New Zenith

The Monthly Newsletter of the Vectis Astronomical Society

Vol 24 Issue 1 — February 2016 *When Printed, this Newsletter costs VAS at least £1*

Society News

Well, it's 2016 (Happy New Year!) and is the first issue in the 24th Volume of New Zenith. I'll start 2016 as I do most years by asking for help. VAS and New Zenith depend on the input from members to keep things fresh and moving forward.

It looks as if the weather is improving so, if you haven't been along to the observatory for a while, please come and join us on a Thursday evening.

Also, please note that February's meeting is a "*bring a friend*" event, so it would be great if we had to put a lot more chairs out! **Please make an extra effort to attend and introduce somebody new to astronomy.**

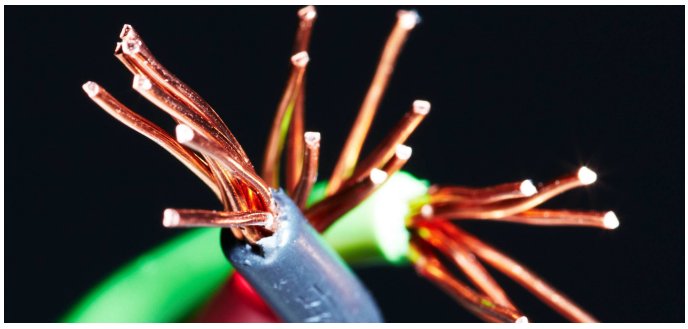
Programme Organiser

Paul England has generously volunteered to help Elaine Spear in the role of Programme Organiser. Thanks Paul, I hope you don't find things to onerous!

The programme for 2016 (See "2016 Monthly Meetings" on page 2.), is looking good with just 2 gaps.

Our monthly meetings are a great chance to meet with other members and to hear talks by excellent speakers. Please try to come to some of this years meetings as the recent decline in attendance is rather disappointing.

Electrician Needed



Anyone know a qualified electrician? Get in touch as we need help with a few wiring 'issues' at the observatory. The work needs to be completed as soon as possible.

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

Registered Charity No 1046091

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		
22 Jan	100 years of General Relativity: from Mercury precession and bending of light to black holes and gravitational waves	Dr Marco Bruni
26 Feb	Basket Balls and Beyond ***Bring a Friend***	Jane A Green
25 Mar	Death From Space	Ninian Boyle
22 Apr	Astronomy on the Tablet	Dr Lilian Hobbs
27 May	Meteors	Richard Kacerek
24 Jun	***TBA***	***TBA***
22 Jul	ESA EUCLID Mission Latest Update	Dr Tom Kitching
26 Aug	AGM Starts at 7pm sharp William Herschel and the Rings of Uranus	Dr Stuart Eves
23 Sep	Galaxy Formation	Prof Chris Lintott
28 Oct	Radiation protection in space (for manned missions)	Dr Elizabeth Cunningham
25 Nov	***TBA***	***TBA***

Observatory Visits Booked

26th Jan - 1700-1930	1st Ryde Beavers
It would be appreciated if members could avoid using the observatory at these times.	

VAS Contacts 2014/15

President	Barry Bates president@wightastronomy.org
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Membership Secretary	Norman Osborn members@wightastronomy.org
NZ Distribution	Brian Bond distribution@wightastronomy.org
Others	Mark Williams & Nigel Lee

