



East Rand Astronomy Club

The Universe Is In Us



Interstellar News

October 2019



M45. The Pleiades Star Cluster

<https://science.nasa.gov/astronomy-picture-of-the-day>



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THE EDITORS PIECE.

The curiously mysterious, twinkling span of the Milky Way. A meteor streaking across, low and just above the horizon, or the flick- flick of curiosity as a satellite crosses the night sky. There is something primal, a deep urge within our souls, about watching the night sky. Nothing inspires and generates more questions about "Who Are We?", than pondering the vastness of the Universe, underneath a sky full of constellations, within the deep space of stars.

Sadly, visual access to the night sky has, in the latest century, become increasingly rare. More so, for us in South Africa where, for generations we have enjoyed dark night skies. An accepted gift taken for granted, now, due to progress, we are messing it up.

Current light pollution studies have stated that 80% of Earth's land mass suffers from light pollution, while for 99% of people in Europe and the USA, the night sky is obscured by artificial lighting, not to mention the densely populated cities in the Far East.

We all know that, despite the setbacks, the desire for reconnection with something that has a deep, soulful meaning to humans, continues to persist. No matter how one chooses to experience the night sky, be it in our own backyard, on a couch in the house, on holiday, or observing the night skies with like-minded fellows, we need to fulfil that need. Stargazing! Think of it as a glimpse through history gaining an important and fascinating sense of perspective about our place in the universe.

Night Skies Ahoy!

OUR NEXT MEETING:

WHERE: Marachelle Country Estate.

WHEN: Wednesday 6 November 2019

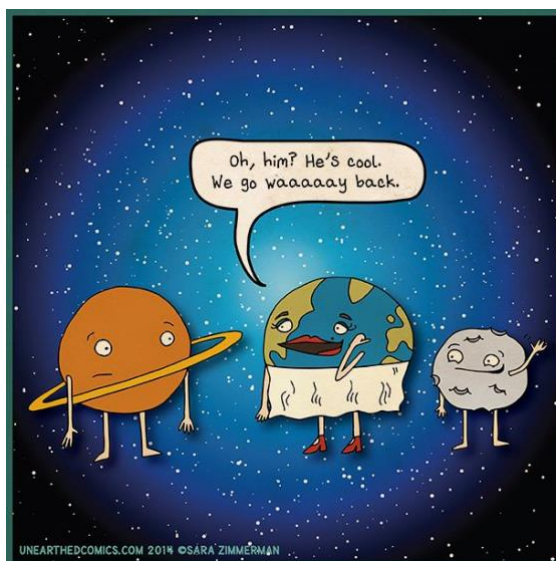
SPEAKER: Jerome Jooste

SUBJECT: Stars: proper title will be advised



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SUNRISE AND SUNSET TIMES IN OCTOBER 2019:

DATE	SUNRISE	SUNSET
1/10/2019	5:46	18:06
07/10/2019	5:40	18:09
14/10/2019	5:33	18:12
21/10/2019	5:26	18:16
28/10/2019	5:20	18:20

At just before 1:50 pm EDT on Sept. 1, 2019, NASA's Parker Solar Probe completed its third close approach (or perihelion) of the Sun. At the time of perihelion, the spacecraft was about 15 million miles from the Sun's surface, traveling at more than 213,200 miles per hour.

<http://parkersolarprobe.jhuapl.edu/News-Center/>



Harvest Moon



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THE MOON IN OCTOBER 2019:

	MOON RISE	MOONSET	MOON PHASE
05/10/2019		00:10	Third Quarter
13/10/2019		05:30	Full Moon
21/10/2019	00:24	11:14	First Quarter
28/10/2019	05:40	18:47	New Moon



THE PLANETS:



Mercury: is very close to the sun in September, making it very hard and difficult to see. Mars will transit from the evening to the morning sky at solar conjunction on Sept. 2; from our vantage point it will then be at nearly 400 million km from Earth. It will reappear low in the eastern sky in mid-October.



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Venus: is close to the sun and only visible for a short while in the west after the sun has set. Mars will transition from the evening to the morning sky at solar conjunction on Sept. 2; from our vantage point it will then be nearly 249 million miles (400 million km) from Earth. It will reappear low in the eastern sky in mid-October in eastern Virgo.



