

## Society News

### Important Change of Address

*Please note the change of phone number and address for all contact with NZ (and me!). Details are over on the right of this page.*

### Photographic Equipment Has Arrived

We now have the astro-photography equipment and are currently exploring how best to train members in its use.

Please keep an eye on this column for details.

### Dimbola Event

The recent event (Sat May 16) saw good weather and plenty of visitors. VAS set up telescopes in front of the lodge in the parking area.



*Jupiter from Dimbola, Credit: Martyn Weaver*

Jupiter was the “star” of the evening and Martyn Weaver captured it, “I fired off a quick 1000 frames with the Phillips webcam, just to demonstrate to the punters. The result was quite pleasing. Even showing a couple of moons. All this with NO post editing!”

Thanks to Elaine Spear for organising everything and to all the VAS members who came along.

*Brian Curd  
Editor New Zenith.*

## VAS Website: [wightastronomy.org](http://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 295128** or email: [editor@wightastronomy.org](mailto: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
22 May	Are We Alone?	Stephen Tonkin
26 Jun	TBA	Haley Gomez
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/](http://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**

<b>President</b>	Barry Bates president@wightastronomy.org
<b>Chairman</b>	Bryn Davis chairman@wightastronomy.org
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<b>Membership Secretary</b>	Norman Osborn members@wightastronomy.org
<b>NZ Distribution</b>	Brian Bond distribution@wightastronomy.org
<b>Others</b>	Mark Williams & Nigel Lee

