



East Rand Astronomy Club

The Universe Is In Us



Interstellar News

JANUARY 2020





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Lines of Time

Image Credit & Copyright: Anton Komlev

Explanation: In time stars trace lines through the night sky on a rotating planet. Taken over two hours or more, these digitally added consecutive exposures were made with a camera and wideangle lens fixed to a tripod near Orel farm, Primorsky Krai, Russia, planet Earth.

The stars trail in concentric arcs around the planet's south celestial pole below the scene's horizon, and north celestial pole off the frame at the upper right. Combined, the many short exposures also bring out the pretty star colours. Bluish trails are from stars hotter than Earth's Sun, while yellowish trails are from cooler stars.

A long time ago this tree blossomed, but now reveals the passage of time in the wrinkled and weathered lines of its remains.

<https://apod.nasa.gov/apod/astropix.html>

THE EDITORS PIECE.

Welcome to the year 2020! Humans have advanced in time, from Caveman to what are and what there is today, yet, I think there lies a massive challenge ahead.

How did mankind get to Planet Earth and are we alone in the Universe?

With the technical and electronic advancement in the field of astrophysics, knowledge is continuously expanding. For example: Our little Parker Solar Probe, under extreme challenges, investigating, photographing and sending back to Earth such vital information. Something probably not even dreamt of being possible five decades ago. Advancing thus, 2020 is going to be a good year. Science will continue to produce spectacular answers.

We all look forward to a wonderful year ahead and may each family be guided toward, their wishes, health and prosperity!

A Shining 2020!



The Magnetic Fields of Spiral Galaxy M77

Image Credit: NASA, SOFIA, HAWC+; JPL-Caltech, Roma Tre. U.; ESA, Hubble, NuSTAR, SDSS



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OUR NEXT MEETING:

WHERE: Marachelle Country Estate.

