



East Rand Astronomy Club

The Universe Is In Us



Interstellar News

December 2019



[NASA+Pictures+of+Nebulae+in+the+southern+hemisphere&client=firefox-b-d&tbn=isch&source=iu&ictx=1&fir=q6avi-sGyPMm2M%253A%252Cg5RLGw5hSCGPzM%2](#)

The Wing in the Small Magellanic Cloud



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THE EDITORS PIECE.

With the summer holidays upon us and the year 2019 approaching its close, the ERAC Astronomy team wishes all our members:
Season's Greetings, lots of health, happiness peace and joy and may you all travel safely, wherever the destination over the holiday period!

OUR YEAR END PARTY:

WHERE: Marachelle Country Estate.

WHEN: **CANCELLED**

WHAT: A Bring and Braai – from 17:00 until after dark.

THE OCCASION: A YEAR END CLUB SOCIAL: Getting to know fellow members and talking about the stars and space.

THE OCCASION IS CANCELLED

WE REGRET TO INFORM OUR MEMBERS AND THOSE WHO WANTED TO JOIN US.
Our year end party has been cancelled due to unforeseen circumstances.

We hope to see you all at our first meeting of 2020. Same time, same venue on Wednesday 5th. February 2020.

With apologies from Neil and Jess.

SUNRISE AND SUNSET TIMES IN DECEMBER 2019:

<u>DATE</u>	<u>SUNRISE</u>	<u>SUNSET</u>
6/12/2019	05:06	18:48
13/12/2019	05:07	18:53
20/12/2019	05:10	18:57
27/12/2019	05:14	19:01

<https://www.timeanddate.com/moon/south-africa/benoni?month=11&year=2019>



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MOON TALK:

A while back, in 2009 NASA slammed a rocket into the Southern part of the moon to see if it held any water. It was detected that near the South Pole there was a lot of underground water ice. Today NASA' Space Agency is thinking of sending a rover in 2022 to the lunar South Pole in search of ice water and man to live there from 2024.

This rover will be called VIPER which stands for Volatiles Investigating Polar Exploration Rover. It will be on the moon for 100 days searching for water. NASA has another program called Artemis which is aimed at putting humans on the Moon thus, they need to choose an area where lots of water ice will be available.

The interesting part is that water is not only required for humans to settle on the Moon but if water ice is mined, astronauts can use that to extract the hydrogen and the oxygen and then use it to make rocket fuel, thus reducing the amount of fuel needed to bring astronauts to the Moon.

If the human eye could see gamma rays, Then the Moon would appear brighter than the Sun, that is, if we were to look through NASA's Fermi Gamma-ray Space Telescope. This being the case, there will most probably be further problems to overcome. astronauts and humans living on the moon would need protection from those cosmic rays that produce high-energy gamma radiation.

To understand the seriousness of this statement. Gamma rays are an energetic form of electromagnetic radiation produced by radioactive decay or other nuclear or subatomic processes such as electron-positron annihilation. Gamma rays form the highest-energy end of the electromagnetic spectrum.

All the same, as is said, there is nothing more constant than change. Astronomy hobbyists are going to hear of wonderful, surprising scientific events and amazing space discoveries in the short-term future. Who knows, all might be on the path that we find Earthlings going to live elsewhere in space.

<http://www.astronomy.com/news/2019>
wikipedia



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NASA, Apollo 8, Bill Anders
Processing: Jim Weigang

**NASA APOD: 2018 DECEMBER 24 – EARTHRISE
HISTORIC IMAGE REMASTERED**

[nasa+pictures+of+moon+rise&tbm=isch&source=univ&client=firefox-b-d&sa=X&ved=2ahUKewjD4uP865bmAhVis3EKHV6WBykQ7Al6BAgKECQ&biw=1440&bih=786](https://www.nasa.gov/pictures/0001/moonrise/tbm=isch&source=univ&client=firefox-b-d&sa=X&ved=2ahUKewjD4uP865bmAhVis3EKHV6WBykQ7Al6BAgKECQ&biw=1440&bih=786)

THE PLANETS:

A Planet is a celestial body moving in an elliptical orbit around a star. The name Planet hails from the Greek word “Planetes” meaning “Wanderer”.

Earth is at least 1,000 years old. In the very early days of astronomy all the planets, except for Earth, were named after Greek and Roman gods and goddesses. The name “Earth” is a Germanic word, which simply means “the ground.”