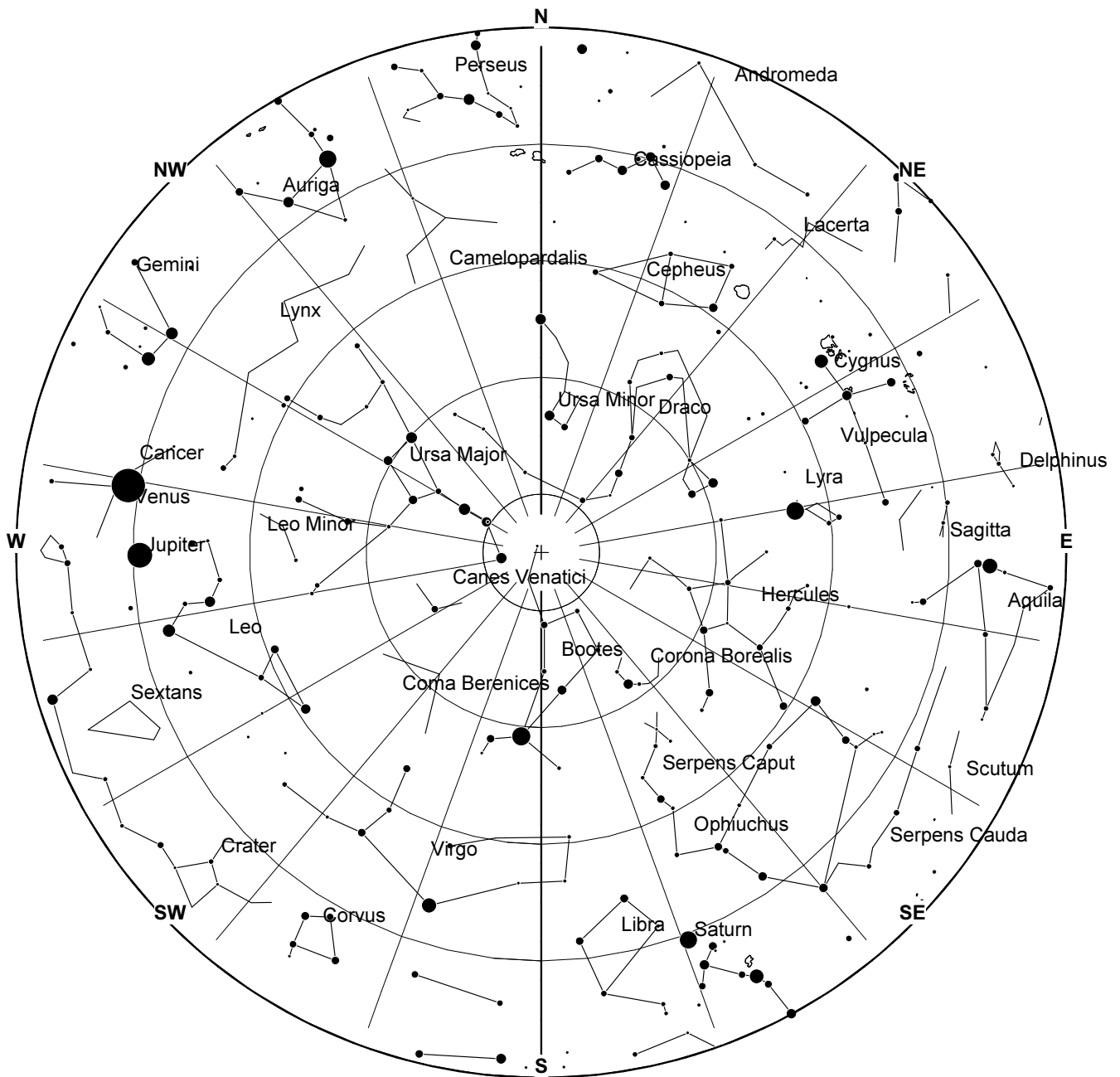
**Important**

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.**

## June 2015 Sky Map



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



**Messier 4 or M4** (also designated NGC 6121) is a globular cluster in the constellation of Scorpius. It was discovered by Philippe Loys de Chéseaux in 1746 and catalogued by Charles Messier in 1764. It was the first globular cluster in which individual stars were resolved.

M4 is conspicuous in even the smallest of telescopes as a fuzzy ball of light. It appears about the same size as the Moon in the sky. It is one of the easiest globular clusters to find, being located only 1.3 degrees west of the bright star Antares, with both objects being visible in a wide field telescope. Modestly sized telescopes will begin to resolve individual stars of which the brightest in M4 are of apparent magnitude 10.8.





This article is licensed under the [GNU Free Documentation License](https://www.gnu.org/licenses/old-licenses/fdl-1.0.html).  
It uses material from the Wikipedia article "Messier 4".

## June 2015 Night Sky

### Summer Solstice

The Summer solstice, the point at which the Sun reaches its most northerly point and gives us the longest day occurs on June 21 at 05:36.

### Moon Phases

New	First Qtr	Full	Last Qtr
			
June 16th	June 26th	June 2nd	June 9th

### Planets

#### Mercury

There is a challenging morning apparition of Mercury at the end of the month. From our latitude Mercury will be only about 7 degrees above the horizon at sunrise. The weather will have to be very clear of any haze towards the horizon to enable the planet to be seen in the bright pre-dawn sky. This is on best left to the specialist Mercury observer.

#### Venus

As the month progresses Venus' position in the evening sky will start to move slightly lower and towards the southwest. On the 19th there is a photogenic grouping with the crescent Moon and Jupiter.

#### Mars

Mars is in conjunction on the other side of the Sun from the Earth and can not be seen, it will appear again in the morning sky in the autumn.

#### Jupiter

Jupiter is now sinking towards the western horizon as darkness falls, It has a close conjunction with Venus on the 30th when the pair will be about 22 arc seconds apart.

#### Saturn

As soon as the sky is dark enough Saturn is available for observation. It is due south at midnight at the start of the month and at 22:00 at the end. It is clear enough of the horizon haze for only about 4 hours a night, so towards the end of the month viewing time will be restricted by the bright summer evenings.

### Uranus & Neptune

Both the outer planets are too close to Sun to be visible from our latitude until later in the year.

### Deep Sky



**M13 The Hercules Cluster**  
RA 16h 42' Dec 36° 26' mag 5.8

On a dark night the Hercules globular can be seen with the naked eye as a fuzzy star part way down the right hand side of the keystone asterism. This is the brightest and many would argue the best globular visible from the northern hemisphere. It lies some 25,000 light years away from us, relatively close by globular cluster standards. As with all globular clusters the view improves with increasing aperture used to observe it. The view is of a sugar coated ball frozen in time, and surrounded by a flurry of sugar grains.



**M4 The Cat's Eye, Globular Cluster**  
RA 16h 24m Dec -26° 33' mag 7.5

At about 7200 light years this 10,000 million year old cluster may be the closest globular cluster to our solar system. This core of this cluster is rather looser than most globulars with a distinct chain of stars running across its centre.



**M80 Globular Cluster**  
RA 16h 17m Dec -22° 59' mag 8.5

In contrast to M4 this cluster is a much smaller with a very condensed core. In 1880 a nova was observed here, one of only two novae ever seen in a globular cluster.

