



THE BLUE MOON OBSERVER



Door Peninsula Astronomical Society

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www.doorastronomy.org

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July, 2018 Volume 20 Number 7



The July general meeting of the Door Peninsula Astronomical Society will take place on Tuesday, July 10 at 7 PM. The deviation from the first Tuesday of the month is to avoid conflict with activities around the Independence Day holiday. The main program will be based on the video, "Space, Time, and Gravity" led by Tom Minahan, who will also present the "Learning the Night Sky" monthly feature. Our general meetings are held at the Ray & Ruthie Stonecipher Astronomy Center at 2200 Utah.

Notes from: DPAS General Meeting June 5 @ 7 pm

Our crowd this evening was large for our facility - we actually ran out of chairs and unfortunately a visitor or two had to stand!

President Gary Henkelmann gave thanks to our NCRAL committee for putting on an excellent, and favorably reviewed astronomy conference. Special thanks to committee chairperson Jacque Axland. He then announced upcoming society events: Late viewing night on Saturday, June 16 (sunset @ 8:38 pm), an impromptu Mars viewing late on July 31 when it is in closest approach to Earth, and the 5 Nights Under Dark Skies program at Newport State Park, August 10-14, 2018. FYI: Newport State Park has been designated an International Dark Sky park by the International Dark-Sky Association.

The main presentation: Measuring Gravity by Steve Ransom-Jones in 3 sections: Classical Gravity, Relativity, and Measurement (of gravity waves).

Classical Gravity as devised by Sir Isaac Newton was a good theory

because it is simple to write down, it unified the work of Galileo, Copernicus & Kepler, it explained the precession of the Earth's axis, it explained the acceleration of falling objects, tides and the orbits of the planets and comets, with great precision. Newton's gravity basically solved most of the known problems in astronomy and terrestrial physics! However, it has shortcomings. It assumed an absolute frame of reference in which space and time are static - only matter moves or changes. It also assumes that the force of gravity acts instantaneously over great distances. Every object "knows" of the existence of a force from all other objects in the universe! It also could not account for the shift in the perihelion of Mercury's orbit around the Sun.

Enter Albert Einstein. His General Theory of Relativity depicts gravity not as a force, but the warping of space-time by matter. A large mass such as a planet or a star curves the space around it and any object will move through the curved space with an apparently curved path with really no force acting on it. "Information about changing gravitational field is carried by gravitational radiation at the speed *continued on page 3*



Who We Are

DPAS is a local club and chapter of the Astronomical League. We are also a club member of the International Dark-Sky Association and the Night Sky Network, teaching arm of the Astronomical Society of the Pacific. We meet on the first Tuesday of every month, with rare exception. Meetings are held at the Ray & Ruthie Stonecipher Astronomy Center unless otherwise announced. We operate and maintain the Leif Everson Observatory which houses a 14" Celestron Schmidt-Cassegrain telescope on a sophisticated tracking mount controlled by computer, and a weather station housed in the observatory. Current weather readings are shown on our web site: www.doorastronomy.org

The StarGarden near the observatory is used for viewing the sky with unaided vision, binoculars and members' telescopes. There are also binocular mounts set in concrete which allow viewers of different heights to view the same object through the same binocular.

The Ray & Ruthie Stonecipher Astronomy Center provides for storage, projects, meetings, warm-up and toilet facilities. It also houses a StarLab, an inflatable planetarium with a sophisticated projection system. The planetarium is used for group presentations.

An Analemmatic Sundial was dedicated on October 20, 2012.

The "astronomy campus" as described here is reached by taking Utah Street east to the stop sign and turning left through the gate onto Stargazer Way. Or you can set your GPS to 2200 Utah.

Conjunctions: When Wanderers Visit Attractive Neighborhoods

Tom Minahan

In astronomy, a conjunction is the coincidence of two or more heavenly bodies at a nearby celestial latitude and longitude. A conjunction is only apparent, caused by the observer's perspective on Earth. The objects actually never come near to each other and can be light-years apart. Because the background of stars and nebulae are fixed and do not appear to move from our viewpoint, a conjunction usually involves a close approach of the moon or a planet to a notable deep-sky object that lies near the ecliptic. A good example of a conjunction will occur on the evening of Wednesday, June 19th: Venus will pass within 0.42° north of Messier 44, the Beehive Cluster. The pair should become visible before 9 pm as the sky darkens, 21° above the western horizon. They will sink westward and set just before 11 pm.