There are more planets than stars, that is what our scientists are still discovering. By definition, a planet is a celestial body that is in orbit around the Sun and has sufficient gravity so that it keeps its round shape.



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Mercury: is the innermost planet in the solar system, From the surface of Mercury, the Sun would appear more than three times as large as it does when viewed from Earth, and the sunlight would be as much as seven times brighter. Despite its proximity to the Sun, Mercury is not the hottest planet in our solar system. Orbiting the Sun at a distance of 0.387 AU once every 88 days.

Watch out for the Mercury transition on 11 November. Remember to use a solar filter if you are going to watch the transition.



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Venus: Is visible in our morning sky this month. Venus orbits the Sun faster than the Earth, so it will either appear in the sky in the West in the evening and rises before the Sun in the East.

Venus spins slowly in the opposite direction most planets do. The hottest planet in our solar system is not Mercury, the closest to the sun, but Venus. Venus has a very dense atmosphere that is why it is the hottest. Its thick atmosphere traps heat in a runaway greenhouse effect, making it the hottest planet in our solar system—with surface temperatures hot enough to melt lead.



Earth: Astronomers and astrophysicists study physics on Earth. They are the people who decipher the meaning of the signals in radio astronomy which reads space by sound.

Earth is the only world in our solar system with liquid water on the surface. Just slightly larger than nearby Venus, Earth is the biggest of the four planets closest to the Sun, all of which are made of rock and metal.

It is said that the size of Jupiter has protected Earth from many a meteorite hit. Satellites circle Earth to study it from above. We call that Orbital Science thus scientists are able to gather current and vital information from observing the atmosphere, the oceans and glaciers as well as the solid earth on which we live and practice agriculture..



Mars: The Red Planet resembles our own Earth in many ways. It is made of rock, plus it has an atmosphere and weather systems. Mars has two tiny moons, named Phobos and Deimos. They are probably asteroids captured by Mars. In November 2019, Mars will be more easily viewed from the Northern Hemisphere and Southern tropics than at temperate latitudes in the Southern Hemisphere. it becomes visible in the morning sky before dawn in October 2019, and then gradually becomes more easily visible and brightens as it heads towards its next closest approach to Earth.

These robotic explorers have found lots of evidence that Mars was much wetter and warmer, with a thicker atmosphere, billions of years ago.



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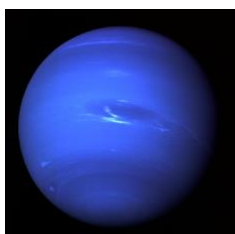
Jupiter: Jupiter has spent a long time in our night sky and is still very prominent in the early evening sky, shining brilliantly. One can see it in the south-west as soon as the sky darkens. Southern hemisphere observers get the best views because Jupiter's far southerly declination means it climbs higher in the sky. Travelling very close to each other Jupiter and Antares, the brightest star in constellation Scorpius



Saturn: Is very easy to see through out the month from nightfall to dawn. It follows close behind Jupiter and though it is not as bright as Jupiter it is still easy to find. Jupiter has lost the race! 20 new moons have been found orbiting Saturn. This brings the ringed planet's total number of moons to 82, Jupiter only has 79.



Uranus: 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

GEYSERS ERUPTING INTO SPACE – ARE THEY FOUNTAINS OF LIFE?



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Very much like Earth's moon, Europa has a leading hemisphere, meaning, Europa is gravitationally locked on to its host planet Jupiter. During 2016 -2017, scientists did see water molecules at Europa's leading hemisphere. They have also suspected a presence of water from as far back as 1979, after the spacecraft, Voyager, managed to take the first closeup pictures of this moon.

At first it was suspected that there was much water because, from photographs sent back to Earth, they found enormous geysers erupting into space.

Recently, on 18 November 2019, a team of scientists reported in the journal, *Nature Astronomy* that they had detected enough water being released from the moon Europa – “to fill an Olympic sized swimming pool within minutes.”

Scientists now think under Europa's thick icy surface there is an ocean much bigger than Earth's oceans. What's more, the ocean is thought to be of water. Water that is necessary for human life.

In the 2020's, scientists are hoping to launch the Europa Clipper mission. Hopefully this mission will report positively about the presence of water. Once it arrives at Europa the Clipper will try to take images of the plumes from the geysers. Using spectrometres, it can sample the molecules. Hopefully it can reconnoitre the moon, finding a landing site for future missions as well.

<https://www.nasa.gov/feature/goddard/2019/nasa-scientists-confirm-water-vapor-on-europa>

THE CONSTELLATIONS IN DECEMBER:

We have eight constellations in the December skies.

