The Cheyenne Astronomical Society (CAS) was formed in December of 1986. The CAS is for people interested in astronomy who want to share their experiences and increase their knowledge of astronomy. Members are not required to own any equipment or to have any prior knowledge of astronomy. Your basic curiosity about astronomy is all you need.

The benefits of membership in the CAS include:
- Members receive monthly notifications where to find the current newsletter online
- Members have access to star parties at Camp Jack and other spring, summer and fall events
- Members are eligible for discount subscriptions to Astronomy and Sky and Telescope magazines
- Observing sessions for special occasions such as meteor showers, comets, eclipses

This month’s newsletter is posted online at http://killerrabbit.co/newsletter.pdf

The Cheyenne Astronomical Society (CAS) Board Members

President: Marty Curran
cas@killerrabbit.co

Vice President: Marv Schutz
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Secretary/Treasurer/PR
Marcy Curran
Web Page
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Dates for 2018
Meetings at 7 pm
Primrose (Pub) 1530 Dorothy Lane

January 19
February 16
March 16
April 20
May 18
June 15
July 20
August 17
September 21
October 19
November 16
December: No Meeting

CAS membership fees are $12.00 a year and due in January or Pro-rated through the year

Please remit your check to Marcy or mail to: The Cheyenne Astronomical Society
1333 Jessi Drive
Cheyenne, WY 82009

Name________________________________________________________

Address ___________________________________________________________________________________

Phone # _____________________________________________

City, State, Zip _____________________________________________________________________________

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*Please make sure your email is legible; your monthly newsletter will be delivered by email.
Society News

The April CAS meeting began with Marty welcoming the guests and members to the meeting. No one has been observing lately but Rob had a few new pictures for us to enjoy. Marcy showed a picture of the recent Moon and Venus conjunction.

Rob gave us a program on using filters for both visual astronomy and taking astrophotos. Filters are used to pass or block certain wavelengths of light. Colored filters work great on observing details and planets and moons. For example you can see the polar caps on Mars if you use a red filter. Visual filters can be held over your eyepiece or screwed in to them; some telescopes have slides where you can rotate through several filters.

There are also polarizers and filters like Hydrogen Alpha, OIII, nebulae filters or sulfur. Even something like a minus violet filter will help make photos sharper.

You can find visual color filters fairly inexpensive; the more specialized filters can be pricey and it’s recommended you buy from a reputable dealer.

Rob’s website is magicdragin.com and has quite a few examples of his photos including the same image with different filters. Rob takes multiple images and also gets a basic dark sky spot to process and enhance his images.

Camp Jack Star Parties This Summer:
   June 21 - 24
   July 5 - 8
   August 9 - 12
   September 6 - 9

CAS Board Members
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Upcoming Events:
Primrose (Pub)
May 18, 7 pm:
Dyson Sphere / Tabby Star
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Astronomers using the NASA/ESA Hubble Space Telescope have found the most distant star ever discovered. The hot blue star existed only 4.4 billion years after the Big Bang. This discovery provides new insight into the formation and evolution of stars in the early Universe, the constituents of galaxy clusters and also on the nature of dark matter.

The international team, led by Patrick Kelly (University of Minnesota, USA), Jose Diego (Instituto de Física de Cantabria, Spain) and Steven Rodney (University of South Carolina, USA), discovered the distant star in the galaxy cluster MACS J1149-2223 in April 2016. The observations with Hubble were actually performed in order to detect and follow the latest appearance of the gravitationally lensed supernova explosion nicknamed “Refsdal”, when an unexpected point source brightened in the same galaxy that hosted the supernova.

Like the Refsdal supernova explosion the light of this distant star got magnified, making it visible for Hubble. This star is at least 100 times farther away than the next individual star we can study, except for supernova explosions.

The observed light from the newly discovered star, called Lensed Star 1 (LS1) was emitted when the Universe was only about 30 percent of its current age – about 4.4 billion years after the Big Bang. The detection of the star through Hubble was only possible because the light from the star was magnified 2000 times.