*Peter Burgess*

# The August AGM

Please consider joining the  
VAS Committee

We need your support and help to take  
our Society into 2016 and beyond!

An effective and involved Committee is  
essential

If you can spare some time to help we'd  
love to hear from you

There is a nomination form on the other  
side of this page.

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## Venus

Venus is the second planet from the Sun, orbiting it every 224.7 Earth days. It has no natural satellite. It is named after the Roman goddess of love and beauty. After the Moon, it is the brightest natural object in the night sky, reaching an apparent magnitude of -4.6, bright enough to cast shadows. Because Venus is an inferior planet from Earth, it never appears to venture far from the Sun: its elongation reaches a maximum of 47.8°.

Venus is a terrestrial planet and is sometimes called Earth's "sister planet" because of their similar size, mass, proximity to the Sun and bulk composition. It is radically different from Earth in other respects. It has the densest atmosphere of the four terrestrial planets, consisting of more than 96% carbon dioxide. The atmospheric pressure at the planet's surface is 92 times that of Earth's. With a mean surface temperature of 735 K (462 °C; 863 °F), Venus is by far the hottest planet in the Solar System, even though Mercury is closer to the Sun. Venus has no carbon cycle that puts carbon into rock, nor does it seem to have any organic life to absorb carbon in biomass. Venus is shrouded by an opaque layer of highly reflective clouds of sulfuric acid, preventing its surface from being seen from space in visible light. It may have had oceans in the past, but these would have vaporized as the temperature rose due to a runaway greenhouse effect. The water has most probably photodissociated, and, because of the lack of a planetary magnetic field, the free hydrogen has been swept into interplanetary space by the solar wind. Venus's surface is a dry desertscape interspersed with slab-like rocks and periodically refreshed by volcanism.

More at: [wikipedia.org](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*



**Island Planetary  
@Fort Victoria**

*The Island's Telescope Professionals*

**Serious Stuff**

**TAL 200mm Newtonian Reflector OTA  
180mm Maksutov Cassegrain OTA  
EQ 5 mount and drives**

**Various Used ETX 's**

**Also starter scopes and accessories**

**Discounts and deals for VAS members**

**Call Paul England – VAS Member**  
on 761555 - leave a message if I am not there  
Or - [enquiry@islandastronomy.co.uk](mailto:enquiry@islandastronomy.co.uk)

## 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:.....

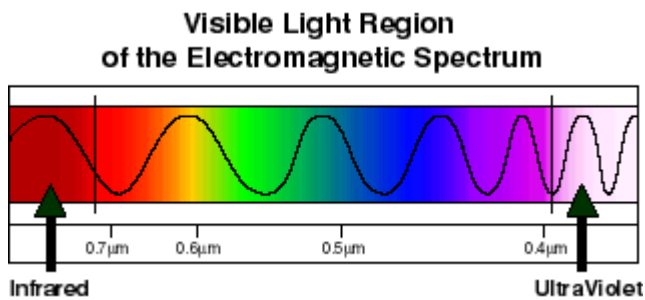
### Notes

- 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.

## Chromatic Aberration

Chromatic Aberration is the colour distortion in an image produced by a lens, caused by the inability of the lens to bring the various colours of light to focus at a single point. They appear as fringes of colour at the edges of objects.

Each colour in the *optical (visible) spectrum* cannot be focused at a single common point. The visible spectrum is the *portion* of the *electromagnetic spectrum* that is *visible* to (can be detected by) the *human eye*.



*Visible Light Waves*

Visible light waves are the only electromagnetic waves we can see. We see these waves as the colours of the rainbow. Each colour has a different wavelength, measured in nanometers (nm). Red has the longest wavelength and violet has the shortest wavelength. When all the waves are seen together, they make white light.

When white light shines through a prism, the white light is broken apart into the colours of the visible light spectrum. Water vapour in the atmosphere can also break apart wavelengths creating a rainbow.

Each colour in a rainbow corresponds to a different wavelength of the electromagnetic spectrum.