Earth: In October, Earth's days are growing longer, and temperatures are rising. Everything is fresh and green after the drab browns of winter.

"Most of the earth's internal fires are fuelled by the radioactive decay of uranium and thorium. The heat produced by these disintegrations eventually makes its way to the surface where we can measure it. but the helium (4He) created by the radioactive decay of the uranium and thorium is mostly missing. The discrepancy is large, and scientists are confronted with the possibility that we are wrong about either the source of the earth's heat or the facts of nuclear physics. You can bet it will not be the latter. We are confident that helium atoms cannot change their type like those solar neutrinos! Neither can we blame chemical sequestration because helium is a noble gas. Perhaps the missing helium is physically trapped and stored somewhere in the earth's mantle. No one knows the answer."

(Chin, Gilbert, ed; "A Scarcity of Gas," *Science*, 292:2219, 2001.) From Science Frontiers #137, SEP-OCT 2001. © 2001 William R. Corliss



Mars: Will reappear low in the eastern sky in mid-October in eastern Virgo and by New Year's Eve it will be a magnitude +1.6 interloper near the Libra-Scorpius border, rising about three hours before the sun.



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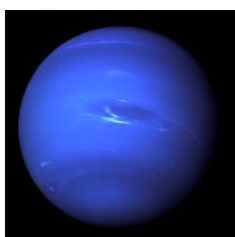
Jupiter: Is one of our “sky lovelies” this month. High up in the NNW and beautiful to see through a telescope. Jupiter went retrograde in April this year and will be back in Sagittarius in the first week of November.



Saturn: The “Queen of the Night”, as surprising as ever, is to be seen NNE going toward mid sky.



Uranus: is of average visibility. When Uranus and Neptune are visible, they normally appear as tiny discs. In our Solar system, Uranus is different in that its axis of spin is tilted by 98 degrees. This means it spins on its side.



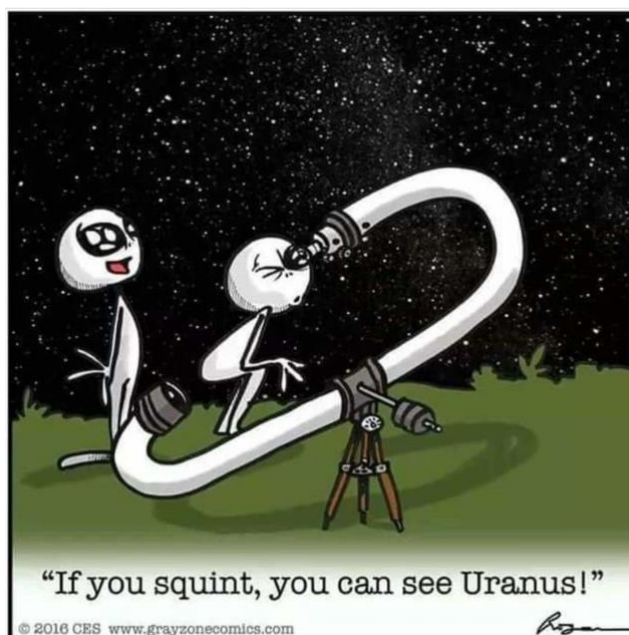
Neptune: Neptune is difficult to see and appears in the sky as a tiny blueish disc.

NASA Solar System Exploration pictures



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THE CONSTELLATIONS:

There are seven constellations in October,
Surprise and amazement stuns one cold sober.
There to focus and to wander through.
Aquarius, the water bearer,
Pegasus, the winged horse,
Great figures of myths two.
Cepheus, Grus, Lacerta,
Piscis Austrinus and Octans,
Large and small, names old and new.
Line up the stars, for constellations to view.

Aquarius is the 10th largest constellation in the sky, occupying an area of 980 square degrees. Found in the fourth quadrant of the southern hemisphere (SQ4) and can be seen at latitudes between $+65^{\circ}$ and -90° . Aquarius contains two globular clusters and one open cluster.

Pegasus is home to a single globular star cluster.

