

SKYMATTERS

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100 years of the International
Astronomical Union

February 2019

Things to watch out for

February 4

The New Moon falls on this date. This means the Moon will be located on the same side of the Earth as the Sun and will not be visible in the night sky. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

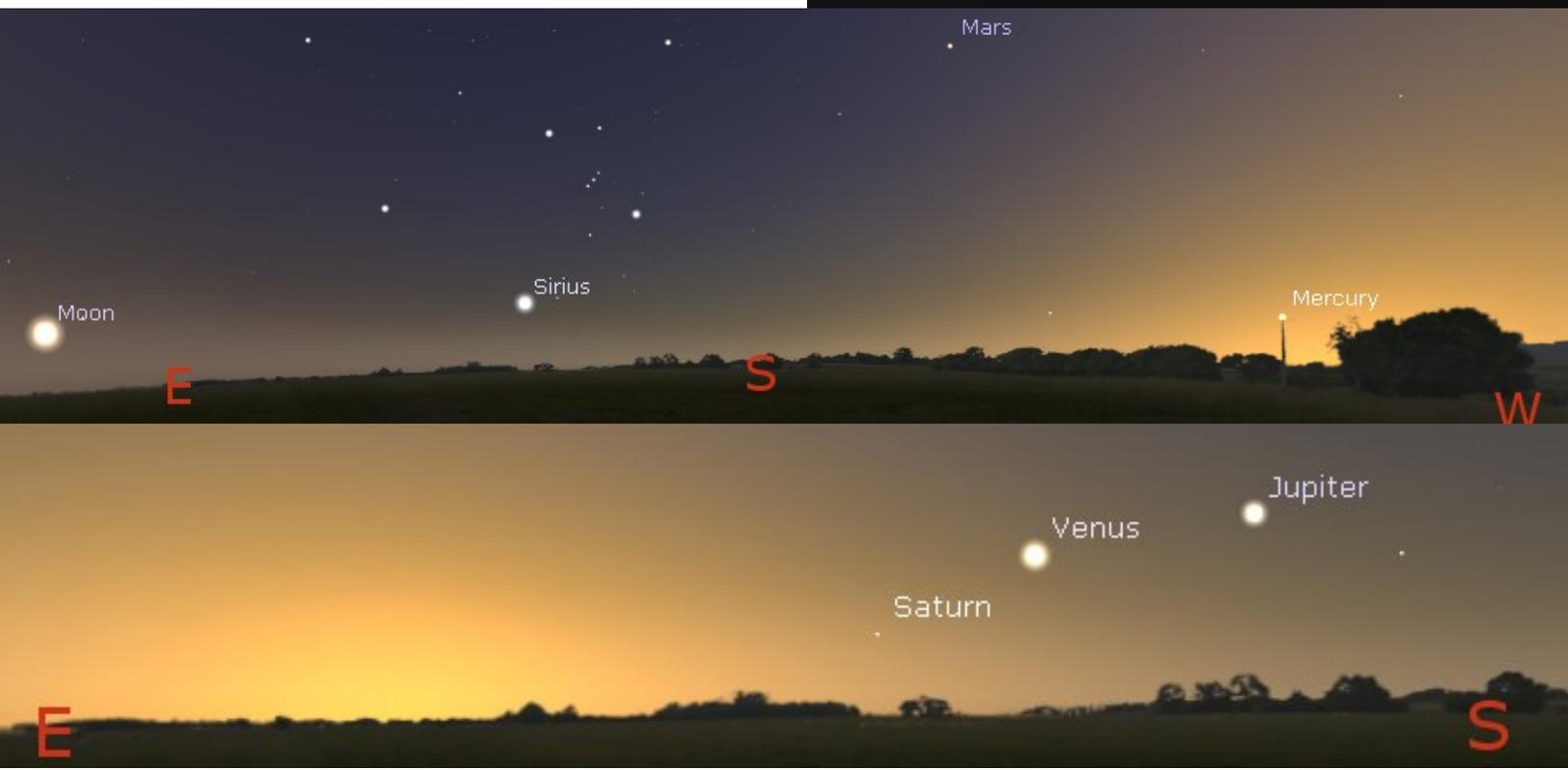
February 19

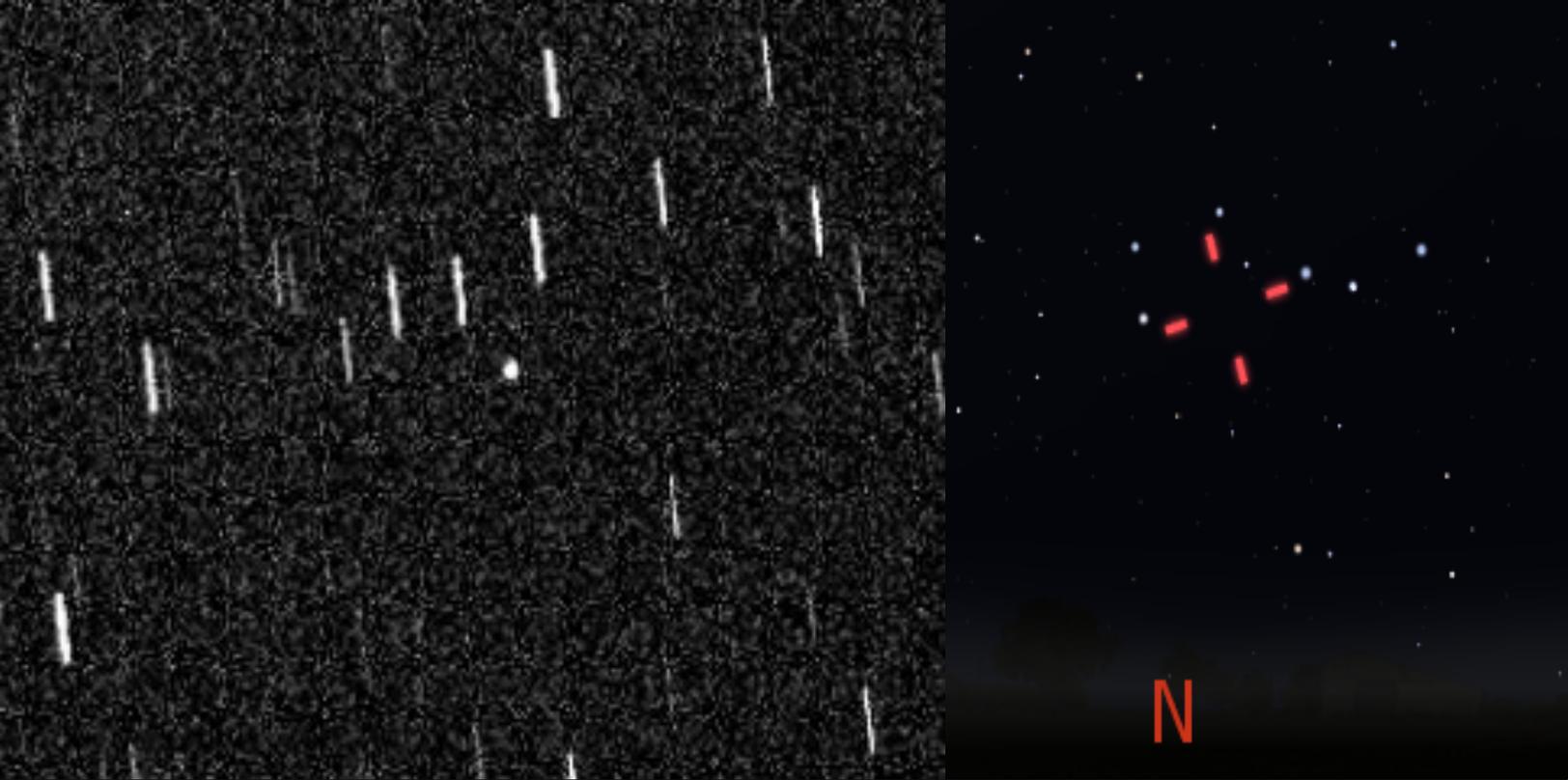
The Full Moon falls on this date in February. This means the Moon will be located on the opposite side of the Earth to the Sun and its face will be fully illuminated. This is also the second of three supermoons for 2019. The Moon will be at its closest approach to the Earth and may look slightly larger and brighter than usual. However, this effect is subtle and best shown through photographs.

February 19

Mercury reaches its Greatest Eastern Elongation on this date. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.

Directly below, there is an image of the sunset on the 19th of February at 5.30pm. Just above the Sun is the planet Mercury at its greatest elongation. Much higher to the south is the planet Mars which is visible all month long. On the eastern horizon is the Full Moon. Bottom of the page is an image of sunrise on the 7th of February at 7.30am. It shows Venus, Jupiter and Saturn all low to the southeast. Due to Venus's quick orbit around the Sun, its position relative to the other planets will change over the course of the month.