## Refraction

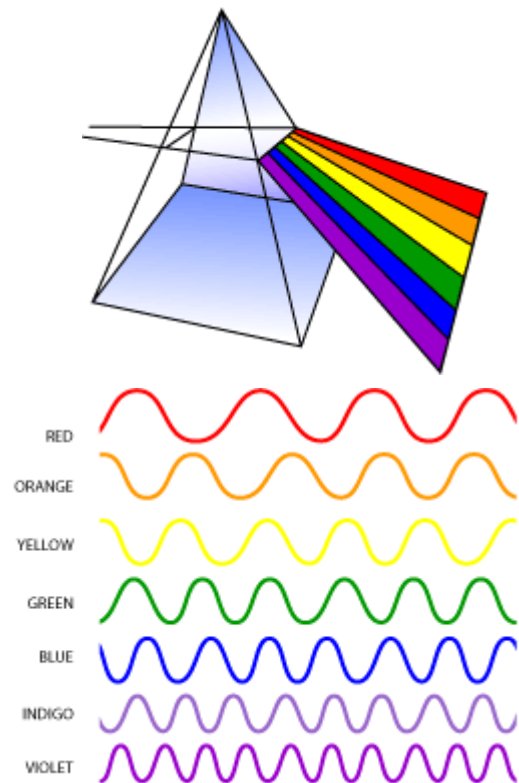
When a light's path is bent, it is refracted. And dispersion is when a refracted white light splits into its component colours.

Refraction is when light bends as it passes from one medium into another of different optical density. The bending of light as it passes from one transparent material to another with a different *refractive index*.

Refractive index is the ratio of the speed of light in a vacuum to the speed of light through the material. When light travels at an angle between two different materials, their refractive indices determine the angle of transmission (refraction) of the light beam. In general, the refractive index varies based on the

frequency of the light as well, thus different colours of light travel at different speeds. High intensities also can change the refractive index.

The refractive index of a vacuum is 1.0, and air is a tiny fraction greater than 1.0. The higher the index, the slower the speed of light through the medium, because the speed through the material is the speed of light ( $c$ ) over the refractive index ( $n$ ), thus speed =  $c/n$ . Following are common refractive indices..



Material	Refractive Index (n)
Vacuum	1.0
Air	1.0**
Water	1.33
Glass	1.45-1.48
Lithium niobate	2.25
Gallium arsenide	3.35
Silicon	3.5
Germanium	4.0

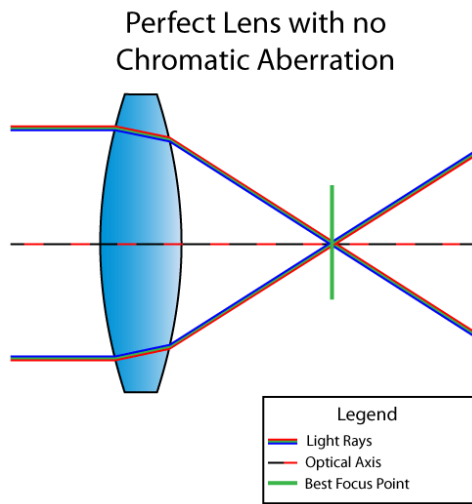
These coloured images occur, even though only white light enters the system.

Chromatic aberrations are caused by the fact that the refraction law determining the path of light through an optical system contains the refractive index, which is a

function of wavelength. Thus the image position and the magnification of an optical system are not necessarily the same for all wavelengths, nor are the aberrations the same for all wavelengths.

In reality, the refractive index for each wavelength is different in lenses, which causes two types of Chromatic Aberration:

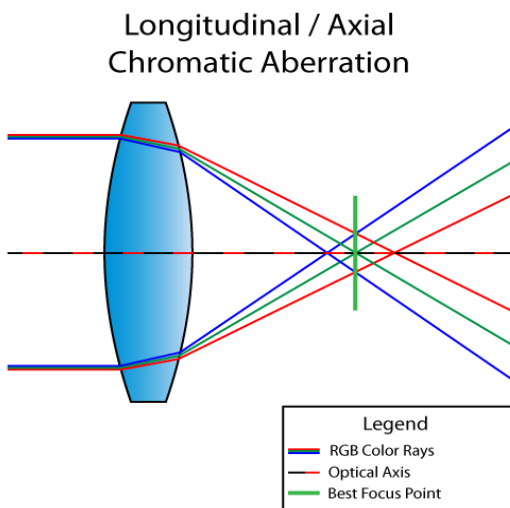
- Longitudinal Chromatic Aberration and
- Lateral Chromatic Aberration.