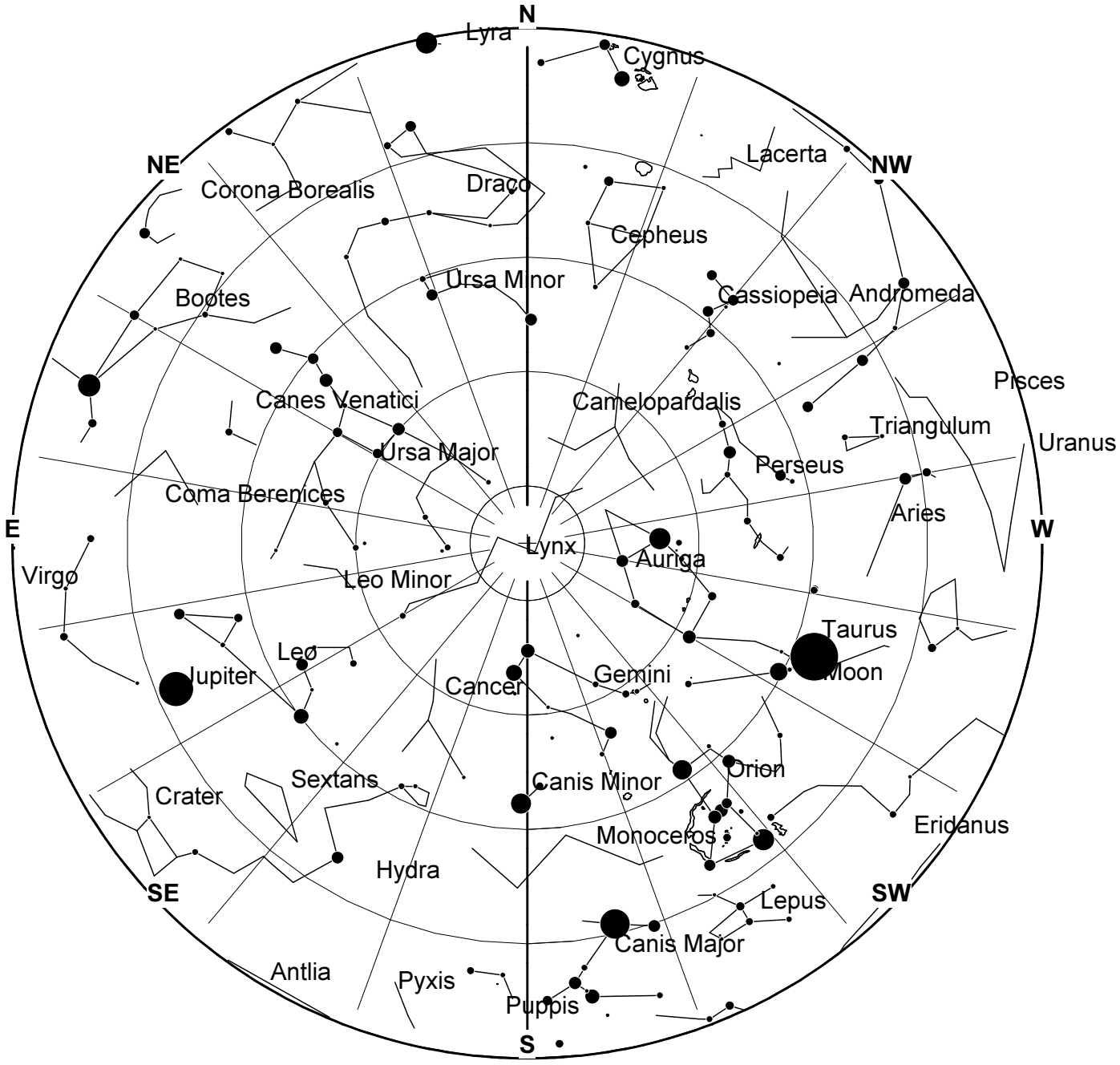
Important

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

On several 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.

February 2016 Sky Map



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

Messier 46 (also known as M 46 or NGC 2437) is an open cluster in the constellation of Puppis. It was discovered by Charles Messier in 1771. Dreyer described it as "very bright, very rich, very large." M46 is about 5,500 light-years away. There are an estimated 500 stars in the cluster, and it is thought to be some 300 million years old.

The planetary nebula NGC 2438 appears to lie within the cluster near its northern edge (the faint smudge at the top center of the image), but it is most likely unrelated since it does not share the cluster's radial velocity. It is an example of a superimposed pair possibly similar to that of NGC 2818. On the other hand the illuminating star of the bipolar Calabash Nebula shares the radial velocity and proper motion of Messier 46, and is at the same distance, so is a bona fide member of the open cluster.

February 2016 Night Sky

Moon Phases

New	First Qtr	Full	Last Qtr
			
8th	15th	22nd	Jan 24th

Planets

Mercury

Mercury makes a difficult apparition in the morning sky it lies very close tho the horizon as the sun rises. For the first two weeks of the month Mercury is a few degrees to the left of the much brighter Venus. Use Venus as a guide to spot this elusive planet. There is a nice grouping with the crescent moon on the 6th.