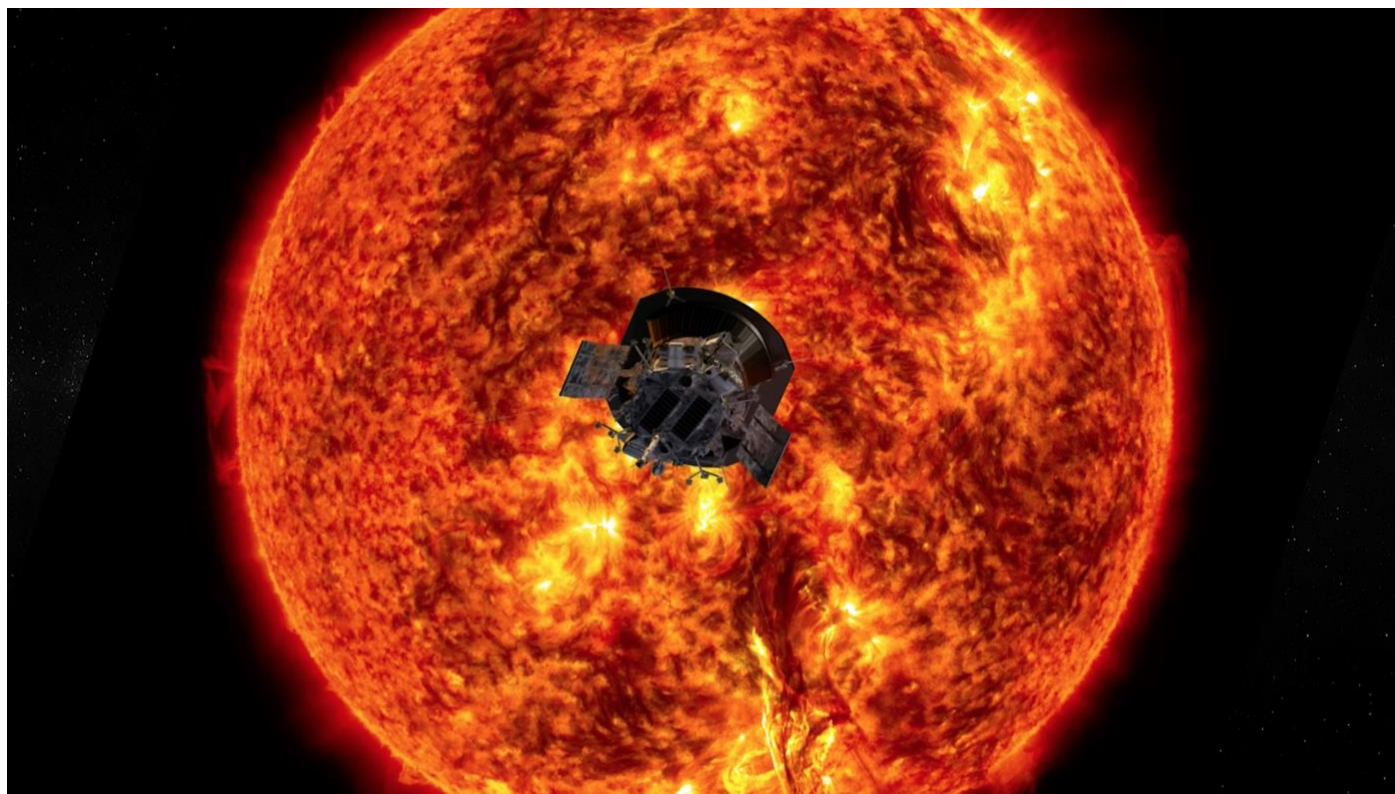
WHEN: Wednesday, 4TH. FEBRUARY 2020

WHAT: Our monthly Meeting

SUNRISE AND SUNSET TIMES IN JANUARY 2020:

<u>DATE</u>	<u>SUNRISE</u>	<u>SUNSET</u>
6/01/2020	05:20	19:03
13/01/2020	05:26	19:03
20/01/2020	05:31	19:03
27/01/2020	05:37	19:01

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





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NEWS OF THE PARKER SOLAR PROBE:

One of the most important and most exciting happenings in 2018 was the launch of the Solar Parker Probe.

It was especially built to venture as close as possible to our sun. Special protective material was used to protect all the instruments on board so that as much scientific data could be relayed back to Earth and the wonderful news is that, that has been happening.

So far it has completed three of the 24 planned passes it is due to make through the Sun's atmosphere. From this we hope to learn more and more about our existence in the Universe.

Throughout the ages man has wondered about the uses of the sun. Many have even worshipped the sun in ages past, since they knew that the sun effects and gives life to things on Earth. However, the sun is not so quiet and peaceful as those impressions lead one to believe.

The sun is our star, it is turbulent, searingly hot and violent. It sends out immense and powerful bursts of light together with weighty tons of particles of magnetised material in clouds that move at the speed of light.

All this has been happening, most probably since our star was born and became our Sun, all its lifetime and it not only affects Earth, it also affects the other planets in our Solar System and will continue to do so for the next fifty billion years, or as long as our Galaxy exists.

This activity affects our planet in many ways. Damaging particles fly into the space where our satellites and astronauts fly. When a very bad eruption happens, it can affect our communication and navigation signals. Extreme activity could affect our power on Earth and cause power outages.

Perhaps in its favour is some sign of beauty. As the solar winds drive the magnetic rays through the solar system it causes the beautiful magnificence of the northern lights, a tourist attraction to icy winter locations in the northern hemisphere.

Northern lights form when the charged particles of a solar flare penetrate our Earth's magnetic field. These particles collide with atoms and molecules in our atmosphere and make photons which make up the Aurora or Northern Lights.

Some of these lights have been observed as low as in the region of Northern California and although not as frequently, Southern Lights Have been observed in New Zealand.