Aries, Cetus, Eridanus, Fornax, Horologium, Hydrus, Perseus and Triangulum.

Oddly enough, three of them have a reference to water and December falls in our summer months, rainfall season. They are Cetus the whale, Eridanus the river and Hydrus known as the southern water snake. This little river of stars does not have any mythological connections as it is so far from the Northern Hemisphere. The Romans and Greeks never knew it was there. Discovered by Dutch Sailors, it was only mapped in 1597.

Hydrus is flanked by Mensa, also historically, a very new constellation, Reticulum and Horologium and Octans.

Aries is a constellation seen by both the Northern and Southern hemispheres, and it also has Cetus flanking it.

Eridanus is the longest river in our Southern Hemisphere, It is represented as a long, winding river that starts at the left foot of Orion in the north, sweeps south of Taurus, west to the edge of Cetus, back east to Caelum. It eventually ends to the south, at the border with Hydrus. Achernar is the brightest star right next to Rigel, Orion's foot. Achernar means “The end of the River”. It is a blue white sub giant star. Cetus lies next to Eridanus as well.



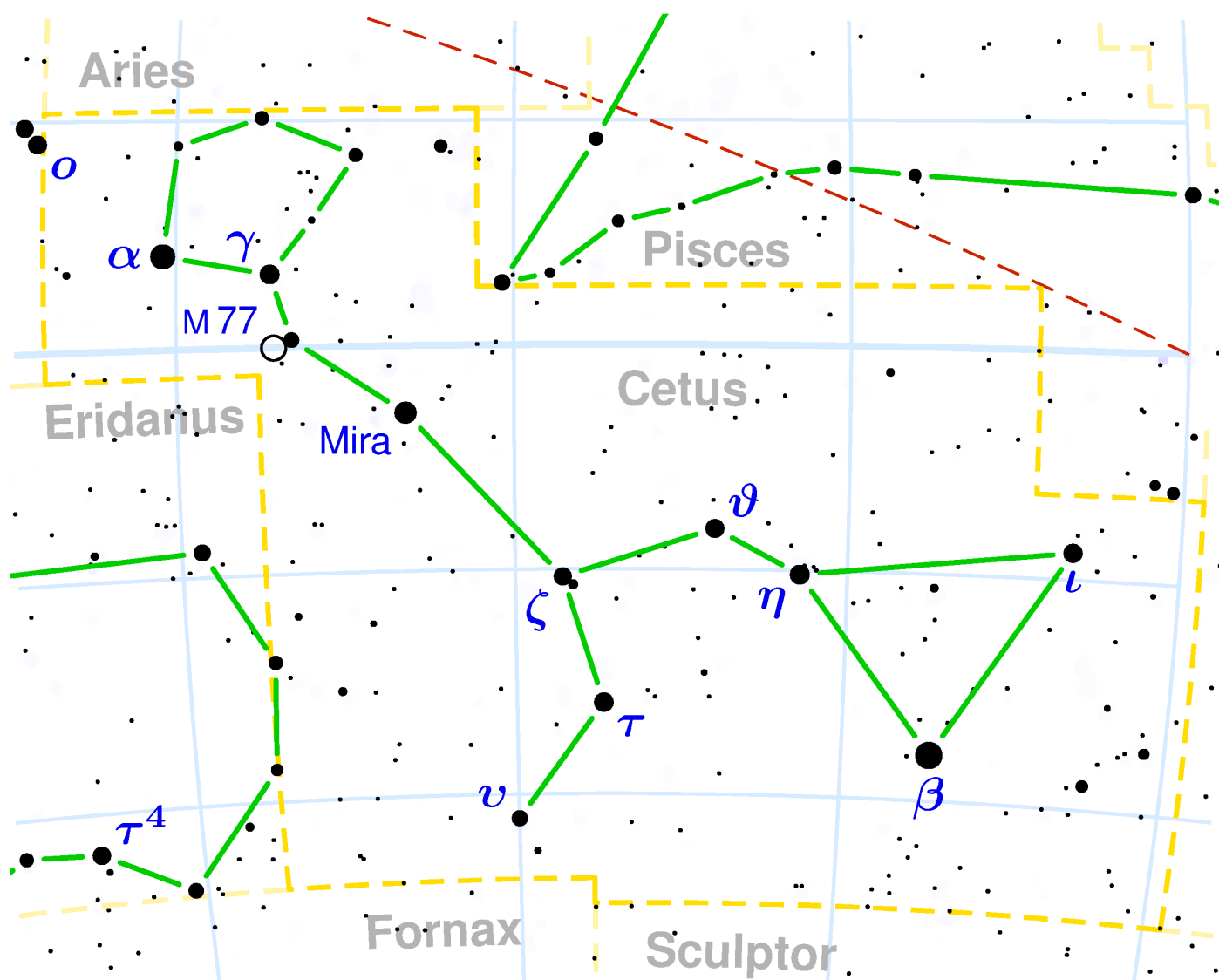
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Next to mention is Triangulum, as one looks upward it is a very clear triangle. It is bordered by Andromeda to the North East, Pisces to the West, Aries to the south and Perseus to the East.

