

# SANDRA F. PRITCHARD MATHER PLANETARIUM NEWS

## 2018-2019 Season

*The Mather Planetarium at West Chester University*



Greetings! It's been a busy couple of months for astronomers. We've had a comet, a close encounter with a member of the Kuiper belt, and new spacecraft landing on the Moon. For those of you watching the skies in your backyard, you may have noticed that we went from a plethora of planets in the fall to just Mars in our evening skies now. If you're an early riser you can catch Venus before the Sun comes up. The rest are tucked in close to the Sun at the moment so you'll have to wait until later in the year to check them out.

Or you can come visit them under the dome!

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*"We especially need imagination in science. It is not all mathematics, nor all logic, but is somewhat beauty and poetry."*

*- Maria Mitchell*

## Remaining Live Shows for the 2018-2019 Season

**January 25, 2019** - The Expanding, Accelerating Universe

**February 22, 2019** - Our Milky Way Galaxy

**March 22, 2019** - Killer Rocks from Outer Space

**April 26, 2019** - Your Backyard Sky

**Movie shows** are also scheduled for many Fridays this spring.

A calendar of all shows can be found on our website, as well as descriptions of the various movies. A short sky tour is given before each movie presentation. All shows start promptly at 7:00pm.

## The “Dark” Side of the Moon

It's a mysterious-sounding phrase, a groovy Pink Floyd song, and a lot of people think that it's a fitting description of the back of the Moon. But it's not. On January 3, China's Chang'e 4 spacecraft made history, being the first-ever manmade object to land on the far side of the Moon. The images sent back to Earth were awash in sunlight. So what's going on?

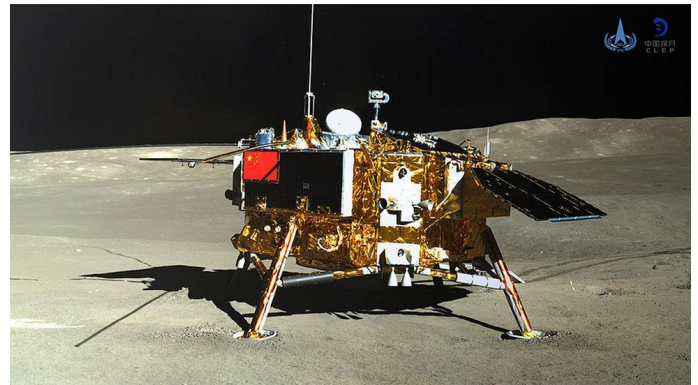
The Moon always presents the same side to the Earth. We can confirm this by noticing that the dark patches we see on the face of the Moon (the *mares* or “seas”) are always in the same positions. This is due to the fact that the Moon rotates on its axis at the same rate that it revolves around the Earth. This is called *synchronous* rotation and is a result of the gravitational interaction between the Moon and the Earth. If the same side of the Moon is always facing the Earth then that means there is a side that *never* faces the Earth. And here's where the confusion creeps in.

The Moon does not make its own light. The light we see from the Moon originates at the Sun; moonlight is simply reflected sunlight. The Moon is a sphere, just like the Earth. At any given time, the Sun is shining on half of the Earth – the side facing the Sun – and the other half is experiencing night. The same is true for the Moon. At any given time, the Sun is shining on half of the Moon. Sometimes it's the same side that we see from Earth, but sometimes it's the *other* (far) side. As the Moon orbits the Earth, the sunlight eventually falls on all sides. When we see a full Moon, all lit up from Earth, then the back side of the Moon would, in fact, be dark. However, when our side is completely dark – a new Moon – then the back side is in full sunlight! Over the course of one

29-day lunar cycle, the far side of the Moon receives just as much sunlight as the near side.

So why all the hype about the “dark side” of the Moon? Well, while it's not actually dark it is a side that we never get to see from the Earth and that does make it a bit mysterious. The first images of the far side came from the Soviet probe Luna 3 in 1959. In 1968, the Apollo 8 astronauts were the first humans to view the far side as they orbited the Moon.

With the landing of Chang'e 4, China's Space Agency joins the list of “firsts”. You might wonder why it's taken so long to achieve this feat. The challenge isn't a lack of sunlight but rather a lack of communication. Once an object goes around the back of the Moon – whether it lands or just orbits – we have no way of directly communicating with that object. Radio signals cannot travel through the Moon. So in order to communicate with their lander, the Chinese scientists put a relay satellite in an orbit that allowed communication between the Earth and the probe on the far side.



The Chang'e 4 lander, as photographed by its rover, on the far side of the Moon.



The programs in the Mather Planetarium are made possible by generous donations from the community. To learn more about how you can support our educational and public activities please contact Dr. Karen Schwarz at (610) 436-2788, [kschwarz@wcupa.edu](mailto:kschwarz@wcupa.edu).



## Looking Up: Leo

Rising almost straight up from the eastern horizon, Leo is an easily recognized constellation. The backwards question mark – also called the sickle – which traces Leo's head tends to catch your eye. The bright star Regulus acts as the dot at the bottom. Shaping the rest of the stars into a lion isn't difficult, with the triangle at the end stretching out as Leo's tail.

In Greek mythology, Leo represents the Nemean lion which was killed by Heracles (Hercules, to the Romans). The Nemean lion would abduct women, taking them to his lair, and then lie in wait for the warriors who would come to rescue the ladies. The lion was impervious to harm by any weapons – clubs, spears, swords. Heracles was tasked with defeating the lion, as part of his twelve labors. Knowing the lion's nature, Heracles understood that his great strength would be his only weapon. Engaging the lion in close quarters, Heracles grasped the lion's two front feet in one hand, his two back feet in the other, and snapped the lion's back. Zeus commemorated Heracles' feat by placing the image of the lion in the sky.

Leo dates far back, with archeological evidence indicating that the Mesopotamians had a similar constellation as early as 4000 BCE. Babylonian astronomers identified it as the "Great Lion" and the bright star Regulus was known as "the star that stands at the Lion's breast".

Leo is the 12<sup>th</sup> largest of the 88 official constellations that are recognized by modern astronomers. It is also the radiant point for the Leonid meteor shower that occurs in November. A number of galaxies can be found within the boundaries of Leo, several of which can be seen with amateur telescopes.

Regulus is the 21<sup>st</sup> brightest star in the night sky. Despite how it looks to the unaided eye, Regulus is not a single star. There are two pairs of binary stars occupying that bright spot in the sky. The primary pair consist of two stars separated by a distance roughly equivalent to the distance between Mercury and the Sun. These two stars complete one orbit every 40 hours! Imagine what our sky would be like if we lived in that solar system!