Venus

Day by day Venus is getting more difficult to spot as it plunges towards the sun. By the end of the month even though it is well south of the sun at sunrise both objects rise at almost the same time.

Mars

Mars is still an early morning object. Look for it low in the south at about 6 am, brighter than any nearby star and distinctly red in colour, it is moving to the east against the stars so quickly hardly moves from this position throughout the month. Things will change quickly next month as opposition approaches.

Jupiter

At the start of the month Jupiter is really for the night owls being at its best for observation during the early hours of the morning. By the end of the month it is rising at about 7, and while still rather low it has easily cleared the horizon haze by mid evening. Late March and early April is the best time for observation during this apparition, but Jupiter is so large and far away that observation time is not too critical.

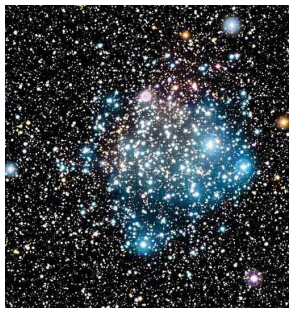
Saturn

Saturn can be found low in the south south eastern pre dawn sky. It is getting higher every day and slowly approaching Mars for a wide conjunction in April. Like Mars it is brighter than any nearby star so should be easily recognised. Compare its colour with that of Mars and the nearby bright red star Antares, the only bright star in that part of the sky. Antares looks much like Mars, but Saturn is distinctly yellowish by comparison.

Uranus & Neptune

Both outer planets are lost in the glare of the sun and will not return to our skies until later in the year.

Deep Sky

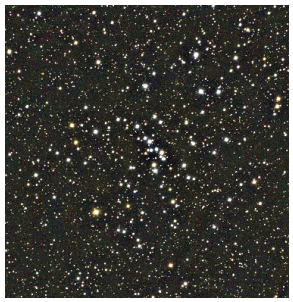


M46 Open Cluster RA 7h 42m Dec -14° 51' mag 6.5

Visible through binoculars as a misty smudge against the winter Milky Way in the same field of view as M47, M46 is a cluster of some 500 stars spread over an area equivalent to the full Moon. For observers with larger telescopes there is an 11th magnitude planetary nebula located towards the northern edge of the cluster. This nebula is a foreground object and appears to be within the cluster boundary purely by chance

M47 Open Cluster RA 7h 37m Dec -14° 31' mag 4.5

In a clear sky M47 may be seen with the naked eye, but optical aid is required to show the full splendour of this cluster. The cluster stars have a wide range of brightness from about magnitude 6 and beyond. This together with a few bright foreground stars allows the imagination to run free with all the different star patterns.



M48 Open Cluster RA 8h 14m Dec -5° 49' mag 5.5

M48 Is one of the 'lost' Messier objects, at the original coordinates there is no object to be found. It is believed that the great comet hunter made an error in either his records or calculations and that this is the object he actually observed. Under dark skies it can be seen with the naked eye and several stars can be resolved even on binoculars. A telescope shows what has been variously described as an arrowhead or boomerang shaped collection of stars.

Peter Burgess

How Mars is slowly killing its biggest moon

Phobos, the larger of the two Martian moons, is on a path to destruction.

Phobos - the larger of Mars's two moons - pictured by the robotic Mars Reconnaissance Orbiter
Photo: NASA/JPL-CALTECH/UNIV. OF ARIZONA

Phobos. It means fear. With a seven-mile diameter, it is the innermost and biggest moon of Mars. Our impressive Nasa picture shows a world so small that a jumping astronaut would be propelled into space.

Phobos is doomed. Its orbit round Mars is decaying, bringing it closer to its parent world by an inch every year. It will eventually disintegrate from tidal pressure and become a ring of debris like that of Saturn.

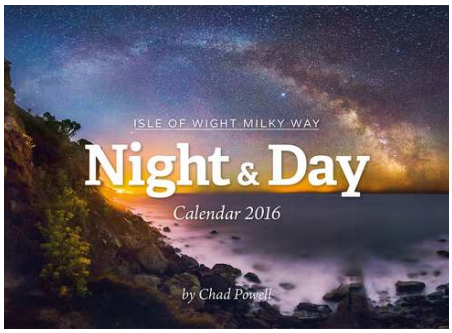
The name Phobos suggests that its largest crater - seen below - ought to have an equally ominous name. But surprisingly it bears the name of a woman, Stickney.