The remaining constellations of October are relatively unremarkable, composed mainly of faint stars. The only bright stars worth mentioning are Alnair, in Grus, and Fomalhaut, in Piscis Austrinus or the Southern Fish.

Fomalhaut is the 18th. brightest star, also known as one of the Persian Royal Stars and the "loneliest star" because it is the only bright star in a very large field of stars. In astronomy Fomalhaut is the first star with a visible exoplanet. This Fomalhaut b is still scientifically unexplained. Some scientists say that it is not a real planet but it might have been formed in the last hundred years, being two Kuiper belt objects that collided.

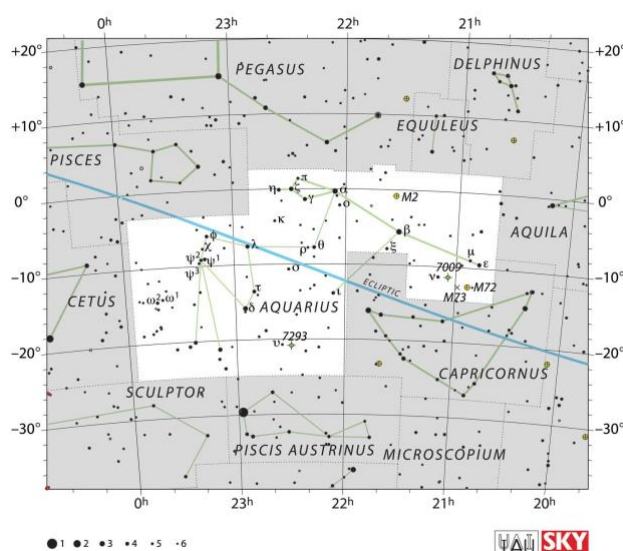


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Other scientists say it is a planet surrounded by scattered dust from Formalhaut's dusty disks. According to the ancient Persians Formalhaut was one of their guardians of the Heavens.



Aquarius is a large, known, constellation. The Water Bearer.

Octans is a small constellation in the south and closest to use on finding true south and that is difficult because it has no known stars. It is named after the Octant a navigational instrument and its' importance is that it is used to locate the South Celestial Pole. Like the Southern Cross, it is circumpolar to the south pole.

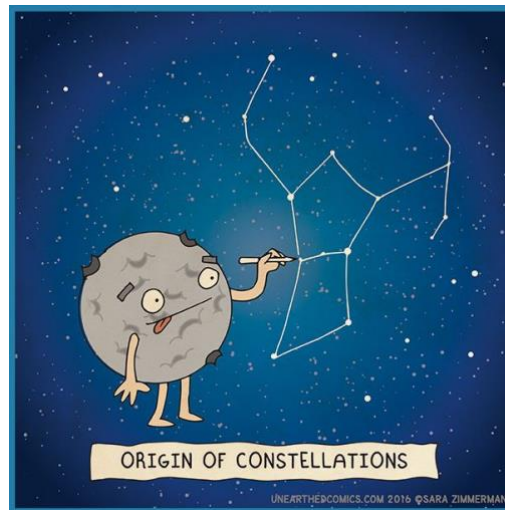
Lacerta, the Lizard, lies between Andromeda and Cygnus in the northern sky. Lacerta is the Latin word for lizard. It is small and relatively unknown because it has no important stars in its area. Perhaps its only importance lies in the fact that it is part of the Perseus family of constellations

Once upon a time Grus was a part of Piscis Austrinus, but today, it is a southern constellation on its own. The 45th constellation in size, located in the fourth quadrant of the southern hemisphere. Alnair is its' brightest star. There is a star in Grus called Gliese 832 and this is one of the six stars known stars in Grus with exoplanets.



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THE JAMES WEBB SPACE TELESCOPE AND WHAT IT WILL DO:

The James Webb telescope has been designed to take over from the Hubble space Telescope which has become expensive to keep repairing and upgrading. Thus, the James Webb Space Telescope is an orbiting infrared observatory that will complement and extend the discoveries of the Hubble Space Telescope, with far more advanced modern technical data, longer wavelength coverage and greatly improved sensitivity.