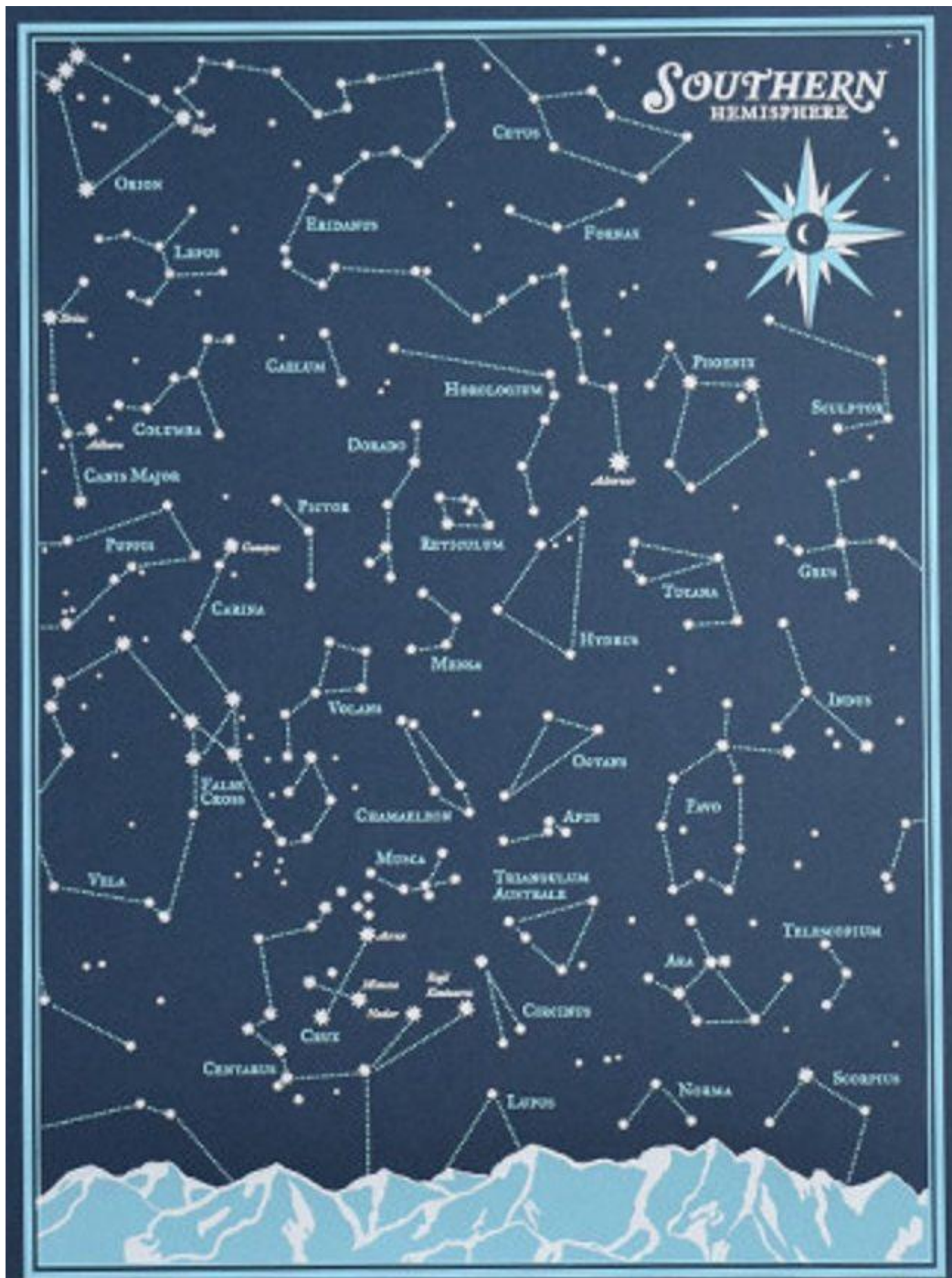
Below is a map of all constellations for dark skies in December. An interesting one to note is the river Eridanus. This long, long river, starts at Orion's foot called Rigel and winds its way all the way southward to a very bright star called Achernar. It is a bright blue star about seven times the mass of the sun.