The star became bright enough to be visible for Hubble thanks to a process called gravitational microlensing. The light from LS1 was magnified not only by the huge total mass of the galaxy cluster, but also by another compact object of about three times the mass of the Sun within the galaxy cluster itself; an effect known as gravitational microlensing.

The discovery of LS1 allows us to gather new insights into the constituents of the galaxy cluster. We know that the microlensing was caused by either a star, a neutron star, or a stellar-mass black hole. LS1 therefore allows astronomers to study neutron stars and black holes, which are otherwise invisible and they can estimate how many of these dark objects exist within this galaxy cluster.

As galaxy clusters are among the largest and most massive structures in the Universe, learning about their constituents also increases our knowledge about the composition of the Universe overall. This includes additional information about the mysterious dark matter.

If dark matter is at least partially made up of comparatively low-mass black holes, as it was recently proposed, we should be able to see this in the light curve of LS1. Our observations do not favor the possibility that a high fraction of dark matter is made of these primordial black holes with about 30 times the mass of the Sun.

After the discovery the researchers used Hubble again to measure a spectrum of LS1. Based on their analysis, the astronomers think that LS1 is a B-type supergiant star. These stars are extremely luminous and blue in color, with a surface temperature between 11,000 and 14,000 degrees Celsius; making them more than twice as hot as the Sun.

But this was not the end of the story. Observations made in October 2016 suddenly showed a second image of the star. Astronomers were actually surprised to not have seen this second image in earlier observations, as also the galaxy the star is located in can be seen twice. They assume that the light from the second image has been deflected by another moving massive object for a long time – basically hiding the image from us. And only when the massive object moved out of the line of sight the second image of the star became visible. This second image and the blocking object add another piece of the puzzle to reveal the makeup of galaxy clusters.

With more research and the arrival of new, more powerful telescopes like the NASA/ESA/CSA James Webb Space Telescope, the astronomers suggest that with microlensing, it will be possible to study the evolution of the earliest stars in the Universe in greater detail than ever expected.
Ursa Major, the Great Bear is a constellation that we see wheel around the northern region of the sky on any clear night. Ursa Major is visible anywhere north of -30 degrees latitude. Ursa Major is also paired with Ursa Minor, the Little Bear and these 2 conspicuous northern constellations are circumpolar and therefore visible through the year from the northern hemisphere.

Ursa Major is our 3rd largest constellation and covers over 3% of the night sky. It is readily recognized by seven bright stars that form an asterism know as “The Big Dipper.” It is also referred to as the Plough or Frying pan in other cultures. Four of those seven stars form a pan and the other three stars are the pan’s handle. The Big Dipper doesn’t take up even half of the entire constellation.

Ursa Major’s brightest stars mostly around second magnitude.

Alioth (epsilon) is a blue-white subdwarf star located 81 light years away and has an apparent magnitude of 1.75. Alioth is 4 times more massive than our Sun and is 127 times brighter.

Dubhe (Alpha) is an orange giant at a distance of 124 light years shining at an apparent magnitude of 1.81. It is 415 times brighter than our sun and is in a binary system whose tars orbit each other every 44.4 years.

Alkaid (Eta) is a blue white main sequence star located 101 light years away with a visual magnitude of 1.88. It is about 6 times more massive than our Sun and is 700 times more luminous.

Mizar and Alcor (Zeta and 80 Ursae Majoris) are probably the most famous naked eye double star in the night sky. They are sometimes referred to as the Horse and Rider. They are both white stars located 80 light year away. Mizar shines at magnitude 2.23 and Alcor is 4.01 magnitudes.

Merak (Beta) is a white star 79 light years away shining at magnitude 2.34. It has about 3 times the mass of our Sun and shining 70 times brighter.

Phecda (Gamma) is a white main sequence star at 84 light years with a magnitude of 2.43. Phecda is about 71 times brighter than our Sun.