[The term conjunction also refers to the alignment of planets in their orbits. A superior conjunction occurs when a planet which orbits outside that of Earth's is exactly opposite from the Sun; it will be visible at the zenith at midnight. An inferior conjunction occurs when an inner planet lines up with the Sun. The Beehive Cluster is an open cluster in Cancer [see sky chart], easily visible to the naked eye as a small nebulous cloud. It is one of the nearest open clusters to Earth, about 600 light-years distant. Age and proper motion of M44 are similar to those of the Hyades in Taurus, suggesting they share a similar origin. In addition to main-sequence stars, both clusters contain red giants and red dwarfs, which designate the latter stages of stellar evolution. Because the Beehive is only 1.5° across and Venus comes so close, the pair should easily fit within the field-of-view of binoculars or a telescope at low power. The Beehive was one of the first celestial objects Galileo studied through his early, low-powered telescopes. If

your sky is dark and clear and you have a garden-variety instrument, you will probably enjoy a better magnified view than he. Wonder and Enjoy!

Because the Moon traverses the entire ecliptic (the plane defined by the Sun and Earth's orbit) every month, it regularly visits some interesting neighborhoods and nears various deep-sky objects: 13 constellations, (Pisces, Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Ophiuchus[27], Sagittarius, Capricornus, Aquarius), the Pleiades, Aldebaran, open cluster Messier 35, the Beehive M44, open cluster Messier 35, Spica, Antares, globular clusters Messier 4, Messier 80 and Messier 19, the Lagoon Nebula Messier 8, the Trifid Nebula Messier 20, open cluster Messier 21, globular clusters Messier 22 and Messier 75 and several galaxies. Many of these deep-sky objects will be washed out by the Moon's brightness if it is more than a crescent and nearby. The good news is that the planets also wander very near the ecliptic and will regularly conjunct (according to the planet's orbital speed or lack thereof) with these dimmer objects. When the Moon does not interfere with sky viewing the night of a planetary visit, you will enjoy a doubly-rich view through your instrument at low power.

Other close conjunctions to occur in 2018 [date, objects, separation]: June 28, Moon & Saturn, $1^\circ 46'$. July 16, Moon & Venus, $1^\circ 37'$. July 25, Moon & Saturn, $1^\circ 59'$. August 31, Venus & Spica, $1^\circ 00'$. October 15, Moon & Saturn, $1^\circ 47'$. October 18, Moon & Mars, $1^\circ 56'$. November 11, Moon & Saturn, $1^\circ 27'$. November 14, Venus & Spica, $0^\circ 12'$. November 16, Moon & Mars, $0^\circ 59'$. December 7, Mars & Neptune, $0^\circ 02'$. December 9, Moon & Saturn, $1^\circ 07'$. December 21, Mercury & Jupiter, $0^\circ 51'$.

A special kind of conjunction is an occultation, when an object is hidden by another solar system object that passes between it and the

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DPAS BOARD

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editor@doorastronomy.org

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Dennis Sundin, Member at
Large

Ray Stonecipher, in spirit

Barbara Henkelmann serves as
the DPAS Archivist.

The business of the DPAS is largely conducted at the Board meetings to leave the general meetings open for programs. The Board meetings are held at the Astronomy Center at 7 PM on Monday, 8 days prior to the following general meeting. Members of DPAS are invited to attend Board meetings.

Meeting notes from page 1

of light." This radiation comes in waves. These waves of radiation interfere constructively and destructively to produce ripples in the shape of space itself. Measuring such gravitational waves is not easy at all. Special detectors have been constructed and different kinds of gravitational waves have been detected.

The detectors are interferometers: They split a beam of monochromatic coherent light (a laser), bounce them off mirrors 4 kilometers away and bring them together again. If space is warped by a passing gravitational wave, the resulting interference pattern will change. Detection! These interferometers (there are two in the U.S. and others are under construction elsewhere) can detect a change in the metric of space by many times less than the width of a proton! 10-20 meters! What causes measurable gravitational waves? The merger of compact binary systems of massive objects such as neutron stars and black holes, spinning neutron stars, supernova core collapse and even echoes from the Big Bang itself. The patterns of space ripples can be thought of as sound waves - chirps and such - and have different frequencies for different events. The future of gravitational wave detection includes an array of detectors on Earth that can triangulate the direction from which they come - very helpful to astronomers - and a laser interferometer in space.