Stickney Crater, the largest crater on Phobos
Photo: HiRISE/MRO/LPL/NASA

In 1877 the astronomer Asaph Hall discovered Phobos after many nights of frustration by the glare of Mars itself. He was about to give up. "Give it one more night," implored his wife Stickney. He did so, and there in his eyepiece was the tiny moonlet. Its principal crater was named after her.

Read More: ***http://www.telegraph.co.uk/***

Calendar Sales



Thanks to all who bought copies of Chad Powell's beautiful calendar and to Elaine for organising things.

Chad generously agreed to support VAS from the sales which amounted to 27 calendars and a donation of £64.73.

Website: ***http://www.isleofwightmilkyway.com/***

Ziggy's Stardust

No, David Bowie doesn't have his own constellation

There may be a starman waiting in the sky, but sadly it isn't in the celestial form of a new stellar arrangement marking David Bowie's passing.

You've probably seen the reports circulating in the wake of Bowie's death -- the man behind Ziggy Stardust, the original space oddity, and one of the most innovative recording artists of all time is now memorialised with a new constellation. Unfortunately, he isn't.

It turns out, you can't just decide that a pattern of stars is a new constellation.

Like most things down here on Earth, there are organisational bodies overseeing that sort of thing. In the case of recognising star-stuff, it's the International Astronomical Union, and they say that the 'Bowie Constellation' doesn't, and tragically, can't exist.

Read More: ***http://www.wired.co.uk/***

Curiosity Delivers First Close-Up Pictures Of Martian Sand Dune

The Namib Dune is the first sand dune on any planet other than Earth to be studied close up.
NASA/JPL-Caltech/MSSS

NASA's Curiosity rover is conducting the first-ever study of a sand dune on any planet other than Earth, and recently returned these panoramic images of Mars's Namib Dune, providing a new glimpse of the Martian landscape.

Rising to a height of about 4 meters (13 feet), the structure is located within a band of dark sand dunes known as the Bagnold Dunes, which line the northwestern flank of Mount Sharp. Curiosity reached the base of the mountain in 2014, and is currently in the process of climbing it in order to examine how the terrain changes with altitude.

At present, the rover is conducting a study into how wind moves and deposits grains of sand on Mars, where the atmosphere is much thinner than that of Earth. Martian dunes share many similarities with terrestrial ones, consisting of a steep slope on the downwind side and a more gradual incline on the windward side.

Read More: ***http://www.iflscience.com/***

NASA: Astronomers Uncover Rogue, Runaway Stars Racing Through the Universe

When some speedy, massive stars plow through space, they can cause material to stack up in front of them in the same way that water piles up ahead of a ship. Called bow shocks, these dramatic, arc-shaped features in space are leading researchers to uncover massive, so-called runaway stars. Astronomers are finding dozens of these fastest stars in our galaxy with the help of images from NASA's Spitzer Space Telescope and Wide-field Infrared Survey Explorer, or WISE.

"Some stars get the boot when their companion star explodes in a supernova, and others can get kicked out of crowded star clusters," said astronomer William Chick from the University of Wyoming in Laramie, who presented his team's new results at the American Astronomical Society meeting in Kissimmee, Florida. "The gravitational boost increases a star's speed relative to other stars."

Our own sun is strolling through our Milky Way galaxy at a moderate pace. It is not clear whether our sun creates a bow shock. By comparison, a massive star with a stunning bow shock, called Zeta Ophiuchi (or Zeta Oph), is traveling around the galaxy faster than our sun, at 54,000 mph (24 kilometers per second) relative to its surroundings.

Both the speed of stars moving through space and their mass contribute to the size and shapes of bow shocks. The more massive a star, the more material it sheds in high-speed winds. Zeta Oph, which is about 20 times as massive as our sun, has supersonic winds that slam into the material in front of it.

Read More: ***http://www.dailygalaxy.com/***

Basketballs and Beyond
A Talk by
Jane A Green
janegreenastronomy.co.uk

A natural, eloquent and captivating speaker, Jane has that rare ability to communicate complexities of astronomy in a warm, easy to understand way. Join her unique illustrated voyage.