Megrez (Delta) is a blue white star 58.4 light years away shining at magnitude 3.31. It is 63% more massive than our sun and 14 times more luminous.

While most of us see the stars as fixed in that they don’t move relative to each other in our lifetimes; in reality all the stars we see are moving through space and we see the familiar shapes only because of chance alignment from our perspective. The stars of the Big Dipper (except Dubhe and Alkaid) are actually a true cluster of stars known as the Ursa Major Moving Cluster. So 25,000 years from now the Big Dipper will look different than now as those 2 stars move away from the cluster.

Ursa Major is the home of many deep sky objects. Some of the most famous DSO’s are M81 also known as Bode’s Galaxy; it is a dense spiral galaxy containing about 250 billion suns. M82 is also known as the Cigar Galaxy and M101 is a face on spiral galaxy usually called the Pinwheel Galaxy. There are two barred spiral galaxies located 12 million light years away and are M108 and M109 on the Messier list. There is also M97, the Owl Nebula located 1630 light years away. Winnecke 4 is number 40 on the Messier list but is actually only a faint double star 510 light years away.

Since Ursa Major is circumpolar in the Northern Hemisphere it never sets below the horizon. Also the constellation makes a complete counterclockwise rotation every 24 hours Polaris, the North Pole star. You can actually use this perpetual rotation around the North Star as a clock.

The stars Merak and Dubhe in the bowl or pan of the Big Dipper are also called the pointers and can be used to find Polaris. If you run a line through them and continue looking north the next star you run in to is Polaris, the North Star. Polaris can be used as a compass. Polaris is almost directly true north and you can use it’s height above the horizon to determine you latitude on Earth. A handy “tool” the Big Dipper provides is a vision test. The second star in the handle is Mizar and it has a fainter companion star, Alcor. If you can see both of them you have good eyesight.

There are three meteor showers associated with Ursa Major. The Alpha Ursae Majorids are active from August 9th to 30th and peak on the 13th to 14th. They average about 4 meteors an hour. The Kappa Ursae Majorids are visible from November 2nd to 9th, peaking on November 5th and only average 1 meteor per hour. The Ursids are visible from December 17th to 24th; peaking on the 23rd with about 10 meteors per hour.
Observing astronomical objects in the sky is not limited to nighttime observing. Obviously there are some easy objects to find during the day, but others take some planning or you might see them by being in the right place at the right time. Here are some of the objects you can see without going out after dark. It’s best to try observing by a building where you can use the building and eve to block out as much of the sky and sun as possible.

An easy cosmic object to spot is the Sun but of course we all know we can’t look at it directly without proper protection for our eyes. Depending on what filters you have you can safely view sunspots, filaments and prominences on the Sun.

The Moon, much to the surprise of many; is also visible in the daylight sky for a few weeks each month. As the moon goes through its monthly phases it moves from the nighttime sky to daylight.

Venus can be picked out in the daytime especially when it is close to the moon. If you know its location you can hunt down Venus by carefully blocking out the Sun and once you find that white dot (binoculars help to locate it) you can easily see Venus with the unaided eye. If the Moon is near Venus that day it makes it easier to locate our brightest planet. One of the easiest ways to see it is to locate it in the morning sky then continue to follow it after the Sun comes up.

Satellites can give off a glint or flash of light during the day that is easily picked out if you happen to be looking at that portion of the sky. The International Space Station can be positioned just right to catch in the daytime. At its brightest the ISS can be brighter than Venus.

Jupiter is not our brightest planet but the King of the planets can still be visible in daylight even though it is not easy to locate. You need excellent eyesight and perfect atmospheric conditions. The most likely time to catch a view of Jupiter is when the planet is 90 degrees from the Sun. It’s best to try it when Jupiter is near a quarter moon making it easier to locate the planet.

Also the planet Mars can be found in daylight but it’s a tougher sight than the rarely found Jupiter. When Mars has a close encounter with Earth it can be as bright as Jupiter but this observation will take planning, luck and excellent seeing conditions.