<https://www.sciencedaily.com/releases/2019/12/191204144903.htm>



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NASA+Picture+of+the+Northern+Lights&tbn=isch&source=univ&client=firefox-b-d&sa=X&ved=2ahUKEwiw3JSKsavmAhWESxUIHZJpBP

THE MOON IN JANUARY 2020:

	MOON RISE	MOONSET	MOON PHASE
03/01/2020	12:22pm	12:01 am	First Quarter
10/01/2020	18:58pm	04:45 am	Full Moon This full moon was known by early Native American tribes as the Full Wolf Moon because this was the time of year when hungry wolf packs howled outside their camps.
17/01/2020	00:00	12:11pm	Last Quarter
24/01/2020	04:55 am	18:56pm	New Moon

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



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January 10 - Penumbral Lunar Eclipse.

A penumbral lunar eclipse occurs when the Moon passes through the Earth's partial shadow, or penumbra.

During this type of eclipse the Moon will darken slightly but not completely. The eclipse will be visible throughout most of Europe, Africa, Asia, the Indian Ocean, and Western Australia.

NASA Map and Eclipse Information

MOON TALK:

This month seems to be the time to carry the importance of the effects of the Sun and the Moon on Earth.

Moon is Earth's only natural satellite and its influence on Earth has been noted down through the ages.

An interesting point to note is that the Moon moderates the Earth's wobble on its axis. One of the consequences of this is that we enjoy a stable climate which has been with us for billions of years. Our little moon at 384,400 kms away, influences the seasons and the movement of Earth.

The moon, when formed was in a molten state about 100 million years ago. Overtime this magma crystallized and with an extremely thin atmosphere, meteorite, comets and asteroids just hailed all over the surface of the moon changing the surface as we know it today. The light areas are the boulders, ridges and mountains while the darker patches are known as Maria from the Latin word "seas", or lakes.

The entire moon surface is covered with a grey charcoal coloured dusty powder and rocky debris known as regolith.



https://www.nasa.gov/images/content/100000main_moon_earth_01.jpg



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THE PLANETS:



Mercury: The smallest planet in our solar system and the nearest to the Sun, Mercury is only slightly larger than Earth's Moon, but Mercury is the fastest planet, zipping around the Sun every 88 Earth days. That is why this planet is named after Mercury, the swiftest and most powerful god in Greek literature. Mercury is currently in our dawn skies but very difficult to see.

Mercury is also very similar in appearance to Earth's moon. Mercury's entire surface is scarred by many impact craters from comets or meteoroids. An atmosphere could have slowed down the bombardments had Mercury had an atmosphere, it suffered due the many bombardments about 3.8 billion years ago. Mercury was also volcanically active during this period.



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Venus: is still bright and well positioned as an evening planet low in the west. Venus gives rise to two complete opposite oddities in thought. The second planet from the sun and the only planet named after a female, the Roman goddess of love and beauty. This naming might be because Venus had the brightest shine of the five planets then known to the ancient astronomers.

By contrast Venus is the most hellishly hot Planet in the Solar system with temperatures reaching 465degrees Celsius. Not the closest to the sun, but its dense atmosphere traps heat in a runaway version of the greenhouse effect that Earthlings say is causing global warming on Earth. Once you look through the cloud of gas that surrounds the planet and gives it its almost ethereal beauty. It is a brown, dead, hard rock dry and extremely volcanic surface you will see,

Not only that, Venus has a toxic atmosphere consisting mainly of carbon dioxide and clouds of sulphuric acid with only trace amounts of water in the atmosphere, an atmosphere heavier than that of any other planet with a surface pressure 90 times that of Earth. Lifeless.



Earth: January is the start of Earths calendar year when it is deeply in its summer cycle therefore temperatures are high in the southern hemisphere while the northern hemisphere experiences winter.

NASA is currently studying Earths Poles and why we have a leaky atmosphere. It is a strange type of Aurora they are studying. To do that they launch rockets through these auroras and take note of the oxygen particles that escape so that history can be gathered.

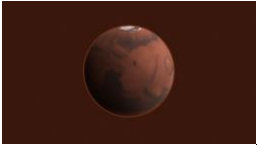
Our Ice-covered Poles are very interesting to scientists. Only in December did a group of scientists, flyover the Antarctica and discover the deepest point on Earths Continent. The area is under the Denman Glacier in East Antarctica. This is an ice-filled canyon 3.5 km. below sea level only in the ocean are the valleys much deeper. The deepest ocean point is in the Mariana Trench in the western Pacific, that goes 11km. below the sea surface. There are land Canyons that have taller sides, but the floors are above sea level. An example would be the Yarlung Tsangpo Grand Canyon in China.