BRING A FRIEND

SPREAD THE JOY OF ASTRONOMY

Friday 26th February 2016 at 7.30pm

Newport Parish Hall, Newport PO30 1JU

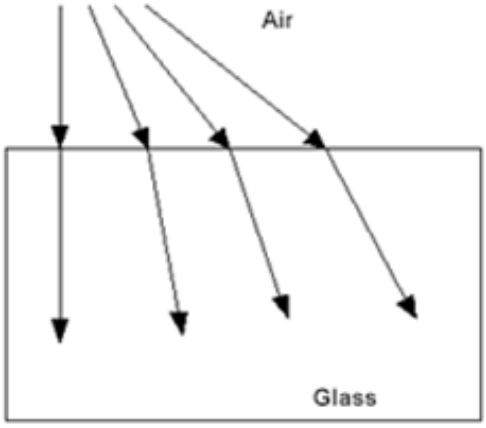
Vectis Astronomical Society (registered charity)

Suggested donation £2

Refractive Index

The speed of light is determined by the medium (material) through which the light is travelling. Light travels faster in a vacuum then it does in any other medium.

Light changes speed as it passes from one medium to another. This is called refraction.



Refraction is also the bending of the path of a light wave as it passes across the boundary separating two media. The light bends because of the densities differences and therefore the refractive index changes. At the optical centre the light waves speed up, but does not bend.

Refractive index of a medium is the measure of the change in speed of light as it passes from a vacuum (or air) into another medium.

It is expressed as a ratio of speed of light in vacuum (or air) to that of the medium in question (eg: water, glass etc.).

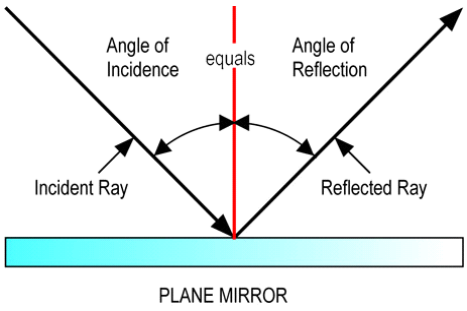
The velocity at which light travels in a vacuum is a physical constant, and the fastest speed at which energy or information can be transferred. However, light travels slower through any given material, or medium, that is not a vacuum. The bigger the refractive index the slower the slower the light travels in the medium.

A simple mathematical description is as follows:

$$\text{refractive index} = \frac{\text{speed of light in a vacuum}}{\text{speed of lightin medium}} \text{ or } n = \frac{c}{v}$$

For example, the refractive index of water is 1.33, meaning that in a vacuum, light travels 1.33 times as fast as it does in water.

As light exits a medium, such as air, water, or glass, it may also change its propagation direction in proportion to the refractive index (Snell's law). In a plane mirror, by measuring the angle of incidence and angle of reflection of the light beam, the refractive index n can be determined.

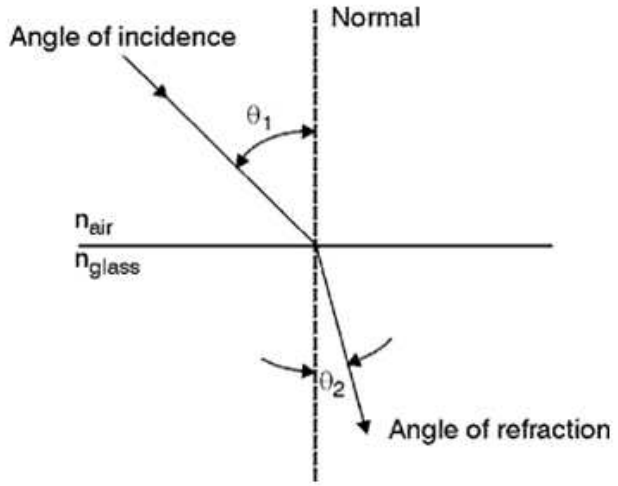


When the light enters from air to glass perpendicular to the surface of the glass, the light travels straight through in the same direction. When the light enters the glass at an angle, it emerges into the glass slightly deflected at an angle.

The dotted line is the normal (perpendicular) to the surface. In refraction, calculation angles are always measured between rays and the normal.

