

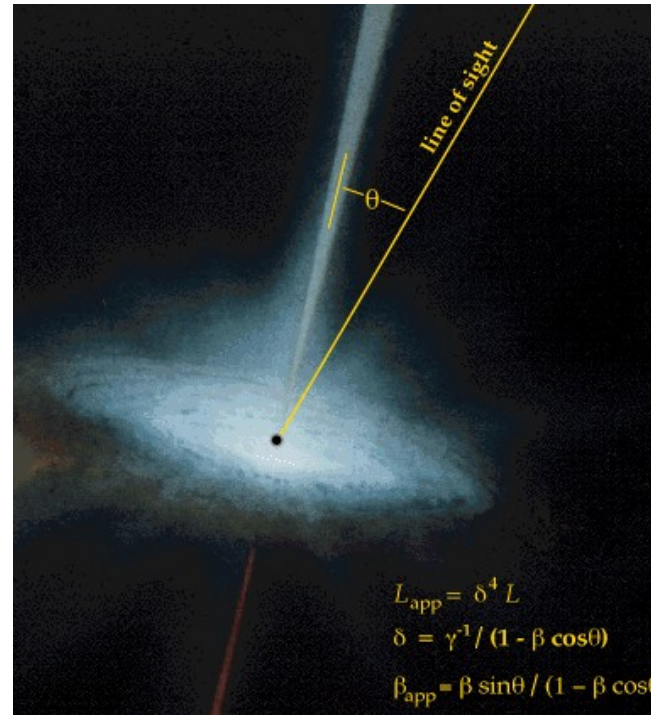


Events:

General Meeting :

Monday, May 6, 2019 at the Ronald H. Roberts Temecula Library, Room B, 30600 Pauba Rd, at 7:00 PM. On the agenda this month is a talk by Clark Williams titled "The Road to Tranquility, part 1 of 3 - From Archytas to Launch Complex 19" followed by "What's Up" by Skip Southwick. Refreshments by Mark Dodd.

Please consider helping out at one of the many Star Parties coming up over the next few months. For the latest schedule, check the Calendar on the [web page](#).



Superluminal Motion first observed in 1902 by Jacobus Kapteyn.

General information:

Subscription to the TVA is included in the annual \$25 membership (regular members) donation (\$9 student; \$35 family).

President: Mark Baker 951-691-0101

<shknbk13@hotmail.com>

Vice President: Skip Southwick

<skipsouthwick@yahoo.com>

Past President: John Garrett <garrjohn@gmail.com>

Treasurer: Curtis Croulet <calypte@verizon.net>

Secretary: Deborah Cheong <geedeb@gmail.com>

Club Librarian: Vacant

[Facebook](#): Tim Deardorff <tim-deardorff@yahoo.com>

Star Party Coordinator and Outreach: Deborah Cheong

<geedeb@gmail.com>

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Website: <http://www.temeculavallevastronomers.com/>

WHAT'S INSIDE THIS MONTH:

Cosmic Comments

by President Mark Baker

A Note from the Editor

Mark DiVecchio

Looking Up Redux

compiled by Clark Williams

Random Thoughts

by Chuck Dyson

Watching the Late Spring Skies

by David Prosper

Send newsletter submissions to Mark DiVecchio <markd@silologic.com> by the 20th of the month for the next month's issue.

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Cosmic Comments by President Mark Baker

BLACK HOLE...it's amazing how an object so ominous sounding has galvanized the imagination of the whole world. The recent compilation of M87* images equaling over 5 PETABYTES of data has everyone enthralled, everywhere...not bad for an object that is 55 million light years from us, and is 6.5 billion times the mass of Sol.

Even the recently assigned name in Hawaiian of Powehi has an awe inspiring and even threatening meaning of "embellished dark source of unending creation"!!! Are black holes new?? No, not at all...but the interest in them is now a bow wave of inquiry and desire for understanding. This is the kind of public interest that pushes discovery and knowledge, and will be a major topic at Outreach events for quite some time to come...so be ready.

So what does the Event Horizon Telescope do for an encore?? It hopes to capture a similar "image" of Sagittarius A*, which is the super massive black hole at the center of our own galaxy. Soon we will be able to peruse our friendly neighborhood gobbler of stellar material...the comparison alone will advance our knowledge tremendously.

So, as a reminder, Science is not stagnant, nor is it dead or dying. Humans continue to press into the nether reaches of understanding, and we TVA members get to be on the front lines...either individually or as a collective, we have opportunities to share the wealth within our communities and be rewarded with the Ooh's, Aah's, and even AHA's!!! Just because we promote looking up and wondering...