Stars are always challenging but viewable during daylight. I managed to find Deneb in binoculars one time when it was at zenith but I sure couldn’t pick it out with my naked eye. Like Venus the best way to see them in daylight is follow them after the sun rises; it’s kind of like watching the stars appear right after sunset in a blue sky. Sirius and other zero or brighter stars can probably be hunted down with practice and patience. Again it works best to be as far away from the Sun as possible and blocking out as much sky light as possible.

Daylight comets are an occasional and welcome sight; sadly I’ve never been lucky enough to see one. Although they are not easy to see, daytime comets are not as rare as we might think. Comet McNaught (2007) was a recent daylight comet (see images below). Comet Halley’s in 1910 was a daytime comet. Comet West in 1976 was observed by a few lucky people after sunrise. Comet ISON was visible in a blue sky in 2012. Daylight comets are easier to find because their location is known so you know where and when to look.

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Meteors cannot be predicted but many have been caught streaking across a blue sky. A few famous daytime fireballs were observed over North America in 1972 and over California and Nevada in 2012. They brilliant meteors are often accompanied by sonic booms and fragments of them have been located after reaching the ground as meteorites.

Last but not least on our list are supernova. Supernova are exploding stars that can burst on the scene brightening the stars from obscurity to the brightest star in the sky. These stellar explosions are rare and unpredictable. The Supernova of 1006 reached an expected magnitude of -7.5 and was visible in daylight.

The Cosmic Babbler
Solar tornadoes were first observed in the early 20th century, and the term was popularized again a few years ago when scientists looked at movies obtained by the AIA instrument on the NASA Solar Dynamics Observatory (SDO). These show hot plasma in extreme ultraviolet light apparently rotating to form a giant structure taking the shape of a tornado (as we know them on Earth).

Now, using the Doppler effect to add a third dimension to their data, the scientists have been able to measure the speed of the moving plasma, as well as its direction, temperature and density. Using several years' worth of observations, they were able to build up a more complete picture of the magnetic field structure that supports the plasma, in structures known as prominences.

Dr Nicolas Labrosse, lead scientist in the study, explains: "We found that despite how prominences and tornadoes appear in images, the magnetic field is not vertical, and the plasma mostly moves horizontally along magnetic field lines. However we see tornado-like shapes in the images because of projection effects, where the line of sight information is compressed onto the plane of the sky."

Dr Arturo López Ariste, another member of the team, adds: "The overall effect is similar to the trail of an airplane in our skies: the airplane travels horizontally at a fixed height, but we see that the trail starts above our heads and ends up on the horizon. This doesn't mean that it has crashed!"

Giant solar tornadoes -- formally called tornado prominences -- have been observed on the Sun for around a hundred years. They are so called because of their striking shape and apparent resemblance to tornadoes on Earth, but that is where the comparison ends.

Whereas terrestrial tornadoes are formed from intense winds and are very mobile, solar tornadoes are instead magnetized gas. They seem to be rooted somewhere further down the solar surface, and so stay fixed in place.

"They are associated with the legs of solar prominences -- these are beautiful concentrations of cool plasma in the very hot solar corona that can easily be seen as pink structures during total solar eclipses," adds Labrosse.

"Perhaps for once the reality is less complicated than what we see!" comments Dr Brigitte Schmieder, another scientist involved in the work.

She continues: "Solar tornadoes sound scary but in fact they normally have no noticeable consequences for us. However, when a tornado prominence erupts, it can cause what's known as space weather, potentially damaging power, satellite and communication networks on Earth."
Gone in a (cosmological) flash: a team of astronomers found 72 very bright, but quick events in a recent survey and are still struggling to explain their origin.

The scientists found the transients in data from the Dark Energy Survey Supernova Programme (DES-SN). This is part of a global effort to understand dark energy, a component driving an acceleration in the expansion of the Universe. DES-SN uses a large camera on a 4-metre telescope in the Cerro Tololo Inter-American Observatory (CTIO) in the Chilean Andes. The survey looks for supernovae, the explosion of massive stars at the end of their lives. A supernova explosion can briefly be as bright as a whole galaxy, made up of hundreds of billions of stars.