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THE NIGHT SKIES IN DECEMBER:

Our December skies have many constellations in view but due to Gauteng being a summer rainfall area, not much stargazing is done seriously. One just watches the night skies and cloud formation to see when it is clear in one's area.

One constellation that seems to overtake everyone's interest is Orion. The biggest and the clearest constellation as it passes from East to West. Besides that, it has very familiar areas such as the three sisters nearby which is the Orion Nebula, a beautiful nebula that reminds one of a pearl in a shell.

One can star hop from Orion westward to Aldebaran in Taurus and from there to the Pleiades, the seven sisters. For an exercise see how many stars you can count in Pleiades! Orion also has his dogs and the hare nearby so look for Canis Major and Canis Minor, Lepus the Hare and our brightest star Sirius. In a straight line across from Sirius going Southward is another bright star, Canopus. Going back to Sirius go straight across from Rigel, the foot of Orion, there you will find Achernar, in Eridanus. Have a look at the bigger picture: Achernar, Sirius, Canopus form a straight line across the night sky, northeast to southeast.

From Sirius hop to Betelgeuse to Bellatrix westward to Aldebaran the major star in constellation Taurus and then westward straight on to Pleiades.

May there be many clear nights for all budding astronomers to have some fun hopping your way around the sky.

All this of course is weather permitting in Gauteng over December.

ASTERIODS, COMETS AND METEORS

Starting with meteors. In December we have 3 sets of meteors:

The Puppids/Velids: visible from 1 December to 15 December.

The Geminids: visible for 7 December to 15 December.

The Ursids: From 17 December to 26 December.

If one ventures outdoors between 1am and 4 am in the early morning, it is likely, on a clear night, one will see lots of shooting stars, the name we have given to meteors.

The Geminid shower is unusual as it is one of two meteor showers confirmed to be caused by an asteroid (most meteor showers are caused by comets).



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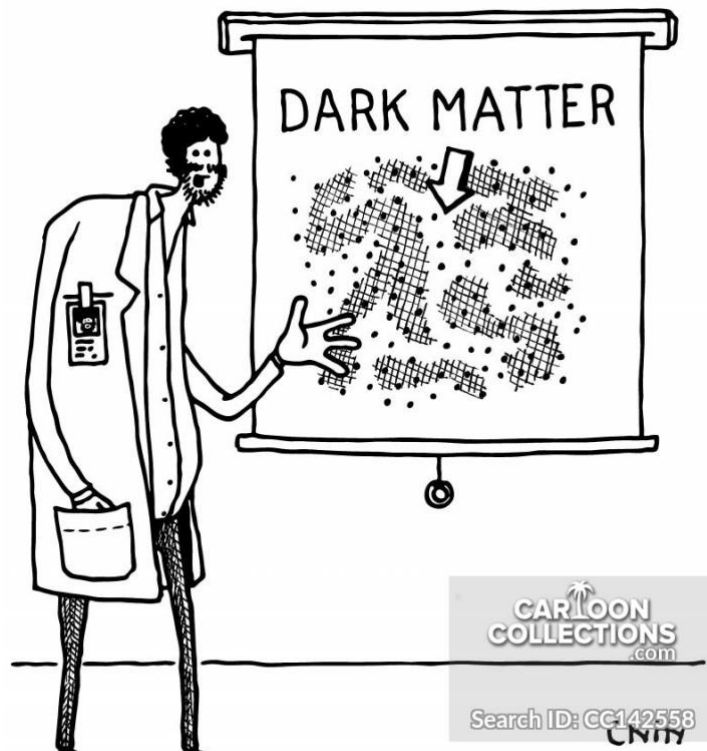


In December of each year the Earth passes through a load of debris, scattered by an asteroid called 3200 Phaethon. A fiery display is caused as the debris is vaporised by Earth's atmosphere, having travelled through the solar system for 4.6 billion years. Therefore, if anyone sees a quick or sudden fiery display in December, remember what it is.

Particles travelling through space are called meteoroids. These particles are mostly smaller than a grain of sand and enter our Earth's atmosphere. While travelling through space, such particles heat up because of friction and make a streak of light before burning up. They are known as meteors.