As always, here's to what we do, for which I am most thankful indeed!!

Clear, Dark Skies my Friends...



A Note from the Editor

Chuck Dyson has told me that he will not be able to write his monthly article for the next several months. His Random Thoughts have become a main stay in the Temecula Valley Astronomer.

We need someone to step up and write one or more articles for all of us to enjoy. Please contact me at markd@silologic.com.

Mark DiVecchio





Looking Up Redux compiled by Clark Williams

from these sources:

SeaSky.org

Wikipedia.com

in-the-sky.org

The American Meteor Society, Ltd.

cometwatch.co.uk

NASA.gov

TVA App (2.0.1296)

FullAndNewMoon App (2.0)

Starry Night Pro Plus 7 (7.6.3.1373)

SkySafari 6 Pro (6.1.1)

Stellarium (0.18.2)



ALL TIMES ARE LOCAL PST WILDOMAR/MURRIETA/TEMECULA

Times are given in 24-hour time as: (hh hours, mm minutes, ss seconds)

hh:mm:ss or hhmmss

hhmm+ (time of the next day)

hhmm- (time of the previous day)

hhmm (seconds not shown)

Moon Phases for the month by date:

Saturday the 04th @ 1546 NEW in Cetus

Saturday the 11th @ 1813 FIRST QTR in Leo

Saturday the 18th @ 1412 FULL in Libra

Sunday the 26th @ 0934 THIRD QTR in Aquarius

Apogee comes on 2019-05-26 @ **0628** – 404 133 km (251, 117 mi)

Perigee comes on 2019-05-13 @ **1454** – 369 015 km (229, 296 mi)

2019 has: (13) new moons, (12) 1st Qtr moons, (12) Full moons, (12) 3rd Qtr moons
(0) Blue moons and (1) Black moon

Daylight Savings: Pacific time is Timezone Uniform -8 GMT (-7 GMT PDT)

Luna: Luna will be peeking above the horizon about four-thirty in the morning on the first. Luna is heading toward New on the 4th of the month so you should have some dark nights for twelve days of the month. Luna by mid-month is only three days short of Full and 90% illuminated. Luna is rising by four-thirty in the afternoon and glowing without mercy and not setting until about **0439+**. This is a perfect time for some lunar exploring with binoculars, a small scope or just your peepers. Luna will be Full by the 18th. The end of the month we're deep into the third-quarter and dark night viewing will be back. In fact on the 31st Luna has hit the pillow by **1719** and you will have a full dark night for viewing.

Compiler's Note: **Blue Moon?** There are a lot of definitions for what is a "Blue" Moon. Some are convinced that a Blue Moon is the fourth full moon in a season. That is if a fourth full moon happens in spring, summer, autumn or winter that is a "Blue" Moon and only that definition is correct. Others are insistent that a second full moon in a month constitutes the definition of a "Blue" Moon. These are the kinds of dogmatic views people will go to war over because they aren't outside looking at the stars with their friends and family. If you believe in the "seasons" definition then this is your "Blue" Moon. If not then you'll have to wait until Halloween of 2020.



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Highlights: (distilled from SeaSky.org and Clark's planetary Orrey program[s])

04 May: Evening – New Moon. 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. (<http://SeaSky.org/>)

6-7 May: late night/early morning – Eta Aquarids Meteor Shower. An above average shower, capable of producing up to 60 meteors per hour at its peak. Most of the activity is seen in the Southern Hemisphere. In the Northern Hemisphere, the rate can reach about 30 meteors per hour. It is produced by dust particles left behind by comet Halley, which has known and observed since ancient times. The shower runs annually from April 19 to May 28. It peaks this year on the night of May 6 and the morning of the May 7. The thin crescent moon will set early in the evening leaving dark skies for what should be a good show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Aquarius, but can appear anywhere in the sky. (<http://SeaSky.org/>)

18 May: Evening – Full Moon, Blue Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs at 21:11 UTC. This full moon was known by early Native American tribes as the Full Flower Moon because this was the time of year when spring flowers appeared in abundance. This moon has also been known as the Full Corn Planting Moon and the Milk Moon. Since this is the third of four full moons in this season, it is known as a blue moon. This rare calendar event only happens once every few years, giving rise to the term, "once in a blue moon." There are normally only three full moons in each season of the year. But since full moons occur every 29.53 days, occasionally a season will contain 4 full moons. The extra full moon of the season is known as a blue moon. Blue moons occur on average once every 2.7 years. (<http://SeaSky.org/>) See: Compiler's Note under Luna (above).