The orbit of the Hubble Space Telescope is about 568 kms from Earth with a decaying orbit over time due to atmospheric drag. Atmospheric Drag is a term used in the build of spacecraft having a random probability distribution or pattern that may be analysed statistically but may not be predicted precisely. This is because the attitude estimation errors of spacecraft in the formation will couple into the accelerations produced by drag for almost all spacecraft shapes.

The Hubble was launched into space on April 24, 1990. The Hubble is still in good use and is expected to last through at least 2020.

The James Webb Space telescope is meant to observe deep space primarily in infrared. This means that it will be able to measure objects that are more distant, redshifted, and are further from the visible range of observation than Hubble. However, the James Webb Space Telescope will not be in orbit around the Earth, like the Hubble Space Telescope is, it will orbit the Sun, 1.5 million kms away from the Earth at what scientists call the second Lagrange point or L2.

The search for life and worlds that could theoretically support life as we know it here on Earth depends on humans' ability to explore and study corners of the cosmos far from home. The James Webb, set to launch in 2021, has four main objectives: to detect light from the first stars and galaxies that formed in the universe, to study planetary systems, to examine the formation of stars and planetary systems, and to investigate life's origins. Scientists have hoped that, by pursuing these objectives, the telescope may also advance the search for life.



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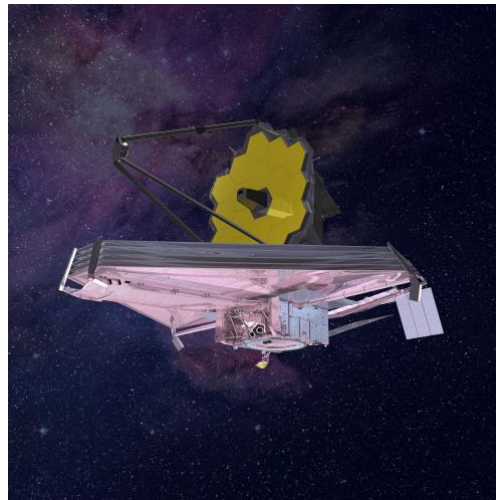
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Scientists are particularly interested in the TRAPPIST-1 system because, although simulations in previous studies have shown that most of the worlds in this system are probably uninhabitable, one TRAPPIST-1e could host liquid water and be capable of supporting life as we know it.

The James Webb Space Telescope (Webb) could gather information about the atmospheres of planets in the TRAPPIST-1 planetary system, but the greatest obstacle may be clouds, one new study has found.

TRAPPIST-1, is an ultra-cool red dwarf star that is slightly larger, but much more massive, than the planet Jupiter; it is located 39.6 light-years from the Sun in the constellation Aquarius. Seven temperate terrestrial planets have been detected orbiting the star, a larger number than detected in any other planetary system.



NASA+picture+of+the+James+Webb+in+space&tbn=isch&source=univ&client=firefox-b-d&sa=X&ved=2ahUKEwikzLP6iNrAhXSNcAKHZSoB1YQ7Al6BAgHECQ&biw=1440&bih=786#imgsrc=jHiouYJ-

[https://www.sciencedirect.com/topics/engineering/atmospheric-drag:](https://www.sciencedirect.com/topics/engineering/atmospheric-drag)
<https://www.space.com/james-webb-space-telescope-trappist-1-exoplanets-problem.html>



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THE NIGHT SKIES IN OCTOBER:

Most of our Southern winter favourites are still with us. However, being October, we will find the big and important ones like Scorpius, which houses the star Antares along with quite a few Messier objects in and around, in the north-north west and heading downward for the close of our winter season.

For some time now Orion has been up in the early morning hours will be in our skies shortly after midnight, truthfully following the old myth about Scorpius and Orion. It is a thought that, following the old saying; all good things come to an end but that is not so when it comes to the constellations and their important stars. At the equinoxes we can see the passing and the coming constellations in one night, just as Scorpius and Orion are in the sky, during the early hours pre-dawn, at the moment.