Comets do not shoot across the sky as one tends to think, instead they rise and set along with the stars. They are brightest when near the sun and often only visible in twilight.

Asteroids are also known as smaller solar system bodies. They are mainly the bits and pieces we call debris, leftover after the formation of the four inner rocky planets. Mercury, Venus, Earth and Mars. The asteroids circulate mainly in a belt between Mars and Jupiter, known as the asteroid belt. Most of them have no actual path they follow so they float at random within this belt.



"We're quietly confident that it smells of cinnamon."

COSMOLOGY:



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GALAXY EVOLUTION AND DARK ENERGY:

Astronomy has so many subfields of study. One of which is Radio Astronomy. This field of Study is growing immensely and should be of interest to South African Astronomers and hobbyists since we have the SKA, Square Kilometre Array situated at Carnarvon in the Northern Cape. Having said that, in south Africa we are in to listening to the sounds of the Universe, that is radio astronomy.

Can one imagine a great Cosmic Dark Age. In fact, there was a Cosmic Dark Age. It happened about twelve billion years ago. Imagine darkness, very, very dark deepened by almost nothing, probably by utter silence and then, the first stars and galaxies light up. Imagine it might have been like the first lighting of a great fireworks display, the bombing, crackling and sizzling to goes with it. Time has no meaning at this stage because how would time have been measured, gradual, instantly, in minutes, years or Light years.

Our Universe is expanding and that is a fundamental mystery of modern science. In further studies scientists are studying this acceleration, consequently they are looking at the distribution of hydrogen throughout the Universe. It has been calculated that about 70% hydrogen makes up the Universe.

The Milky Way is our Galaxy and the stars in our Galaxy are very far apart, some are thousands of light years away. The space between the stars is called the Interstellar Medium which is made up of gas and dust, the gas is hydrogen gas yet it only comprises of about 5% of the mass of visible stars.

Briefly, Dark Matter is the force understood to be causing the acceleration of the expansion of the Universe.

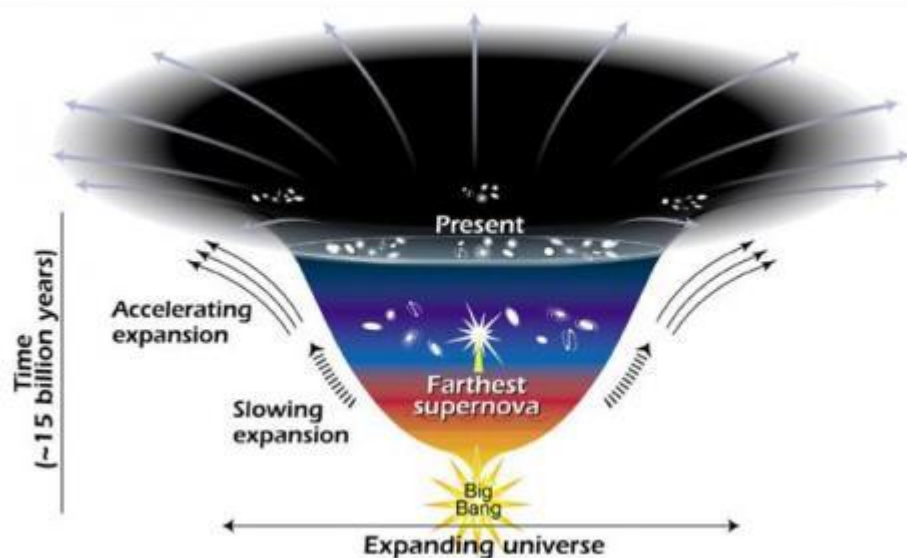
Dark Energy is the force that surpasses mutual gravitation attraction, causing acceleration in expansion.

www.sciencedaily.com/releases/2019/11/191126121134.html



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<https://www.skatelescope.org/galaxyevolution/ps://www.skatelescope.org/galaxyevolution/COSMOLOGY:>

This diagram reveals changes in the rate of expansion since the universe's birth 15 billion years ago. The more shallow the curve, the faster the rate of expansion. The curve changes noticeably about 7.5 billion years ago, when objects in the universe began flying apart at a faster rate. Astronomers theorize that the faster expansion rate is due to a mysterious, dark force that is pulling galaxies apart.

Credit: NASA/STSci/Ann Feild



"Have you ever wondered what would happen if a giant hair ball were to slam into the earth?"