It makes one think Earth is as much in discovery as man is endeavouring to make discoveries outside planet Earth, and, like all other planets, we cannot vouch on the stability of planet Earth either.



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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. Once upon a time billions of years ago, evidence has been found that Mars was much wetter and warmer with an atmosphere much thicker. Mars has years in our sky when it appears bright and exciting and years when it does not. Currently it is dull and not that noticeable in our skies. From January to April, Mars will not be that noticeable in our skies about 2 to 2.5 hours before sunrise because it is right across the Solar System away from Earth. The Red Planet will be reddest and at its brightest only towards October 2020.



Jupiter: Jupiter (only) has 79 moons. Jupiter is a morning planet but too near the sun at the beginning of January but will be rising an hour before sunrise by the end of January. The fifth planet from the sun and Jupiter is the largest planet in the solar system. It is more than twice as big as all the other planets combined. Jupiter has very interesting stripes or bands. Temperature wise, they are very cold, windy swirls and stripes of clouds of ammonia and water in an atmosphere of hydrogen and helium. Jupiter also has rings like Saturn, but they are very faint and made of dust.



Saturn: is in conjunction with the Sun on 14 January and not visible this month. Twenty new moons have been found orbiting Saturn. This brings the ringed planet's total number of moons to 82, Jupiter only has 79. Saturn has a beautiful system of icy rings surrounding it and is quite majestic to look at through a telescope. It is not the only planet with rings, but no other planet has rings quite so spectacular or as complex as Saturn's rings. Saturn, like Jupiter is a gas giant, an enormous planet made of helium and hydrogen gas.



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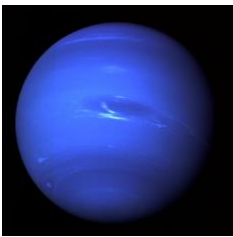


Saturn is famous for its rings and its 82 moons, but everyone awaits news on the scientific discoveries that have been made since the departing of the Cassini Satellite by disappearing forever into the space of the rings.



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 and orbits the sun like a rolling ball. Though low above the horizon Uranus is well positioned in the evening sky at the beginning of January but loses altitude towards the end of the month.

Uranus is a cold, windy ice planet. An ice giant surrounded by 13 very faint rings and 27 small moons. Uranus' atmosphere is mostly hydrogen and helium, with a small amount of methane and a very small amount of water and ammonia. The methane gives Uranus its signature blue colour.



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

Like Uranus, Neptune is cold, very windy and eerisome dark. It's the last of the planets in our solar system. It's more than 30 times as far from the sun as Earth is. Neptune is very similar to Uranus. Its atmosphere is made of hydrogen, helium, and methane. The methane gives Neptune the same blue colour as Uranus. Neptune has six rings, but they're very hard to see.

NASA Solar System Exploration pictures

<https://earthsky.org/astronomy-essentials/visible-planets-tonight-mars-jupiter-venus-saturn-mercury>

<https://spaceplace.nasa.gov/all-about-neptune/en/>



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EXO PLANETS: THE KEPLER MISSION

It is a known fact that our Sun is a star. All the planets in our solar system orbit around the Sun. Planets that orbit around other stars, (Suns,) are called Exoplanets. Exoplanets are very hard to see for they are hidden by the bright glare of the stars they orbit but they are very common, so, astronomers use other ways to detect and study these distant planets. They search for exoplanets by looking at the effects these planets have on the stars they orbit.

By studying the time between transits, astronomers can also find out how far away the planet is from its star. If a planet is just the right temperature, it could contain liquid water, which mankind thinks, is needed for life.

So far, thousands of planets have been discovered by the Kepler mission. And more will be found by NASA's Transiting Exoplanet Survey Satellite (TESS) mission, which is observing the entire sky to locate planets orbiting the nearest and brightest stars.