Astronomers found the largest number of these quick events to date. Even for transient phenomena, they are very peculiar: while they have a similar maximum brightness to different types of supernovae they are visible for less time, from a week to a month. In contrast supernovae last for several months or more.

The events appear to be both hot, with temperatures from 10,000 to 30,000 degrees Celsius, and large ranging in size from several up to a hundred times the distance from Earth to Sun (the Earth is 93,000,000 miles from the Sun). They also seem to be expanding and cooling as they evolve in time, as would be expected from an exploding event such as a supernova.

There is still debate on the origin of these transients. One possible scenario is that the star sheds a lot of material before a supernova explosion, and in extreme cases could be completely enveloped by a shroud of matter.

The supernova itself may then heat the surrounding material to very high temperatures. In this case astronomers see the hot cloud rather than the exploding star itself. To confirm any of this, the team will need a lot more data.

Astronomers explained the DES-SN survey is there to help us understand dark energy, itself entirely unexplained. That survey then also reveals many more unexplained transients than seen before. If nothing else, our work confirms that astrophysics and cosmology are still sciences with a lot of unanswered questions!

For the future, the team plan to continue their search for transients, and estimate how often they take place compared with more 'routine' supernovae.
Space weather emitted by Proxima Centauri, the star closest to our sun, may make that system rather inhospitable to life after all.

Using data from the Atacama Large Millimeter/submillimeter Array (ALMA), a team of astronomers discovered that a powerful stellar flare erupted from Proxima Centauri last March. This finding raises questions about the habitability of our solar system's nearest exoplanetary neighbor, Proxima b, which orbits Proxima Centauri.

At its peak, the newly recognized flare was 10 times brighter than our sun's largest flares, when observed at similar wavelengths. Stellar flares have not been well studied at the millimeter and submillimeter wavelengths detected by ALMA, especially around stars of Proxima Centauri's type, called M dwarfs, which are the most common in our galaxy.

“March 24, 2017, was no ordinary day for Proxima Centauri,” said Meredith MacGregor, an astronomer at the Carnegie Institution for Science, Department of Terrestrial Magnetism in Washington, D.C., who led the research with fellow Carnegie astronomer Alycia Weinberger. Along with colleagues from the Harvard-Smithsonian Center for Astrophysics, David Wilner and Adam Kowalski, and Steven Cranmer of the University of Colorado Boulder — they discovered the enormous flare when they reanalyzed ALMA observations taken last year.

The flare increased Proxima Centauri's brightness by 1,000 times over 10 seconds. This was preceded by a smaller flare; taken together, the whole event lasted fewer than two minutes of the 10 hours that ALMA observed the star between January and March of last year.

Stellar flares happen when a shift in the star's magnetic field accelerates electrons to speeds approaching that of light. The accelerated electrons interact with the highly charged plasma that makes up most of the star, causing an eruption that produces emission across the entire electromagnetic spectrum.

“It’s likely that Proxima b was blasted by high energy radiation during this flare,” MacGregor explained, adding that it was already known that Proxima Centauri experienced regular, although smaller, X-ray flares. “Over the billions of years since Proxima b formed, flares like this one could have evaporated any atmosphere or ocean and sterilized the surface, suggesting that habitability may involve more than just being the right distance from the host star to have liquid water.”

An earlier paper that also used the same ALMA data interpreted its average brightness, which included the light output of both the star and the flare together, as being caused by multiple disks of dust encircling Proxima Centauri, not unlike our own solar system’s asteroid and Kuiper belts.

But when MacGregor, Weinberger, and their team looked at the ALMA data as a function of observing time, instead of averaging it all together, they were able to see the transient explosion of radiation emitted from Proxima Centauri for what it truly was.

“There is now no reason to think that there is a substantial amount of dust around Proxima Centauri,” Weinberger said. “Nor is there any information yet that indicates the star has a rich planetary system like ours.”