Just recently a planet had been found orbiting a sun-like star just 10 light years away. The parent star is Epsilon Eridani. Epsilon Eridani, the star, is near Orion's belt and it is the closest yet, found to house an extra-solar planet. Interestingly, this planet is thought to have a mass like Jupiter and orbiting closer to its star. This planet orbits elliptically which raises the thought to our scientists, whether the nearly circular orbits of planets in our solar system, are possibly an uncommon pattern.

Now is the time to have a look at the Messier objects around Scorpius, namely: M4-NGC 6128, M6- NGC 6405, M7- NGC 6475 the Ptolemy Cluster and M8- NGC 6093.

Of these, the Butterfly Cluster is perhaps the most fascinating, a beautiful delicate arrangement of stars.

The two major stars are Antares the heart of the scorpion and Shaula in the tail.



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Beta Scorpii with the traditional name Acrab is a multiple star System in Scorpius. it appears as a binary star with two components separated by 13.5 seconds of arc. The brighter of the two components is itself a binary star with an orbital period of 610 years and its own brighter component is a spectroscopic binary, with components separated by only 1.42 milli-arc seconds and orbiting each other every 6.82 days. One has every chance to study and photograph it Messier objects in Scorpius until it passes from our skies and returns next winter so enjoy the fun.

[//apod.nasa.gov/apod/ap000807.html](http://apod.nasa.gov/apod/ap000807.html)

www.constellation-guide.com/constellation-list/scorpius-constellation/

ASTERIODS, COMETS AND METEORS FOR 2019:

The Southern Taurids are a long-lasting shower that reaches a barely noticeable maximum on October 9 or 10. The shower is active for more than two months but rarely produces more than five shower members per hour, even at maximum activity. The Taurids (both branches) are rich in fireballs and are often responsible for increased number of fireball reports from September through November.

<https://www.amsmeteors.org/meteor-showers/meteor-shower-calendar/>.

What are the chances that an asteroid will surprise us and hit Earth?

The chances that an asteroid can hit Earth seem most unlikely. Asteroids can come pretty close, as in astronomical terms, thousands of kilometres away, as in 100,000Kms., but, hitting Earth, no, everyone would no doubt be made aware of that occurrence long before it was to happen, definitely the larger ones.

NASA admitted that it was already too late when the agency detected an asteroid that was on a collision course with Earth. The asteroid breached Earth's atmosphere and exploded somewhere over the Caribbean. ... The space agency noted that the asteroid entered Earth's atmosphere just hours after it was spotted. The asteroid that recently hit Earth was identified as 2019 MO, which had an estimated diameter of only 16 feet. It entered Earth's atmosphere on June 29. Before colliding with Earth, NASA reported that it first spotted the asteroid more than 300,000 miles from the planet. According to the agency, the size of the asteroid made it almost impossible to detect.



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“When first spotted, 2019 MO was about 310,000 miles from Earth – farther out than the orbit of our Moon,” NASA said in a statement. “This was roughly the equivalent of spotting something the size of a gnat from a distance of 310 miles.”

<https://earthsky.org/space/asteroid-2006-qv89-strike-earth-september-2019>

Orionids	Oct 02 – Nov 07	Oct 21	23
Southern Taurids	Oct 01 – Nov 25	Nov 05	5
Northern Taurids	Oct 01 – Nov 25	Nov 12	5
Leonids	Nov 10 – Nov 23	Nov 18	15+
Puppis/Velids	Dec 01 – Dec 15	Dec 07	10
Geminids	Dec 07 – Dec 17	Dec 14	120
Ursids	Dec 17 – Dec 26	Dec 23	10

Although this news below will have no bearing on meteor showers in October. It is in fact meteor shower news with regard to the constellation Aquarius. Avid meteor shower watchers may be familiar with the three showers that seem to emanate from Aquarius each year. The first is the Eta Aquariids, which on the 5th and 6th of May. This is the strongest of the three and can produce up to 35 meteors per hour. The meteors from this shower come from materials shed by Comet Halley as it travels through the solar system. The Delta Aquariids that peak twice: once on the 29th of July and again on the 6th of August. It's not quite as active as its sister shower in May, but still worth checking out. The weakest of the three is the Iota Aquariids, which peak on August 6th each year.