After a break with choice refreshments provided by Jim O'Reilly and unrestrained conversation, John Beck presented our monthly Learning-the-Night-Sky: a very thorough tour of Star Clusters and Nebulae in the two richest summer constellations, Sagittarius and Scorpius. Both overlap the Milky Way and the center of our galaxy, known as Sagittarius A*, lies just between them. Almost all of the deep-sky objects enumerated by Dr. Beck are easily seen with dark skies and binoculars or a telescope at low power. Some are even visible to the naked eye.

The list of targets specified include several Messier objects: globular cluster M4, M6 the Butterfly cluster, M7 the Ptolemy cluster (naked eye), globular cluster M80, open cluster NGC 6231 and the star Antares, a bright red giant. In Sagittarius, we have M8 the Lagoon Nebula, M17 the Swan Nebula, open cluster M18, the Trifid Nebula M20, open cluster M21 (young stars), bright globular cluster M22, open clusters M23 and M25, globular clusters M28, M54, M55, M69 and M70 etc. Wow, much to see in the rich, nebulous area looking towards our galactic center!

See images on page 6.

Thomas Minahan

Thanks, Tom! DPAS is looking for someone to volunteer to serve as "scribe" for our general meetings. Thanks to Mike Egan for doing this for as long as I can remember, Barb Henkelmann for doing the honors for the May meeting, and again to Tom for pitching in and has volunteered to take over the task if nobody else comes forward.

Editor

August 10 - 14, 2018 @ Newport State Park



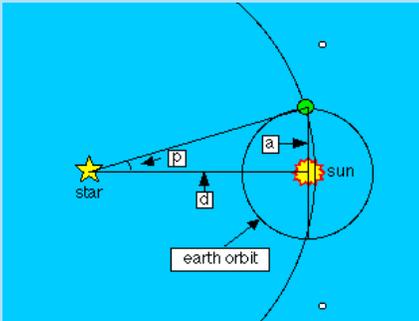
Upcoming Programs:

August 7 general meeting at 7 PM
Steve Ransom-Jones will present a program on "Atmospheres of the Terrestrial Planets"
Steve will also deliver the monthly Learning the Night Sky feature

September 4 general meeting at 7 PM
John Beck will host the video program, "Cosmology in Einstein's Universe"
Gary Henkelmann will deliver the monthly Learning the Night Sky feature.

Astronomy Quiz

1. Charles Messier lived from 1730 to 1817. The last item added to the Messier Catalog was M110. In what year was M110 added to the catalog?
2. Mars' polar ice caps are composed of
 - a. water ice
 - b. carbon dioxide ice
 - c. ammonia ice
 - d. some combination



3. In the above diagram, the angle P between the star-sun line and the star-earth line is one arc-second. Earth is one astronomical unit from the sun. How far away is the star?
4. The Hooker telescope at Mount Wilson with its 100" diameter glass mirror and 100 tons total weight allowed Edwin Hubble to discover that the Andromeda "nebula" was actually a galaxy. Who figured the French-made glass disc into an astronomical mirror?



The Blue Moon Observer

A Close-Up View of Mars

By Jane Houston Jones and Jessica Stoller-Conrad

In July 2018, skywatchers can get an up close view of Mars—even without a telescope! In fact, on July 31, Mars will be closer to Earth than it has been in 15 years.

Why is that?

Like all the planets in our solar system, Earth and Mars orbit the Sun. Earth is closer to the Sun, and therefore it races along its orbit more quickly. Earth makes two trips around the Sun in about the same amount of time that Mars takes to make one trip.

Sometimes the two planets are on opposite sides of the Sun and are very far apart. Other times, Earth catches up with its neighbor and passes relatively close to it. This is called Mars's closest approach to Earth, and it's happening this year on July 31. The Moon will be near Mars on that night, too!

Keep in mind that even during its closest approach, Mars is still more than 35 million miles away from Earth. That's really far. So, Mars won't appear as big as the Moon in the sky, but it will appear bigger than it usually does.

July and August will be a great time to check out Mars. Through a telescope, you should normally be able to make out some of the light and

dark features of the Red Planet—and sometimes even polar ice. However, a huge Martian dust storm is obscuring these features right now, so less planetary detail is visible.

There is another important Mars date in July: Mars opposition. Mars opposition is when Mars, Earth and the Sun all line up, with Earth directly in the middle. This event is happening on July 27 this year.

Although you may see news focusing on one of these two dates, Mars will be visible for many months. For about three weeks before and three weeks after opposition and closest approach, the planet will appear the same size to a skywatcher.