On 15 February 2013 at 7.25pm Universal Time, the asteroid Duende passed 0.0002276 AU (34,050 km) from the center of Earth. Not only is this closer to us than the Moon, it was closer than satellites in geosynchronous orbit. The best observation location for the closest approach was Indonesia. The above left image is an image of the object through the Slooh telescope (it's the central circular object). The right image shows how it would have appeared to the naked eye, under ideal conditions from Kuala Lumpur in Malaysia, that is, totally invisible, even at its closest approach.

How close is a “Near-miss”?

An asteroid longer than the Leaning Tower of Pisa passed closer to the Earth than our own Moon at the end of December 2018! Another four flew closer to the Earth than we are to the Sun on the day that this piece was written, one of which was between 2 and 4 kilometres long. This is similar to the City Centre of Cork if it was pulled out of the River Lee and hurled through space.

Every few months we are treated to headlines warning us of the imminent passing of a comet or asteroid. Even worse, these headlines often talk in comparisons, such as comparing the rock in question to a large building or area, or comparing the distance to other distances in space. The Leaning Tower of Pisa cruising between us and the Moon is really the same as a very tall tree, lets say a Giant Sequoia, 384,000 kilometres away. If the Moon is the nearest point of comparison, then whatever the object, it is far enough away that the chances of it hitting us are slim. This is even more true if the object is flying “closer to us than we are to the Sun”. There are two whole planets, one of which is nearly as big as we are, between us and the Sun. If we aren't worried about Venus, most other objects at 0.2 AU away should also be safe.

An AU is an astronomical unit, or the distance between us and the Sun (149.6 million km). It is a useful unit for measuring distances within the Solar System. If the Earth is at 1 AU and Venus is about 20-30% closer to the Sun, then it's orbit should be between 0.7 and 0.8 AU from the Sun. And indeed it is, at 0.723 AU. Measuring the distance between us and various Near Earth Objects such as comets and asteroids, gives us an easy reference. For example, if the object is less than 0.2 AU away, it's closer to us than Venus. The Moon is just about 0.00256 AU away from us, so even tiny fractions of an AU are quite a distance from the Earth.

So why do these headlines keep popping up? It is partly due to transparency. The Centre for Near Earth Object Studies (CNEOS) tracks the path of any objects that may pass near the Earth. It then displays the proximity of these passes and when they are going to happen on their website. Of course, they cant show every lump of rock in space. The most distant approach that they show on their list is less than or equal to 0.2 AU . Looking this far out means that hundreds of objects pass ‘near’ the Earth every year. CNEOS also shows the sizes of these objects. They range in size from a metre to many kilometres across. This part of their list should provide a salve to any worries you have of a collision. Even asteroids the size of houses breakdown substantially as they pass through the atmosphere.

The Earth has a lot of ‘near’ misses, following the outer limits set by CNEOS. However, these may not be as near as they seem. An asteroid passing between the Earth and the Moon is like a car driving past your house. It is moving past you, the road may even be right on your doorstep, but it is still far enough away to be safe. No matter how close a near miss is, near misses aren't much of a problem for us here on Earth. They might be near, but they are misses. An inch is a good as a mile when it comes to misses, or several million miles as the case may be.

If you would like to stay informed, CNEOS has a searchable catalogue on their website. You can find their address on the back page.



In this image, we can see the shape of Libra taking up the majority of the left, with the top of Scorpius in the bottom right. The star Zubeneshamali in the top left shows how for the Scorpions claws once reached. The star Acrab, resting in the claws of the Scorpion comes from the Arabic for the Scorpion, showing that he must have stretched across what we now call Libra. Antares, the red star in the bottom right gets its name from the Greek god of war Ares, known to the Romans as Mars. Antares was his enemy, another bright red object in the sky, similar to the red color of the planet Mars.

The Names of Stars

There are roughly 250 stars visible above Cork City, assuming no clouds, a perfect horizon with no trees or buildings and an average amount of light pollution. The vast majority of these have a name. Not a string of numbers and letters, but a name. Then again, we are only seeing the 250 brightest stars, the ones that would have stood out to the Ancient Greek and Persian astronomers who named them. These are the stars that would have first appeared in the sky as the Sun set and last to vanish as it rises.