In 2009, NASA launched a spacecraft called Kepler to look for exoplanets. Kepler looked for planets in a wide range of sizes and orbits. These planets orbited around stars that varied in size and temperature.

Some of the planets discovered by Kepler are rocky planets that are at a certain distance from their star. When at this certain distance it is called the habitable zone, where life might be possible.

Kepler detected exoplanets using something called the transit method. When a planet passes in front of its star, it's called a transit. As the planet transits in front of the star, it blocks out a little bit of the star's light. That means a star will look a little less bright when the planet passes in front of it. Observing the change in the brightness of a star during a transit is how the size of the planet gets figured.

<https://spaceplace.nasa.gov/all-about-exoplanets/en/>

THE CONSTELLATIONS AND STARS IN JANUARY:

Stars can be of different colours. Usually, most observers have difficulty in seeing different colours or tints because a lot depends on the equipment used as well as the observer's eyesight. At low light levels, colours are not readily visible, yet the colours are quite distinct in photographs.

Individual stars get divided into spectral classes. This is a scientific way of describing the temperature and composition of a star. Here are a couple of examples:



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Spica in Virgo is a bluey colour and has a very hot temperature of 25000 degrees centigrade.

Our sun has a temperature of 6000 degrees centigrade and is a nice yellow colour.

Betelgeuse in Orion is a dull, deep red in colour and has a temperature of 3000 degree centigrade.

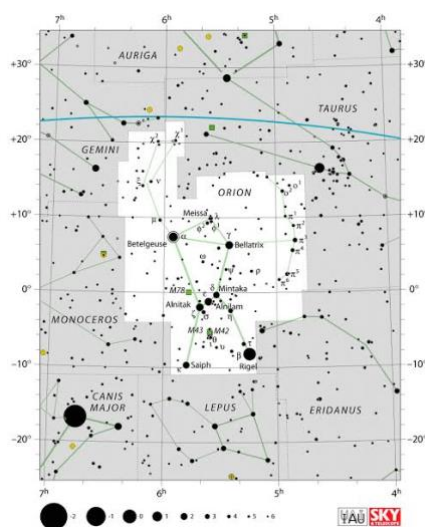
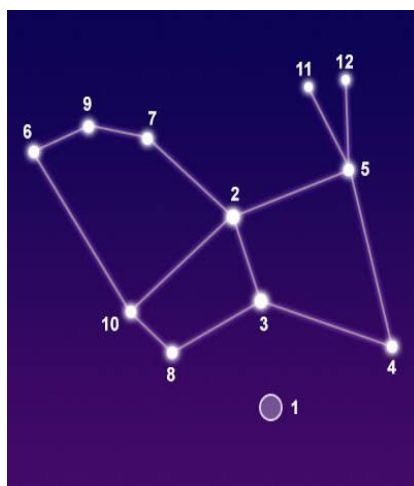
Thus, approximately in this manner, one can say that the hotter the star, the lighter the colour of the star is.

All the stars you see belong to one special group of stars — the stars in our own galaxy, the Milky Way.

Each constellation on the other hand, is a collection of stars that are distributed in three-dimensional space; meaning the stars are different distances from Earth. The stars outlining constellations and all the stars in a constellation only appear to be in the same plane, simply because we are viewing them from far, far away. Sometimes, in reality, the faintest star is the closest and the brightest star the farthest away.

Constellations given the ancient names are usually found within the northern hemisphere while modern constellations like the Peacock and Telescope were named by astronomers of the 1500/1600 and 1700s. They used telescopes then and were able to observe the night sky in the Southern Hemisphere, that is why the more modern names are found mostly in the Southern Hemisphere.

Two constellations, Orion and Taurus, are quite prominent in the evening sky, while others are simply best observed at this time of year. Orion, Taurus and Lepus are northern constellations, located in the first quadrant of the northern hemisphere, while others lie in the first quadrant south of the celestial equator. It is to be noted, all constellations as seen in the Southern Hemisphere are upside down; therefore Lepus, the hare, can be seen very clearly at the feet of Orion designated by the bright stars, Rigel and Saiph. One can join the dots and maybe not too clearly, make out Lepus the Hare.





