon, and do not cause serious problems for most persons; they represent one of the most common presentations to hospital eye services. A survey of optometrists in 2002 suggested that an average of 14 patients per month per optometrist presented with symptoms of floaters in the UK. However, floaters are more than a nuisance and a distraction to those with severe cases, especially if the spots seem to constantly drift through the field of vision. The shapes are shadows projected onto the retina by tiny structures of protein or other cell debris discarded over the years and trapped in the vitreous humour. Floaters can even be seen when the eyes are closed on especially bright days, when sufficient light penetrates the eyelids to cast the shadows. It is not, however, only elderly persons who are troubled by floaters; they can also become a problem to younger people, especially if they are myopic. They are also common after cataract operations or after trauma.

Floaters are able to catch and refract light in ways that somewhat blur vision temporarily until the floater moves to a different area. Often they trick persons who are troubled by floaters into thinking they see something out of the corner of their eye that really is not there. Most persons come to terms with the problem, after a time, and learn to ignore their floaters.

More at: <http://wikipedia.org>

THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

Websites

Just a few sites I visit fairly regularly:

I particularly like the stuff under the "Science" menu option.	http://astronomyonline.org/
The Sloan Digital Sky Survey has created the most detailed 3D maps of the Universe ever made.	http://www.sdss.org/
If you don't get lost on this site you must be doing something wrong!	http://www.nasa.gov/
Celebrating space exploration, innovation, and discovery with daily news and analysis of space science discoveries, spaceflight, and the technology behind it.	http://www.space.com/
Over 2,000,000 pages covering the vast ideological spectrums of space, science, health, and technology.	http://www.redorbit.com/

Is there anybody out there?

Internet investor Yuri Milner yesterday (20th July) announced the Breakthrough Listen project with Stephen Hawking, Martin Rees, Frank Drake, Ann Druyan and Geoff Marcy at The Royal Society in London, a \$100 million Breakthrough Prize Initiative to dramatically reinvigorate the search for intelligent life in the



universe over the next ten years. This is the biggest scientific search yet for signs of intelligent life beyond Earth.

Lick Observatory's Automated Planet Finder (APF) Telescope above San Jose, California, will undertake a new deep and broad search for optical laser transmissions from nearby civilisations, if any exist.

The APF is the newest telescope at Lick Observatory. It consists of a 2.4-metre automated telescope and enclosure, and the high-resolution Levy spectrograph. It operates robotically on every clear night of the year; its main emphasis to date has been on discovering and characterising extrasolar planets.

More at: <http://astronomynow.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 all aspects of astronomy.

Contributions to the Editor at the email or postal address on the front page.

"I had the ambition to not only go farther than man had gone before, but to go as far as it was possible to go"

Captain Cook

"Two things inspire me to awe - the starry heavens above and the moral universe within"

Albert Einstein

"Physicists are made of atoms. A physicist is an attempt by an atom to understand itself"

Michio Kaku

"The aeroplane will never fly"

Lord Haldane