From July 7 through September 7 Mars will be the third brightest object in the sky (after the Moon and Venus), shining even brighter than Jupiter. The best time to view Mars during this time is several hours after sunset, when Mars will appear higher in the sky.

Mars will still be visible after July and August, but each month it will shrink in size as it travels farther from Earth in its orbit around the Sun.

In other sky news, there will be a partial solar eclipse on July 13, but it will only be visible from Northern Antarctica and *continued on page 5*

Poetry Corner

The Night Sky

by Quinn Schreder (5th grade)

Blinded by the brilliant light refracted in
a crystal dome
A metropolis of stars mixes and forms
Standing there on the ground, oblivious
to what goes all around
The constellations delicately made,
eons ago
Fade into the morning light.

Quinn Schreder, age 11, is homeschooled and lives in rural SW Wisconsin. He saw the eclipse in totality last summer. He likes to read, play board games, and play outside with his brother.

For the Conjunction of Two Planets

We smile at astrological hopes
And leave the sky to expert men
Who do not reckon horoscopes
But painfully extend their ken
mathematical debate
With slide and photographic plate

And yet, protest it if we will,
Some corner of the mind retains
The Medieval man who still
Keeps watch upon those starry skeins
And drives us out of doors at night
To gaze at anagrams of light.

Whatever register or law
Is drawn in digits for these two
Venus and Jupiter keep their awe,
Wardens of brilliance, as they do
Their dual circuit of the west -
The brightest planet and her guest.
Is any light so proudly thrust
From darkness on our lifted faces
A sign of something we can trust,
Or is it that in starry places
We see the things we long to see
In fiery iconography?

Adrienne Cecile Rich

Submitted by Thomas Minnahan with his article on Conjunctions starting on page 2.

Mars continued from page 4

southern Australia. On July 27 (beginning at 20:21 UTC), a total lunar eclipse will be visible in Australia, Asia, Africa, Europe and South America. For those viewers, Mars will be right next to the eclipsing Moon!

If you're wanting to look ahead to next month, prepare for August's summer Perseid meteor shower. It's not too early to plan a dark sky getaway for the most popular meteor shower of the year!

You can catch up on NASA's missions to Mars and all of NASA's missions at



www.nasa.gov

New Members

Welcome Kevin Marquez.

New members are welcome; membership applications are available at our website.

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observer on Earth. The Moon occults many stars during a month and occasionally planets, but the timing must be right to see the moment of occultation. For example, the Moon will occult Mars, Saturn and Pluto latter this year, but each event occurs briefly and is visible from only a small region on Earth. To find information on future occultations, see <http://www.goastronomy.com/solar-system/planets-conjunctions.htm> or [en.wikipedia.org/wiki/List_of_conjunctions_\(astronomy\)](http://en.wikipedia.org/wiki/List_of_conjunctions_(astronomy)). Asteroids sometimes occult stars, and astronomers use the timing of such events to determine the size of the occulting object.

Once in a while, Mercury or Venus will pass between the Earth and the Sun. This is called a transit. Transits of Mercury are infrequent but always occur in May or November. The next will occur on November 11, 2019, and then on November 13, 2032. A typical transit lasts several hours. Unfortunately, the next transit of Venus is not until December 2117. Professionally astronomers detect planets orbiting other stars by (among other means) precisely measuring the dip in illumination when the planet transits in front of the star. A solar eclipse is a special event when our Moon occults part or all of the Sun. Because the apparent size of both are similar, the entire face of the Sun is blocked from view during a total solar eclipse along a 90-mile-wide swath of Earth, which lasts a minute or two for a stationary observer. Where were you last August 21st? Will you be in the path of totality on April 8, 2024 for the next North American eclipse?

The preceding article by Thomas Minnahan will be published in the Peninsula Pulse in July and used by permission of the Peninsula Pulse and doorcountypulse.com.

Astronomy Quiz Answers

1. M110 was added in 1967. Messier made his last discovery in 1798, 19 years before his death. Others added to the catalog.
2. d is correct. The polar ice caps consist of water ice and carbon dioxide ice although the carbon dioxide sublimates in summer leaving water ice.
3. By definition, the distance to the star is one parsec which is about 3.26 light years or 3.086×10^{13} kilometers.
4. George W. Ritchey and his team took 5 years to convert the glass disc into a mirror.

Viewing Nights 2018

August 11
 September 8
 October 6
 November 10
 December 8

Times will be posted in the Blue Moon Observer and on the website:

www.doorastronomy.org