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SATELLITES IN JANUARY 2020:

No Earlier Than: January 4, 2020

Mission: SpaceX Commercial Crew In-Flight Abort Test

Description: The test of SpaceX's Falcon 9 rocket and Crew Dragon spacecraft will launch from Launch Complex 39A at Kennedy Space Center in Florida. As part of the test, SpaceX will configure the spacecraft to trigger a launch escape shortly after lift-off and demonstrate Crew Dragon's capability to safely separate from the rocket in the unlikely event of an in-flight emergency.

ASTERIODS, COMETS AND METEORS:

What makes a comet flare up suddenly? No one knows exactly, but astronomers do know that outbursts are sometimes seen when comets are near their parent stars. Now University of Maryland astronomers say they've made the most complete and detailed observations to date of the formation and dissipation of a comet outburst. The comet is none other than 46P/Wirtanen, which last swept closest to the Earth and sun in its 5.4-year orbit in late 2018. This comet was the original target for investigation by the European Space Agency. The Rosetta Spacecraft missed the time for launching so the Rosetta Spacecraft was sent to 67/P Churyumov-Gerasimenko instead.

NASA's EXOPLANET_HUNTING MISSION CATCHES A NATURAL COMET OUTBURST IN UNPRECEDENTED DETAIL.

Dec. 3, 2019

"Astronomers at the University of Maryland (UMD), in College Park, Maryland, have captured a clear start-to-finish image sequence of an explosive emission of dust, ice and



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gases during the close approach of comet 46P/Wirtanen in late 2018. This is the most complete and detailed observation to date of the formation and dissipation of a naturally-occurring comet outburst."

<https://www.nasa.gov/feature/goddard/2019/nasa-s-exoplanet-hunting-mission-catches-a-natural-comet-outburst-in-unprecedented-detail>

The Quadrantids can be seen in January and are thought to be dust grains left behind by an extinct comet known as 2003 EH1 which was discovered in 2003. They hail from the Constellation Bootes but can be seen anywhere in the sky.

The Quadrantids is an above average shower, with up to 40 meteors per hour at its peak. Meteors will radiate from the constellation Bootes. They can, however, appear anywhere in the sky from 1 am in the morning until early dawn, between the 1st. and 5th of January.

COSMOLOGY:

WHEN IT ALL BEGAN:

After the Big Bang, leaving behind whatever there was at that time, I imagine the Universe settled down to a cosmic darkness and silence, a floating silent theatre, the Universe waiting silently upon time.

Scientists know that the first atoms that were formed, after the Big Bang, were positively charged hydrogen ions and as the Universe cooled the hydrogen atoms reunited with electrons and formed neutral hydrogen. That was basically all there was, until twelve billion years ago, when atoms started clumping together, and the great cosmic dark age ended. This was when the first stars and galaxies lit up. Light from those stars and galaxies re-ionized the neutral hydrogen and so it disappeared from interstellar space.

As very little is known about that time when the first stars formed, a radio telescope was built. Called the Murchison Widefield Array (MWA), to help detect the signal of neutral hydrogen. Scientists need to locate the neutral hydrogen signal in order to measure how it has changed.