*A perfect lens would focus all wavelengths into a single focal point, where the best focus with the “circle of least confusion” is located, as shown.*

### Longitudinal Chromatic Aberration

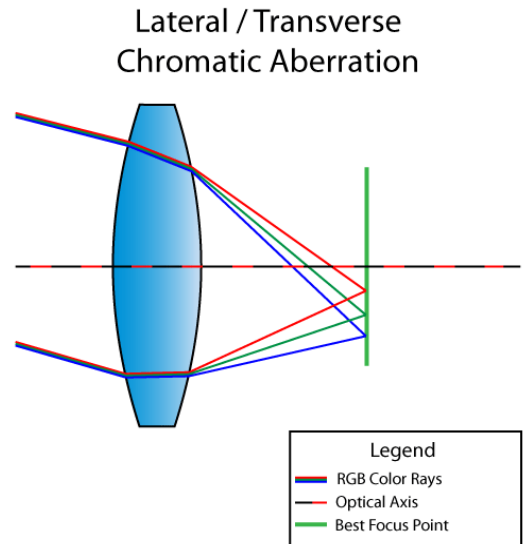
This occurs when different wavelengths of colour do not converge at the same point after passing through a lens.



### Lateral Chromatic Aberration

This is also known as “transverse chromatic aberration”, occurs when different wavelengths of colour coming at an angle focus at different positions along the same focal plane.

Lenses with Longitudinal Chromatic Aberration problems can show fringing around objects throughout the image, even in the centre. Red, Green, Blue or a combination of these colours can appear around objects.



Lateral Chromatic Aberration never shows up in the centre and is only visible towards the corners of the image in high-contrast areas. Blue and purple fringing is often common.

It would require a whole other article to go into the solutions for chromatic aberration, however is generally safe to say that high-quality lenses use multiple elements to diminish chromatic aberration.

While many modern lens manufacturers employ specific techniques to reduce chromatic aberrations, it is still an issue on most primary and zoom lenses that we just have to learn how to get around with.

The good news is that many modern DSLRs incorporate special in-camera post-processing techniques to reduce and even eliminate lens chromatic aberrations and plenty of software packages are also capable of dealing with chromatic aberrations.

*Elaine Spear*



## Is the Universe a Hologram?

*Describing the universe requires fewer dimensions than we might think. New calculations show that this may not just be a mathematical trick, but a fundamental feature of space itself.*

At first glance, there is not the slightest doubt: to us, the universe looks three dimensional. But one of the most fruitful theories of theoretical physics in the last two decades is challenging this assumption. The “holographic principle” asserts that a mathematical description of the universe actually requires one fewer dimension than it seems. What we perceive as three dimensional may just be the image of two dimensional processes on a huge cosmic horizon.

Up until now, this principle has only been studied in exotic spaces with negative curvature. This is interesting from a theoretical point of view, but such spaces are quite different from the space in our own universe. Results obtained by scientists at TU Wien (Vienna) now suggest that the holographic principle even holds in a flat spacetime.

### The Holographic Principle

Everybody knows holograms from credit cards or banknotes. They are two dimensional, but to us they appear three dimensional. Our universe could behave quite similarly: “In 1997, the physicist Juan Maldacena proposed the idea that there is a correspondence between gravitational theories in curved anti-de-sitter spaces on the one hand and quantum field theories in spaces with one fewer dimension on the other”, says Daniel Grumiller (TU Wien).

Gravitational phenomena are described in a theory with three spatial dimensions, the behaviour of quantum particles is calculated in a theory with just two spatial dimensions – and the results of both calculations can be mapped onto each other. Such a correspondence is quite surprising. It is like finding out that equations from an astronomy textbook can also be used to repair a CD-player. But this method has proven to be very successful. More than ten thousand scientific papers about Maldacena’s “AdS-CFT-correspondence” have been published to date.

### Correspondence Even in Flat Spaces

For theoretical physics, this is extremely important, but it does not seem to have much to do with our own universe. Apparently, we do not live in such an anti-de-sitter-space. These spaces have quite peculiar properties. They are negatively curved, any object thrown away on a straight line will eventually return. “Our universe, in contrast, is quite flat – and on astronomic distances, it has positive curvature”, says Daniel Grumiller.