The National Radio Astronomy Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc.
Mars is Earth’s neighbor in the solar system. NASA’s robotic explorers have visited our neighbor quite a few times. By orbiting, landing and roving on the Red Planet, we’ve learned so much about Martian canyons, volcanoes, rocks and soil. However, we still don’t know exactly what Mars is like on the inside. This information could give scientists some really important clues about how Mars and the rest of our solar system formed.

This spring, NASA is launching a new mission to study the inside of Mars. It’s called Mars InSight. InSight—short for Interior Exploration using Seismic Investigations, Geodesy and Heat Transport—is a lander. When InSight lands on Mars later this year, it won’t drive around on the surface of Mars like a rover does. Instead, InSight will land, place instruments on the ground nearby and begin collecting information.

Just like a doctor uses instruments to understand what’s going on inside your body, InSight will use three science instruments to figure out what’s going on inside Mars.

One of these instruments is called a seismometer. On Earth, scientists use seismometers to study the vibrations that happen during earthquakes. InSight’s seismometer will measure the vibrations of earthquakes on Mars—known as marsquakes. We know that on Earth, different materials vibrate in different ways. By studying the vibrations from marsquakes, scientists hope to figure out what materials are found inside Mars.

InSight will also carry a heat probe that will take the temperature on Mars. The heat probe will dig almost 16 feet below Mars’ surface. After it burrows into the ground, the heat probe will measure the heat coming from the interior of Mars. These measurements can also help us understand where Mars’ heat comes from in the first place. This information will help scientists figure out how Mars formed and if it’s made from the same stuff as Earth and the Moon.

Scientists know that the very center of Mars, called the core, is made of iron. But what else is in there? InSight has an instrument called the Rotation and Interior Structure Experiment, or RISE, that will hopefully help us to find out.

Although the InSight lander stays in one spot on Mars, Mars wobbles around as it orbits the Sun. RISE will keep track of InSight’s location so that scientists will have a way to measure these wobbles. This information will help determine what materials are in Mars’ core and whether the core is liquid or solid.

InSight will collect tons of information about what Mars is like under the surface. One day, these new details from InSight will help us understand more about how planets like Mars—and our home, Earth—came to be.

For more information about earthquakes and marsquakes, visit: https://spaceplace.nasa.gov/earthquakes

This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!
Get outside with your telescope on clear May evenings to see celestial treats! With weather warming up and skies clearing up, there’s no shortage of celestial delicacies to view with telescopes and binoculars. Here are a few of Orion’s top suggestions for May observing:

**Eta Aquarid Meteor Shower**

Grab a blanket or a comfy lounge chair to sit back, relax and watch the Eta Aquarids meteor shower, one of two annual showers caused by dust particles from Halley’s Comet. Catch the peak of the dazzling show before dawn on May 6. The waning gibbous Moon might outshine some of fainter meteors, but there will still be opportunities see meteors streak across the night sky at the approximate peak rate of about 30 per hour. Look for meteors appearing to radiate from the constellation Aquarius.

**Mars InSight Lander**

2018 is quite a year for the Red Planet. As you gear up for opposition on July 27, and Mars' closest proximity to Earth since 2003, those of you in California may also have the opportunity to watch NASA's launch of the Mars InSight Lander. At 4:05 A.M. Pacific Time on May 5, InSight will set off for the first ever mission to study the deep interior of Mars.¹ Weather permitting, the launch may be visible to more than 10 million Californians without a need for them to drive to a special location. Get out your binoculars if you’re lucky enough to view the launch in person, or watch the event online on NASA.gov/live.

**Jupiter at Opposition**

Gigantic Jupiter reaches opposition on May 9th, making it the best night of the year to explore the gas giant planet and its four brightest moons Io, Europa, Ganymede, and Callisto. Since Jupiter will be directly opposite the Sun from Earth, it will be visible all night long. Opposition occurs when a planet reaches its closest approach to Earth in its elliptical orbit. Take advantage of Jupiter’s brightest night of the year and take a closer look at its cloud band "stripes" and four Galilean moons with any size telescope.