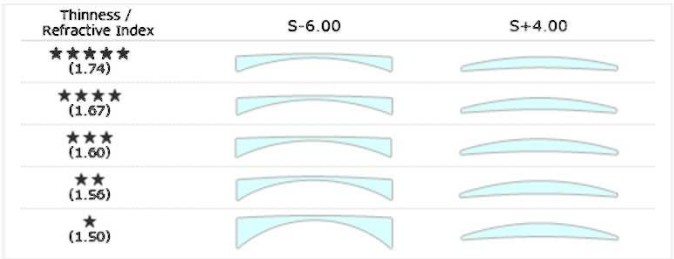
The change in direction of a ray depends on the change in speed of the light and can be used to calculate refractive index.

Remember in the medium where the light is faster (i.e. bigger speed), the angle is bigger and the wavelength is bigger.



To change the refractive index of a medium, you need to be able to change the speed of light through that medium. This could occur if you changed the structure of the medium by adding an amount of atoms or ions and bind to the existing lattice structure. This would cause more (or less) "light resistance" which is simply the friction light experiences as it travels through a medium.

In the case of spectacle lenses, the refractive index can be determined by equation, once the curvature of the front and back surfaces are know, along with the thickness of the lens.



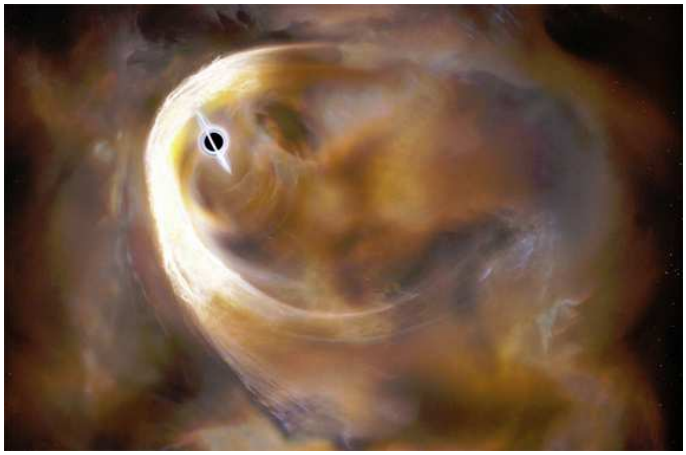
In the simplest of terms, to change the refractive index of spectacle lenses, you need to change the front and back surface curvatures, which in turn alters the centre or edge thickness of the lens (depending if it's concave or convex). So, to increase refractive index, the front and back surface are made flatter, which as a result makes the centre or edge thickness thinner.

This results in creating a surface that emits more reflections, warranting the need for an anti-reflection coating.

Perhaps another article for another time?

Elaine Spear

Milky Way's Second Most Massive Black Hole Found?



This artist's impression shows the swirling gases surrounding an "invisible object" at the center of CO-0.40-0.22. Credit: Keio University/NOAJ

Astronomers have detected what could be the second most massive black hole in our galaxy and it may be the missing piece of a cosmic puzzle.

But radio astronomers didn't directly detect the candidate black hole, rather they spied the whirling gases caught in its powerful gravitational grasp, potentially establishing a new method to track down elusive "intermediate-mass" black holes.

Using the Nobeyama 45-meter Radio Telescope, which is managed by the National Astronomical Observatory of Japan (NAOJ), the researchers found the object only 200 light-years from the Milky Way's supermassive black hole Sagittarius A* (Sgr. A*). By tracking the emissions from a swirling gas cloud called "CO-0.40-0.22," they found a "surprisingly wide velocity dispersion" — in other words, this cloud of gas is composed of material that is swirling at a wide range of speeds. There appears to be no supernova activity or any other energetic event in the region that could be driving this bizarre phenomenon.

Using computer models, the researchers were able to deduce that an extremely compact object — in other words, a black hole — lives in the "eye" of this interstellar storm and it must be massive. And by "massive" they mean in the order of 100,000 solar masses-massive. If confirmed, this would make the invisible object at the core of CO-0.40-0.22 a so-called "intermediate-mass" black hole, second in mass only to mighty Sgr. A* itself. Sgr. A* "weighs in" at a staggering 4 million solar masses.

Read More: ***http://www.space.com/***

Globular Clusters Could Nurture Interstellar Civilizations

Globular star clusters are extraordinary in almost every way. They're densely packed, holding a million stars in a ball only about 100 light-years across on average. They're old, dating back almost to the birth of the Milky Way. And according to new research, they also could be extraordinarily good places to look for space-faring civilizations.