However, Grumiller has suspected for quite some time that a correspondence principle could also hold true for our real universe. To test this hypothesis, gravitational theories have to be constructed, which do not require exotic anti-de-sitter spaces, but live in a flat space. For three years, he and his team at TU Wien (Vienna) have been working on that, in cooperation with the University of Edinburgh, Harvard, IISER Pune, the MIT and the University of Kyoto. Now Grumiller and colleagues from India and Japan have published an article in the journal “Physical Review Letters”, confirming the validity of the correspondence principle in a flat universe.

### Calculated Twice, Same Result

“If quantum gravity in a flat space allows for a holographic description by a standard quantum theory, then there must be physical quantities, which can be calculated in both theories – and the results must agree”, says Grumiller. Especially one key feature of quantum mechanics – quantum entanglement – has to appear in the gravitational theory.

When quantum particles are entangled, they cannot be described individually. They form a single quantum object, even if they are located far apart. There is a measure for the amount of entanglement in a quantum system, called “entropy of entanglement”. Together with Arjun Bagchi, Rudranil Basu and Max Riegler, Daniel Grumiller managed to show that this entropy of entanglement takes the same value in flat quantum gravity and in a low dimension quantum field theory.

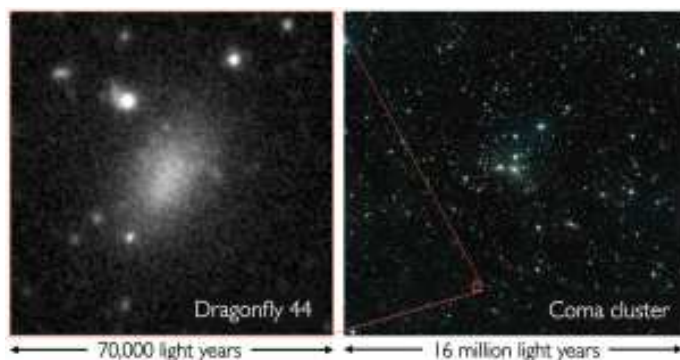
“This calculation affirms our assumption that the holographic principle can also be realized in flat spaces. It is evidence for the validity of this correspondence in our universe”, says Max Riegler (TU Wien). “The fact that we can even talk about quantum information and entropy of entanglement in a theory of gravity is astounding in itself, and would hardly have been imaginable only a few years back. That we are now able to use this as a tool to test the validity of the holographic principle, and that this test works out, is quite remarkable”, says Daniel Grumiller.

This however, does not yet prove that we are indeed living in a hologram – but apparently there is growing evidence for the validity of the correspondence principle in our own universe.

### Further information

**Prof. Daniel Grumiller**  
**Institute for Theoretical Physics**  
**TU Wien**  
**Wiedner Hauptstraße 8-10, 1040 Vienna**  
**daniel.grumiller@tuwien.ac.at**

## Scientists at Keck Discover the Fluffiest Galaxies



CREDIT: P. VAN DOKKUM, R. ABRAHAM, J. BRODIE

*A collection of unidentified blobs was discovered toward the Coma cluster of galaxies, using the Dragonfly Telephoto Array. One of these puzzling objects, Dragonfly 44, was studied in detail using the Keck Observatory and confirmed as an ultra-diffuse galaxy.*

Maunakea, Hawaii – An international team of researchers led by Pieter van Dokkum at Yale University have used the W. M. Keck Observatory to confirm the existence of the most diffuse class of galaxies known in the universe. These “fluffiest galaxies” are nearly as wide as our own Milky Way galaxy – about 60,000 light years – yet harbor only one percent as many stars. The findings were recently published in the *Astrophysical Journal Letters*.

“If the Milky Way is a sea of stars, then these newly discovered galaxies are like wisps of clouds”, said van Dokkum. “We are beginning to form some ideas about how they were born and it’s remarkable they have survived at all. They are found in a dense, violent region of space filled with dark matter and galaxies whizzing around, so we think they must be cloaked in their own invisible dark matter ‘shields’ that are protecting them from this intergalactic assault.”

The team made the latest discovery by combining results from one of the world's smallest telescopes as well as the largest telescope on Earth. The Dragonfly Telephoto Array used 14cm state of the art telephoto lens cameras to produce digital images of the very faint, diffuse objects. Keck Observatory’s 10m Keck I telescope, with its Low Resolution Imaging Spectrograph, then separated the light of one of the objects into colors that diagnose its composition and distance.