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NASA+current+picture+of+October+asteroid&client=firefox-b-d&tbn=isch&source=iu&ictx=1&fir=WlaTnzB4pntcGM%253A%252CpNZMLlile9XKpM%252C_&vet=1&usg=AI4_kQA6DBFo423SenjoTKeyfa3JAzOQ&sa=X&ved=2ahUKEwjz_KjZldjkAhXKiFwKHZe0DSkQ9QEwAXoECAQQCQ#imgsrc=9v8zcRZ3wxYR7M:&vet

COSMOLOGY:

SPACE TIME:

Imagine a dark spiders-web stretched vastly across our dark night skies. It covers the grandest of all, our Universe.

The Cosmic web is filled with dark energy and dark matter and today, every new measurement or discovery our scientists make, adds another flame or point of interest.

“The value of the current expansion rate of the universe, also called the Hubble constant, appears to depend on how it's measured. Observations of the early universe give lower values than those measured using nearby objects. Studies of red giant stars are giving a value of the Hubble constant that's right in the middle.”

Freedman et al. / Astrophysical Journal

Scientists today, have used many different methods, relying on very different physics, yet they all get very similar results, that is, the Universe today appears to be expanding much faster than what is expected, based on the measurements of the early Universe.



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There are two ways that astronomers can estimate the current expansion rate, also known as the Hubble Constant. The first is to look way back in time and space. Most precise measurements of the cosmic microwave background (CMB), the Big Bang's "afterglow," provide a window into the young universe. Tiny temperature fluctuations in this background radiation correlate to density variations in a cosmos only 370,000 years old, which in turn relate to the structure of galaxies and galaxy clusters in the universe today, roughly 13.8 billion years later. Cosmologists can reproduce those temperature variations using the so-called "Lambda CDM" model, a scenario where dark matter and dark energy rule the universe.

In the Planck Collaboration, graphically, the strength of temperature variations is plotted vertically against their approximate angular sizes horizontally over a first or standard cosmological graph.

The expansion rate allows for numerous tests and experiments using stars like the cepheid variables and many other methods. So far, we do know that the Universe is expanding far faster than we knew before and until we can do the exact measurements and know that we are doing so, the distance discrepancy will remain.

To all our readers, do not be too concerned, someday our gifted scientists will come up with a very simply understandable answer and who knows maybe still without a visit to space.

For the meantime, we can enjoy these beautiful words, beautifully composed and perhaps they might bring more sense and understanding of those dark matters and dark energies.

Nasadiya Sukta; From the most Ancient text of Humanity-

The Rigveda {10.129}

*At first was no Being neither Non-being,
There was yet no Air nor Sky spread.
So what was covering? Where was it present?
Was Water there, in the unfathomable depth?*

*There was no Death, nor Immortality;
Of Night or Day there was yet no sign.
The One breathed windless, self-sustaining,
Other than HIM was nothing divine.*

*Darkness was there, wrapping more Darkness,
And All was Water indistinguishable, Dark.
The Cosmic seed was wrapped in the Void,
Rising at last, by the power of Thought.*



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*In this beginning, Desire took form,
The primal seed, born of the Mind.
Wisely sifting, Existence from Non-existence,
Sages have found all this in their Heart.*

*A Ray was stretched across the Void,
Know what was below, and what above.
Bearers of seed were there and Mighty forces,
Below was Strength, and Creative-will above.*

*Who really knows? Who can declare?
When did it happen? How Creation came on?
Even the Devas came after its emergence.
So who truly knows, Whence it was born?*

*He, from Whom this Creation Arose,
Did He fashion it or did He not,
He, who surveys it from the Highest Heaven,
He surely knows or maybe even He does not!*

Aum Shanti: Shanti: Shanti:

HUMANS AND SPACE

On Earth we all live under a canopy of stars, and when we look up at night, we find them exciting, breath taking and awe-inspiring. Why? Because our Universe is such a mystery to us.

Whether we see dark velvety backgrounds, virtually lit up with stars glittering like millions of diamonds, or whether we see grey darkness and an occasional star that we might recognise as one that should be shining with others, depicting a constellation. The questions that always niggle are: How does the Universe work? How did we get here and are we alone? Cosmology alongside astrophysics will find the answers in time.