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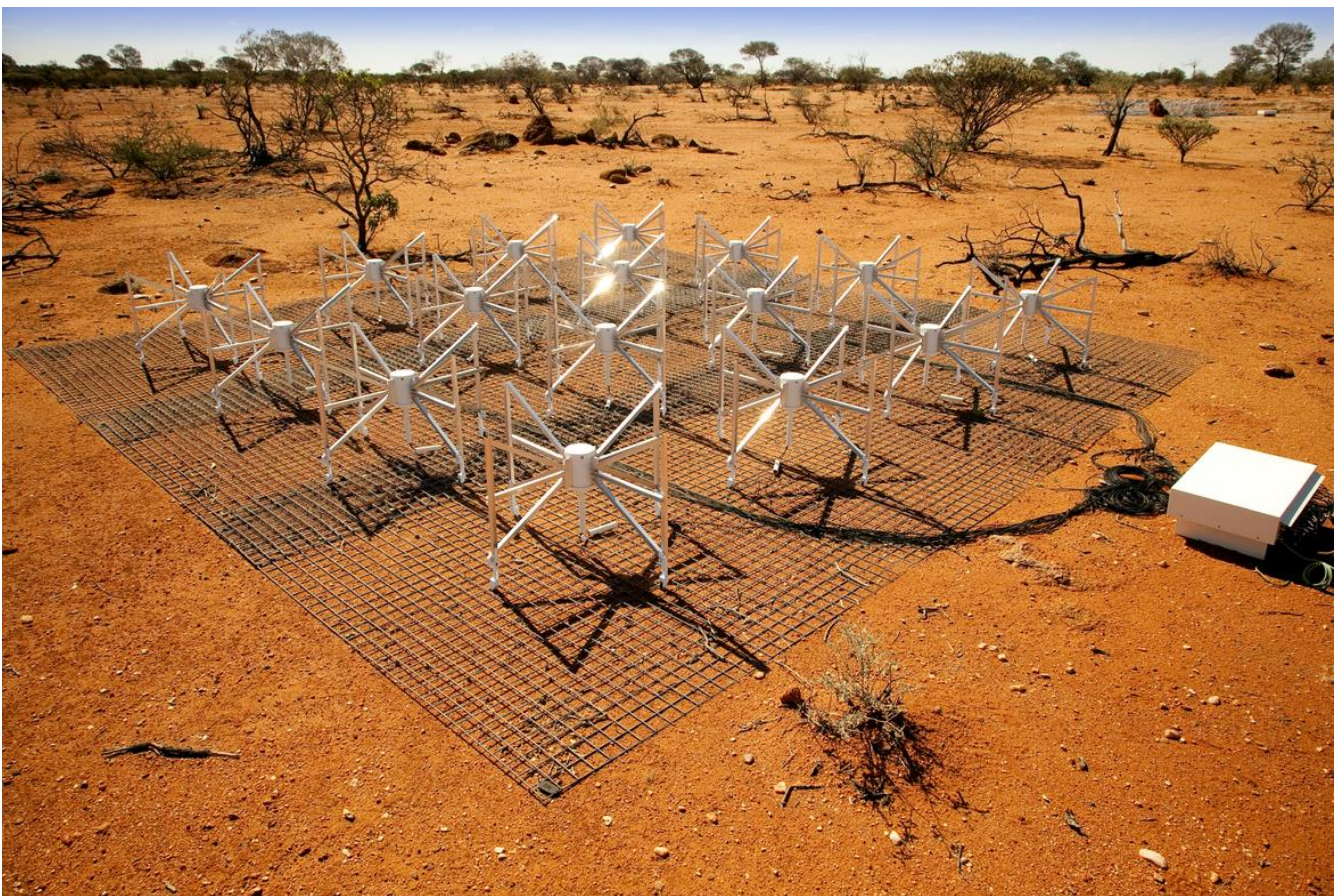
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Today, stars are known as the building blocks of the Universe. Thus, if neutral hydrogen could be located and measured how it changed as the Epoch of Re-ionization occurred then scientists could discover the critical information about the first stars.

The whole operation is difficult and requires intricate and sensitive equipment, lots of time and a lot of patience. The ultimate goal being to inch closer than ever to a signal from cosmic dawn.

https://www.sciencedaily.com/terms/cepheid_variable.htm



<https://www.skatelescope.org/multimedia/image/one-128-tiles-murchison-widefield-array-mwa-telescope/>

A THOUGHT FOR 2020:

"Our loyalties are to the species and the planet. We speak for Earth. Our obligation to survive is owed not just to ourselves but also to that Cosmos, ancient and vast, from which we spring." - Carl Sagan, Astronomer.