**Four Big Planetary Nebulae**

Use a 6" or larger telescope and an Oxygen-III or UltraBlock filter to catch nice views of four relatively large planetary nebulae in May skies. See the "Ghost of Jupiter," NGC 3242 in Hydra; M97, "the Owl Nebula" in the Big Dipper; NGC 4361 in Corvus, and the famous "Ring Nebula", M57 in Lyra just a few degrees from bright star Vega. To help you locate these objects, use the The DeepMap 600.

**New Moon, Dark Skies**

Take advantage of the dark skies provided by the New Moon on May 15th to scope out the many star clusters, galaxies and other deep-sky gems on display. Pack up your astronomy gear using our full line of telescope and accessory cases and head to a dark sky site for the best viewing conditions.

**Five Glittering Globulars**

Five picture-perfect examples of globular star clusters will be visible in May skies. Check out M3 in the constellation Boötes. M13, the "Great Cluster in Hercules" will be visible near the zenith. M5 can be found in Serpens, and M92 in the northern section of Hercules. Be sure to track down M4 (NGC 6121) in Scorpius on May 27th, as it will be in a great position for telescopic study throughout the night, reaching zenith around midnight. Big telescopes will provide the best views, but even a pair of humble 50mm or larger binoculars will show you these dense balls of stars from a dark sky site.

**A Beautiful Pairing — Crescent Moon and Venus**

After the sun sets on May 17th, you’ll find a stunning view of the waxing crescent moon to the left of brilliant Venus. While you’re observing the pair, use at telescope to look for the crater Furnerius at the lower right of the crescent moon’s face. Try Orion’s 1.25” Orion 25% Transmission Moon Filter, perfect for crescent phases, to improve lunar contrast and tone down glare.

**Four Face-On Spirals**

Use a large telescope to see the classic pinwheel shapes of galaxies M51 and M101 in the Big Dipper asterism of Ursa Major, and M99 and M100 in the Virgo galaxy cluster. There are also dozens of additional galaxies to explore in the Virgo cluster with a large aperture telescope.

**May’s Challenge Object**

May skies present some of the best opportunities to grab a view of Omega Centauri — the brightest globular star cluster in the sky! While it’s big and bright, even visible as a "fuzzy" star in binoculars, the challenge Omega Centauri presents is its low position in southern skies, which can make it unobservable from higher northern latitudes. If you’re having trouble locating the famous globular cluster, Bruce McClure from EarthSky.org suggests letting the sparkling blue-white star Spica help you. He explains that when Spica climbs highest up for the night, so does Omega Centauri — look for it 35° directly below Spica.
May Notes
Near the top of the sky are two prominent constellations, LEO with its reverse question mark, the Sickle, punctuated by the kingly star, Regulus, and Ursa Major, containing the Big Dipper (the “backs” of Leo and the Big Dipper face each other). The handle of the dipper curves and points to the star Arcturus in Bootes and continuing the curve, points to Spica in Virgo. In front of Leo is Cancer containing the spindle of stars known as the Beehive. Less known and to Leo’s rear, is another spindle of stars in Coma Berenices. Both spindles can be seen easily with binoculars and appear, to the eyes, as fuzzy patches in dark skies. At one time, the Beehive was thought of as the whiskers of Leo with the spindle of stars in Coma Berenices as the end of its tail.

Clusters, Nebulae, Galaxies +

ly = Light year, a unit of distance. 1 ly = 6 trillion miles.

Castor Double Star. Favorite double star. Need a telescope with 50x to 100x to see Castor separate into two stars. Magnitudes of two stars are 1.9 and 3.0. In Gemini.


Mizar. Two stars with good eyes or binoculars. Three stars with a telescope at 50x. Located in the handle of the Big Dipper.