Science has brought about amazing changes in points of view, for example, black holes in the long past were scary and unknown. They are now known to be at the centre of most galaxies and even in our own Milky Way.

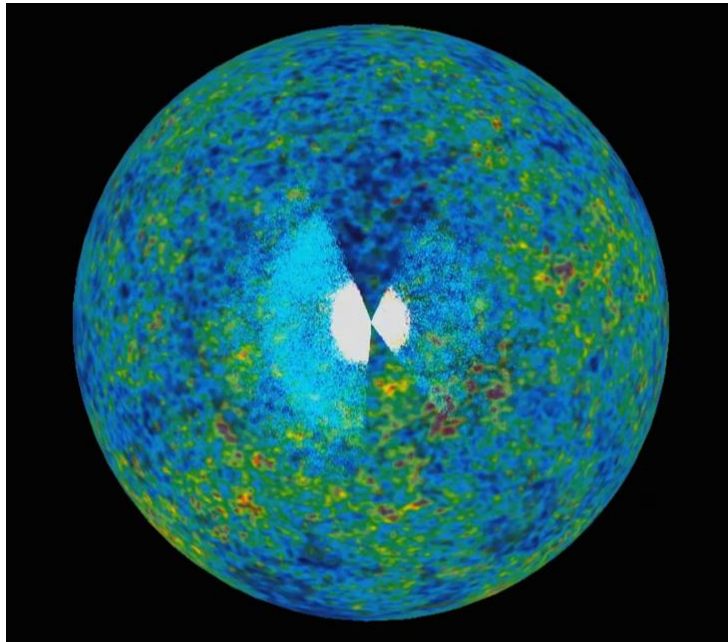


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Knowing more about our Sun, which is also a star, is also very important in understanding and knowing our cosmic origins. As more planets are found orbiting other stars (suns), understanding our own cosmic neighbourhood has never been so important.



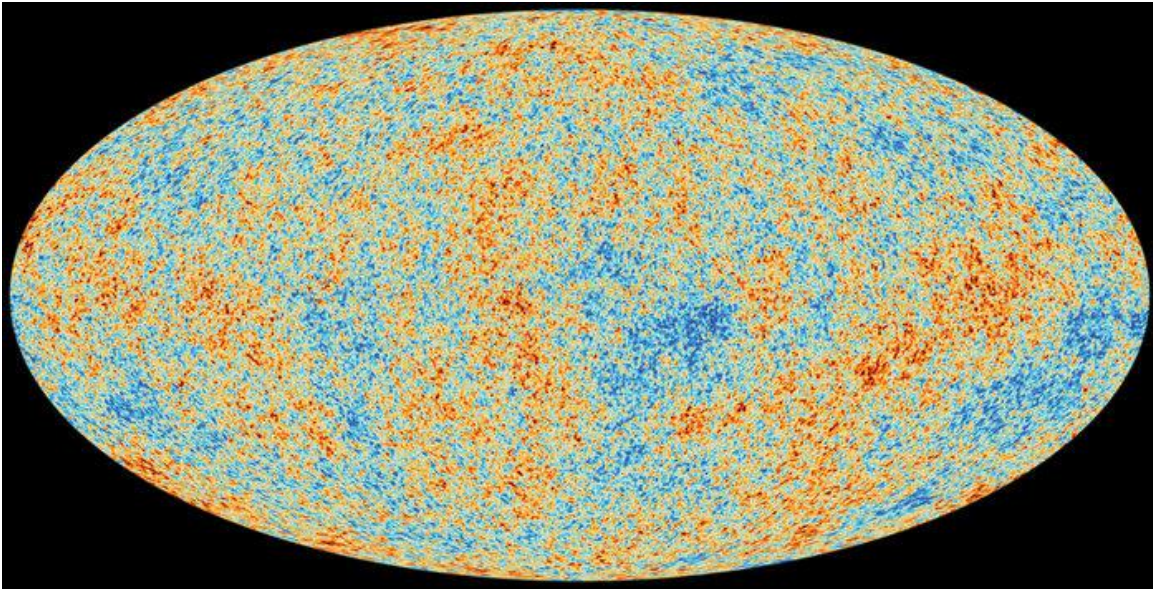
If we could 'see' microwaves, the night sky would glow with the very first light ever released into space. This is the relic radiation of the Big Bang – the event that set the beginning to the Universe itself. With our space science missions we can tease out the details of the Universe's earliest moments, seek out the very first stars and galaxies, and learn about the fabric of space and time. These incredible space observatories can also give us clues as to the future destiny of our Milky Way galaxy, and the Universe itself.