Finding the distance was the clinching evidence. The data from Keck Observatory showed the diffuse “blobs” are very large and very far away, about 300 million light years, rather than small and close by. The blobs can now safely be called Ultra Diffuse Galaxies (UDGs).

More at: <http://www.keckobservatory.org/>

## Galaxies Die by Slow ‘Strangulation’

When galaxies stop making stars, their death is usually a slow process that chokes them of the necessary cool gases over about four billion years.

That is the conclusion of astronomers who surveyed thousands of galaxies, living and dead, to assess whether the transition is rapid or slow.

In the dead galaxies they detected high levels of metals, which build up during star formation and point to a slow strangulation process.

“Metals are a powerful tracer of the history of star formation: the more stars that are formed by a galaxy, the more metal content you’ll see,” said Dr Yingjie Peng from the University of Cambridge, the paper’s lead author.

“So looking at levels of metals in dead galaxies should be able to tell us how they died.”

If a galaxy’s death was quick and violent, with the cool gas that feeds star formation stripped away by internal or external forces, it would immediately stop forming stars and its metal content would remain the same.

On the other hand, if the galaxy is cut off from its supply of gas but it continues to use up what remains, metal would continue to build up until the galaxy eventually “suffocates”.

### Slow way to go

In a commentary for *Nature*, fellow astronomer Andrea Cattaneo from the Observatoire de Paris compared this tell-tale evidence to the high levels of carbon dioxide seen in a strangled human body.

“During [strangulation], the victim uses up oxygen in the lungs but keeps producing carbon dioxide, which remains trapped in the body,” wrote Dr Cattaneo.

“Instead of building up CO<sub>2</sub>, the strangled galaxies accumulate metals - elements heavier than helium - produced by massive stars.”

The team led by Dr Peng spotted that accumulation of metal when they compared the spectrum of light emitted by 23,000 red, passive galaxies and 4,000 blue, star-forming ones.

More at: [www.bbc.co.uk](http://www.bbc.co.uk)

## NASA Announces Winners of 2015 International Space Apps Challenge

From a voice and gesture command system for spacecraft, to an app that provides farmers information about their crops' health, this year's winners of the International Space Apps Challenge cover a wide range of technology solutions for space exploration and life on Earth.

NASA, in conjunction with other space agencies around the world, held the fourth annual code-a-thon April 10-12 at more than 135 locations worldwide and the results are in. Winning apps were selected in six categories, including a People's Choice Award.

Participants were asked to develop mobile applications, software, hardware, data visualization and platform solutions that could contribute to space exploration missions and help improve life on Earth. This year, 35 challenges represented NASA mission priorities in four areas: Earth studies, space exploration, human health research and robotics.

The categories were:

- Best Use of Data
- Best Use of Hardware
- Best Mission Concept
- Galactic Impact
- Most Inspirational
- People's Choice Award

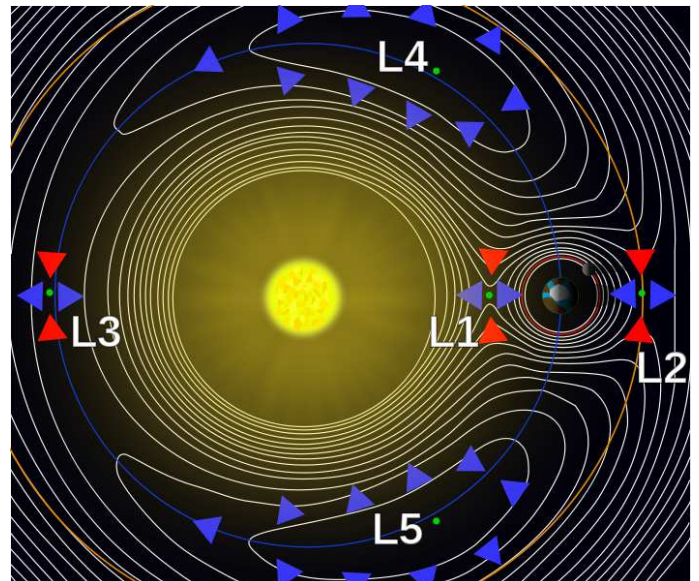
All award finalists were nominated at the local level from among the local winners. Submissions for global judging were required to create a 30-second video to describe the project solution.

Social media users around the world joined the judging action to vote for their favorite projects. People's Choice Award winner NatEv Explorer received the highest score of 69,000 votes.