"A globular cluster might be the first place in which intelligent life is identified in our galaxy," says lead author Rosanne DiStefano of the Harvard-Smithsonian Center for Astrophysics (CfA).

DiStefano presented this research today in a press conference at a meeting of the American Astronomical Society.

Our Milky Way galaxy hosts about 150 globular clusters, most of them orbiting in the galactic outskirts. They formed about 10 billion years ago on average. As a result, their stars contain fewer of the heavy elements needed to construct planets, since those elements (like iron and silicon) must be created in earlier generations of stars. Some scientists have argued that this makes globular cluster stars less likely to host planets. In fact, only one planet has been found in a globular cluster to date.

However, DiStefano and her colleague Alak Ray (Tata Institute of Fundamental Research, Mumbai) argue that this view is too pessimistic. Exoplanets have been found around stars only one-tenth as metal-rich as our Sun. And while Jupiter-sized planets are found preferentially around stars containing higher levels of heavy elements, research finds that smaller, Earth-sized planets show no such preference.

"It's premature to say there are no planets in globular clusters," states Ray.

Read More: ***https://www.cfa.harvard.edu/***

SILLY QUESTIONS?

WE ALL KNOW THAT THERE'S NO SUCH THING AS A SILLY QUESTION BUT.....

What is the difference between a meteor and a meteorite?

Well, A meteor - also known as a *shooting star* - is the flash of light that we see as it streaks across the night sky. It happens when a small chunk of debris from a comet or asteroid burns up as it passes through our atmosphere. "Meteor" refers to the flash of light caused by the debris, not the debris itself. The debris is called a meteoroid.

A meteorite is a solid piece of debris from a source such as an asteroid or a comet, which survives its passage through the Earth's atmosphere and impacts the Earth's surface without disintegrating.

A meteorite's size can range from small to extremely large.

I'd like to think this can become a regular column in NZ. If you have a "Silly Question" you'd like to ask, please send it to the Editor (details on the front page).

No need to worry, you will not be identified;)

Caltech Researchers Find Evidence of a Real Ninth Planet

This artistic rendering shows the distant view from Planet Nine back towards the sun. The planet is thought to be gaseous, similar to Uranus and Neptune. Hypothetical lightning lights up the night side.

Credit: Caltech/R. Hurt (IPAC)

Caltech researchers have found evidence of a giant planet tracing a bizarre, highly elongated orbit in the outer solar system. The object, which the researchers have nicknamed Planet Nine, has a mass about 10 times that of Earth and orbits about 20 times farther from the sun on average than does Neptune (which orbits the sun at an average distance of 2.8 billion miles). In fact, it would take this new planet between 10,000 and 20,000 years to make just one full orbit around the sun.

The researchers, Konstantin Batygin and Mike Brown, discovered the planet's existence through mathematical modeling and computer simulations but have not yet observed the object directly.

"This would be a real ninth planet," says Brown, the Richard and Barbara Rosenberg Professor of Planetary Astronomy. "There have only been two true planets discovered since ancient times, and this would be a third. It's a pretty substantial chunk of our solar system that's still out there to be found, which is pretty exciting."

Brown notes that the putative ninth planet—at 5,000 times the mass of Pluto—is sufficiently large that there should be no debate about whether it is a true planet. Unlike the class of smaller objects now known as dwarf planets, Planet Nine gravitationally dominates its neighborhood of the solar system. In fact, it dominates a region larger than any of the other known planets—a fact that Brown says makes it "the most planet-y of the planets in the whole solar system."

Batygin and Brown describe their work in the current issue of the Astronomical Journal and show how Planet Nine helps explain a number of mysterious features of the field of icy objects and debris beyond Neptune known as the Kuiper Belt.

"Although we were initially quite skeptical that this planet could exist, as we continued to investigate its orbit and what it would mean for the outer solar system, we become increasingly convinced that it is out there," says Batygin, an assistant professor of planetary science. "For the first time in over 150 years, there is solid evidence that the solar system's planetary census is incomplete."