https://www.esa.int/Our_Activities/Space_Science/About_Space_Science



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Planck's view of the cosmic microwave background. **The cosmic microwave back-ground.**
The anisotropies of the cosmic microwave background, or CMB, as observed by ESA's Planck mission.

The CMB is a snapshot of the oldest light in our cosmos, imprinted on the sky when the Universe was just 380 000 years old. It shows tiny temperature fluctuations that correspond to regions of slightly different densities, representing the seeds of all future structure: the stars and galaxies of today.

This image is based on data from the Planck Legacy release, the mission's final data release, published in July 2018.

Note on Planck:

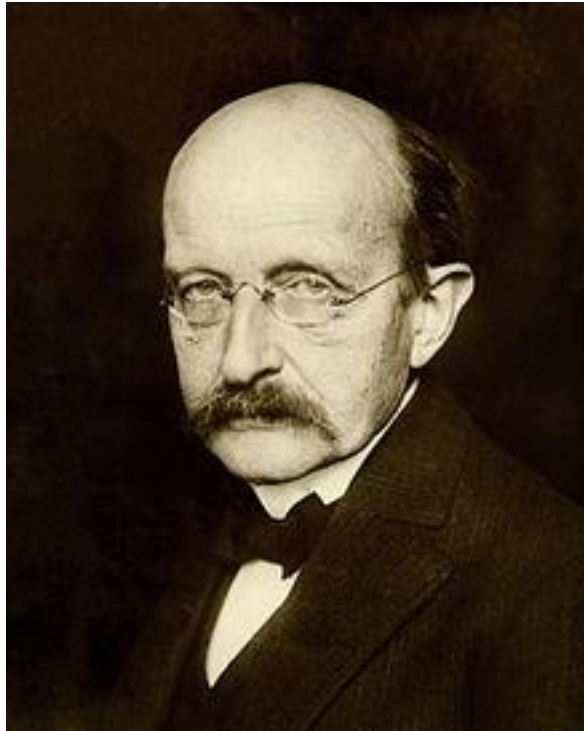
Planck's constant, symbolized h , relates the energy in one quantum (photon) of electromagnetic radiation to the frequency of that radiation. In the International System of units (SI), the constant is equal to approximately 6.626176×10^{-34} joule-seconds.

Planck, a space observatory operated by the European Space Agency (ESA) from 2009 to 2013, which mapped the anisotropies of the cosmic microwave background (CMB) at microwave and infra-red frequencies, with high sensitivity and small angular resolution. The mission substantially improved upon observations made by the NASA Wilkinson Microwave Anisotropy Probe (WMAP). *Planck* provided a major source of information relevant to several cosmological and astrophysical issues, such as testing theories of the early Universe and the origin of cosmic structure. Since the end of its mission, Planck has defined the most precise measurements of several key cosmological parameters, including the average density of ordinary matter and dark matter in the Universe and the age of the universe.



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Max Karl Ernst Ludwig Planck (23 April 1858 – 4 October 1947) was a German theoretical physicist whose discovery of energy quanta won him the Nobel Prize in Physics in 1918.

Planck made many contributions to theoretical physics, but his fame as a physicist rests primarily on his role as the originator of quantum theory,^[5] which revolutionized human understanding of atomic and subatomic processes. In 1948, the German scientific institution the Kaiser Wilhelm Society (of which Planck was twice president) was renamed the Max Planck Society (MPS). The MPS now includes 83 institutions representing a wide range of scientific directions.

https://en.wikipedia.org/wiki/Max_Planck
<https://www.space.com/16042-cosmology.html>
<https://www.physicsoftheuniverse.com/cosmological.html>





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