Winners were invited to attend the September launch from Cape Canaveral Air Force Station, Florida of SpaceX's eighth commercial resupply mission to the International Space Station.

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

## Langrangian Points



*Contour plot of the effective potential of a two-body system. (the Sun and Earth), showing the 5 Lagrange points*

In celestial mechanics, the Lagrangian points; (also Lagrange points, L-points, or libration points) are positions in an orbital configuration of two large bodies where a small object affected only by gravity can maintain a stable position relative to the two large bodies. The Lagrange points mark positions where the combined gravitational pull of the two large masses provides precisely the centripetal force required to orbit with them. There are five such points, labelled L1 to L5, all in the orbital plane of the two large bodies. The first three are on the line connecting the two large bodies and the last two, L4 and L5, form an equilateral triangle with the two large bodies. Objects can orbit these points as well.

Several planets have minor planets near their L4 and L5 points (trojans) with respect to the Sun, with Jupiter in particular having more than a million of these. Artificial satellites have been placed at L1 and L2 with respect to the Sun and Earth, and Earth and the Moon for various purposes, and the Lagrangian points have been proposed for a variety of future uses in space exploration.

## History

The three collinear Lagrange points (L1, L2, L3) were discovered by Leonhard Euler a few years before Lagrange discovered the remaining two.

In 1772, Joseph-Louis Lagrange published an "Essay on the three-body problem".

More at: [wikipedia.org](http://wikipedia.org)

## THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

### No Warp Drive Here: NASA Downplays 'Impossible' EM Drive Space Engine

Despite the fevered reports rocketing around the Internet recently, NASA is not on the verge of developing a fuel-free, faster-than-light propulsion system, space agency officials stress.

A team based at NASA's Johnson Space Center (JSC) in Houston reportedly tested a prototype engine system in a vacuum recently and determined that it produced a small amount of thrust. This news was disclosed on a NASASpaceflight.com forum earlier this year, and last week, it hit the broader Internet with a vengeance, as some pieces linked the technology to a long-sought "warp drive."

Why all the attention? The novel thruster system is based on the EmDrive, a British invention said to create thrust without propellant by bouncing microwaves around inside a chamber. If it works, the engine could revolutionize spaceflight — and it would apparently violate the laws of physics, as well. But NASA is downplaying the research and its potential to deliver a huge propulsion breakthrough in the near future.

"While conceptual research into novel propulsion methods by a team at NASA's Johnson Space Center in Houston has created headlines, this is a small effort that has not yet shown any tangible results," NASA officials told Space.com in a statement. "NASA is not working on 'warp drive' technology."

Read more at: [space.com](http://space.com)

### Hubble finds massive halo around the Andromeda Galaxy

University of Notre Dame astrophysicist Nicolas Lehner has led a team of scientists who have used NASA's Hubble Space Telescope to identify an immense halo of gas surrounding the Andromeda Galaxy, the nearest major galaxy to Earth. The halo stretches about a million light-years from Andromeda, halfway to the Milky Way. The discovery will tell astronomers more about the evolution and structure of giant spiral galaxies such as the Milky Way and Andromeda.

"Halos are the gaseous atmospheres of galaxies," said Lehner, the lead investigator. "The properties of these gaseous halos control the rate at which stars form in galaxies." The gargantuan halo is estimated to contain at least as much mass in its diffuse gas as half of the stars in the Andromeda Galaxy.

The Andromeda Galaxy, also known as Messier 31 or M31, is the most massive galaxy in the Local Group of galaxies that also includes the Milky Way and about 45 other known galaxies. M31 contains one trillion stars, about double the number of stars in the Milky Way. It is estimated to be about 25 percent more luminous than the Milky Way and lies 2.5 million light-years away.

The study demonstrates that the halo is a significant feature of Andromeda, having an apparent size about 100 times the diameter of the moon, yet the gas in the halo is "invisible." To find and study the halo, the team looked at bright background objects whose light is affected by the intervening gas in the halo.

Read more at: [spacedaily.com](http://spacedaily.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 please at the email or postal address on the front page.

*"One may say the eternal mystery of the world is its comprehensibility"*

**Albert Einstein**

*"When you hear a physicist invoke the uncertainty principle, keep a hand on your wallet"*

**David Griffiths**

*"Our imagination is stretched to the utmost, not, as in fiction, to imagine things which are not really there, but just to comprehend those things which are there"*

**Richard Feynman**