If we travel into darker parts of the countryside, the number of stars that you can see grows. In a perfect cloudless sky, with no glaring street-lights, about 2500 stars will become visible. If you were to stand outside all night, giving time for stars to set and new ones to rise, that number approaches 5000, depending on where you are. Here in Ireland, there is a large section of the sky where the stars never set. Closer to the equator, this area is smaller, meaning more stars can become visible as others disappear. By travelling around the world and exploiting different seasons, most people could spot about 9000 to 10,000 distinct individual stars with just their eyes. Those are the stars that were named in ancient times, as they were the only stars we knew about. The more distant and fainter stars that require a telescope were out of view to our ancient forebears. However, that is still a lot of stars. So they named only a few hundred of the thousands that they could see.

Lets take the North Star or the Pole star. To the Greeks it was Polaris, still used as its official name today. The brightest star visible in the sky at night is Sirius, also known as the Dog Star. Sirius is the brightest star in the constellation of the dog—Canis Major. Many stars get their name from where they are in the sky, especially those stars that formed part of the Greek constellations. The Persians also had constellations, though different from the Greeks, and this influenced the names of some stars too. For example the stars in the constellation of Libra. Libra is known as the scales and is placed next to the constellation of Scorpius. However, some of the bright stars in Libra have names in Arabic referring to the Claws of the Scorpion, Zubeneshamali in Arabic. This shows that different cultures saw different shapes in the sky, leading to different names.

Not all constellations are ancient. Before the International Astronomical Union generated its list of star names and official constellations, these things would shift and change over time. This means that many stars have more than one name, often in more than one language. For example, the constellation of Columba, known as the Dove. This constellation wasn't mentioned in older texts, but added to the sky in the 1500's to place some stars that seemed out of place into a defined shape. Once this was done, its stars were named, Alpha Columbae is the Latin for its brightest star. This star is also known as Phact, coming from the Arabic for "ring dove", even though this constellation wasn't used by the Ancient Romans or Persians.

The names of the stars have origins as diverse as the names we people have. They are recorded by the IAU online if you would like to see them, at www.iau.org.

Tips for Spotting an Asteroid

As mentioned inside, we are often warned of approaching asteroids. Although the chances of impact are usually very low (often non-existent), you can still use these approaches to go find an asteroid in the sky.

First, keep in mind that asteroids are one of the smaller classes of object in space. This makes them difficult to spot without a telescope, and even though they are interesting, they are often dull in another sense, failing to reflect much light. This makes them a challenging, though not impossible target.

Secondly, you need to pick an asteroid. The CNEOS website has a list of upcoming approaches as well as a tool to help you find when objects will be in the sky for you at a given time and place. This helps for planning observations as you will know where you need to look and what time.

Thirdly, it is good to set up early. Once you know where the object will be in the sky, get your telescope or binoculars ready and watch out for the predicted time. It is usually better to be ready when the object passes through your telescope's field of view.

Lastly, be prepared for a chase. Asteroids can often whizz past the Earth at incredible speeds, so you may need to adjust where your telescope is pointing to keep up with the object. The tools on the CNEOS website will help you figure out how long the object will be in the sky and where it will move too, making it easier to follow the object or even get ahead of it in the sky.

Website of the month

<https://cneos.jpl.nasa.gov/>

The Centre for Near Earth Object Studies is where you can find up coming asteroid approaches and learn more about how the threat of an asteroid is assessed. You can also learn about comets and future missions to these objects.

Quote of the month

“a system of postulates, mathematical relationships, data, and inferences that form a basis for describing a scientific process or sequence of events. These models need to be tested against new observations to see how well they hold up. That’s a big part of the scientific method.”

— Donald K. Yeomans, Near-Earth Objects: Finding Them Before They Find Us

Some Upcoming Events at CIT Blackrock Castle Observatory

February of course is the shortest month, so we are already looking ahead to a jam packed March.

As well as Seachtain na Gaeilge being celebrated here at the Castle, Engineers Week will also be running in March and Athlone Institute of Technology will be hosting a Space Careers Roadshow.

Whether you’re a Gaeilgeoir or a fan of engineering, here on Earth or in space, there should be something for you during the month of March. If you’ve never had the chance to visit us here in Cork, you might catch us at the AIT roadshow, or in other locations during the rest of 2019.

PUBLIC OPENING Hours: 10am—5pm (Mon-Sun)

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Blackrock Castle Observatory is operated by Cork Institute of Technology and is a partnership with Cork City Council.