Observing Tips
If possible, observe at a dark location and when the Moon is not bright. A bright Moon will make it more difficult to see the stars and impossible to see clusters, nebulae and galaxies. Only a small telescope at lower magnifications, around 50x, is required to see the objects listed above. The planets and Moon are best observed with a telescope around 100x. To get a feel for the size of objects, the Moon extends 30’ (30 arc minutes). The binocular objects are best with binoculars because these objects are large in size—telescopes have too much magnification.

Meteor Showers
The Eta AQUARIIDS peak around May 5 with 60 meteors/hour.

Brightest Stars

Arcturus. In Bootes. Magnitude ~0.04. Distance: 37 ly. Diameter: 26 times the Sun’s. It’s an Orange Giant.


Castor. In Gemini. Magnitude +1.6. Distance: 52 ly. Favorite double star that is twice the diameter of the Sun.


Pollux. In Gemini. Magnitude +1.2. Distance: 34 ly. Diameter is 8.8 times the Sun’s & 46 times brighter.

Procyon. In Canis Minor. Magnitude +0.4. Distance: 11.4 ly. Diameter is 2 times the Sun’s & 7.5 times brighter.

Regulus. In Leo. Magnitude +1.4. Distance: 78 ly. Diameter: 3.5 times the Sun’s & 140 times brighter.

Spica. In Virgo. Magnitude +1.1. Distance: 262 ly. Actually two close stars revolving around each other in 4 days.

Vega. In Lyra. Magnitude +0.0. Distance: 25 ly. Rotates on axis once every 12 hours. Mass is about 2.3 times our Sun.

May Mythology

FOR THE CENTRAL CONSTELLATIONS, NORTH TO SOUTH

Arcas and his beautiful mother, Callisto were turned into the Little and Big Bears, Ursa Minor and Major, because of jealous June, wife of promiscuous Jupiter.

During a war between the Titans and Olympians, Draco, the Dragon was flung to the North and frozen in place by the cold.

Regulus, the brightest star in Leo, the Lion has several meanings including regal, king and mighty. Before him is Cancer, the Crab sent to prevent Hercules from killing the nine-headed Hydra as one of his twelve labors toward a virtuous life.

Corvus was a bird placed in the heavens on Hydra’s back by Apollo for being slow for bringing water and lying about his tardiness. Crater represents the container of water that is always out of reach of Corvus.

When Virgo, the Virgin is in the night sky, crops grow. The growing season ends when, in the early evening, she sets on the western horizon.

Canes Venatici are the Hunting Dogs of Bootes who is sometimes seen as a Ploughman. Corona Borealis is the crown of Bacchus, the god of wine.

May Moon Phases

- Third or Last Quarter. Monday, May 7, 9:09 pm, CDT
- New Moon. Tuesday, May 15, 6:48 am, CDT
- First Quarter. Monday, May 21, 10:49 pm, CDT
- Full Moon. Tuesday, May 29, 9:20 am, CDT

What’s Out Tonight?

May 2018 Sky Chart

Visit: WhatsOutTonight.com
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Instructions
Face North, South, East or West, then rotate the chart so your direction is at the bottom. Match the biggest stars on the chart to the brightest stars in the sky. The center of the chart is the top of the sky.

Planets
The position of any visible, naked-eye planet is indicated for the 15th of the month with a size matching its magnitude. If the planet moves significantly during a month, other positions will be noted with dates. The ECLIPTIC is the path of the Sun through the sky but the planets and Moon move along it, too. It passes through the constellations of the zodiac.

May 2018 Planet Notes
Venus, at magnitude −4.0, sets in the west about 2.5 hours after the Sun. Mars, at magnitude −0.8, in Capricornus, rises in the east around 1:00 AM. Jupiter, at magnitude −2.5, in Libra, is up in the east when the Sun sets and up for most of the night. Saturn, at magnitude +0.3, in Sagittarius, rises in the east around midnight.

Distances planets from Earth the 15th of this month:
Venus: 127,000,000 miles, Mars: 67,000,000 miles
Jupiter: 409,000,000 miles, Saturn: 864,000,000 miles.