The road to the theoretical discovery was not straightforward. In 2014, a former postdoc of Brown's, Chad Trujillo, and his colleague Scott Sheppard published a paper noting that 13 of the most distant objects in the Kuiper Belt are similar with respect to an obscure orbital feature. To explain that similarity, they suggested the possible presence of a small planet. Brown thought the planet solution was unlikely, but his interest was piqued.

He took the problem down the hall to Batygin, and the two started what became a year-and-a-half-long collaboration to investigate the distant objects. As an observer and a theorist, respectively, the researchers approached the work from very different perspectives—Brown as someone who looks at the sky and tries to anchor everything in the context of what can be seen, and Batygin as someone who puts himself within the context of dynamics, considering how things might work from a physics standpoint. Those differences allowed the researchers to challenge each other's ideas and to consider new possibilities. "I would bring in some of these observational aspects; he would come back with arguments from theory, and we would push each other. I don't think the discovery would have happened without that back and forth," says Brown. "It was perhaps the most fun year of working on a problem in the solar system that I've ever had."

Fairly quickly Batygin and Brown realized that the six most distant objects from Trujillo and Shepherd's original collection all follow elliptical orbits that point in the same direction in physical space. That is particularly surprising because the outermost points of their orbits move around the solar system, and they travel at different rates.

"It's almost like having six hands on a clock all moving at different rates, and when you happen to look up, they're all in exactly the same place," says Brown. The odds of having that happen are something like 1 in 100, he says. But on top of that, the orbits of the six objects are also all tilted in the same way—pointing about 30 degrees downward in the same direction relative to the plane of the eight known planets. The probability of that happening is about 0.007 percent. "Basically it shouldn't happen randomly," Brown says. "So we thought something else must be shaping these orbits."

Read More: ***https://www.caltech.edu/***

THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

How to Teleport Info Out of a Black Hole

Quantum teleportation of subatomic particles could be used to retrieve information from a black hole, a new algorithm suggests.

The information that can be extracted from this hypothetical black hole is quantum information, meaning that instead of existing in either a 0 or 1 state, like a classical bit, the data collected would exist as a superposition of all potential states.

"We've demonstrated concretely that it is possible, in principle, to retrieve some quantum information from a black hole," said study co-author Adam Jermyn, a doctoral candidate at the University of Cambridge in England.

More at: ***http://www.livescience.com/***

Discovery and Assignment of Elements with Atomic Numbers 113, 115, 117 and 118

IUPAC announces the verification of the discoveries of four new chemical elements: The 7th period of the periodic table of elements is complete.

The fourth IUPAC/IUPAP Joint Working Party (JWP) on the priority of claims to the discovery of new elements has reviewed the relevant literature for elements 113, 115, 117, and 118 and has determined that the claims for discovery of these elements have been fulfilled, in accordance with the criteria for the discovery of elements of the IUPAP/IUPAC Transfermium Working Group (TWG) 1991 discovery criteria. These elements complete the 7th row of the periodic table of the elements, and the discoverers from Japan, Russia and the USA will now be invited to suggest permanent names and symbols. The new elements and assigned priorities of discovery are as follows:

Element 113 (temporary working name and symbol: **ununtrium**, **Uut**)

Element 115 (temporary working name and symbol: **ununpentium**, **Uup**)

Element 117 (temporary working name and symbol: **ununseptium**, **Uus**)

Element 118 (temporary working name and symbol: **ununoctium**, **Uuo**)

More at: ***http://www.iupac.org/***

Striking views of our Solar System

Fog on Mars, storms on Jupiter and fiery flares on the Sun - stunning close up images of our nearest planetary neighbours are going on show at London's Natural History Museum.

What would you see if you travelled to the surface of Mars? Or were able to drift in and out of Saturn's rings?

A new exhibition - Otherworlds - focuses on the creative work of US-based artist Michael Benson. He mixes art with science - to make crisp, colourful and seamless digital images from data sent back to Earth by Nasa and ESA spacecraft.

The museum's Poppy Cooper, who helped put the show together, says the 77 images are meant to represent what humans would see if they went to visit those places.

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

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.

"We live in a society exquisitely dependent on science and technology, in which hardly anyone knows anything about science and technology"
Carl Sagan

"Everything is theoretically impossible, until it is done"
Robert A. Heinlein

"Inanimate objects can be classified scientifically into three major categories; those that don't work, those that break down and those that get lost"
Russell Baker