Algol minima: (All times PDT)

05/03/19	1922
05/06/19	1611
05/09/19	1300
05/12/19	0949
05/15/19	0638
05/18/19	0310
05/21/19	0000
05/23/19	2049
05/26/19	1738
05/29/19	1427

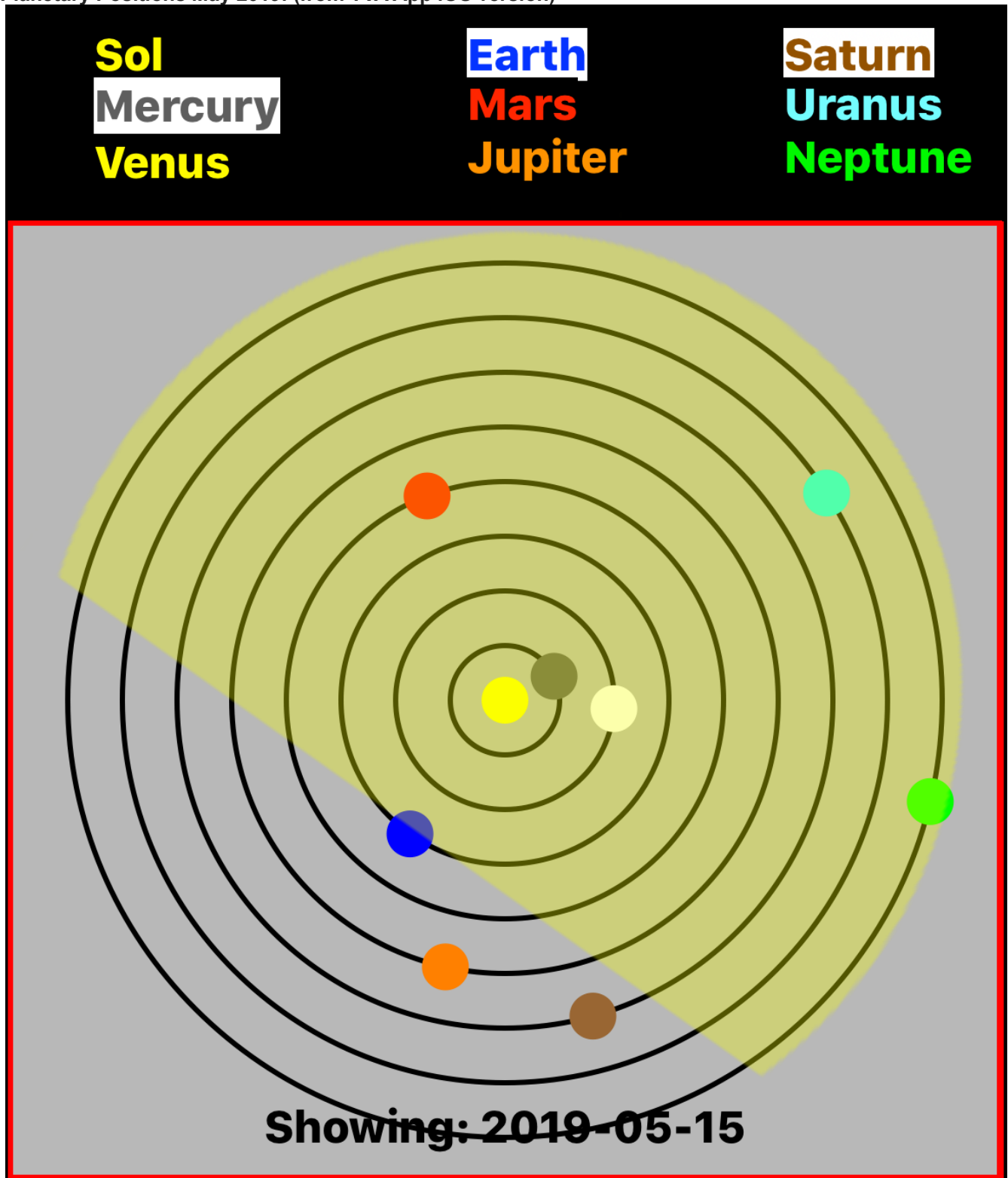


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Planets:

Planetary Positions May 2019: (from TVA App iOS version)





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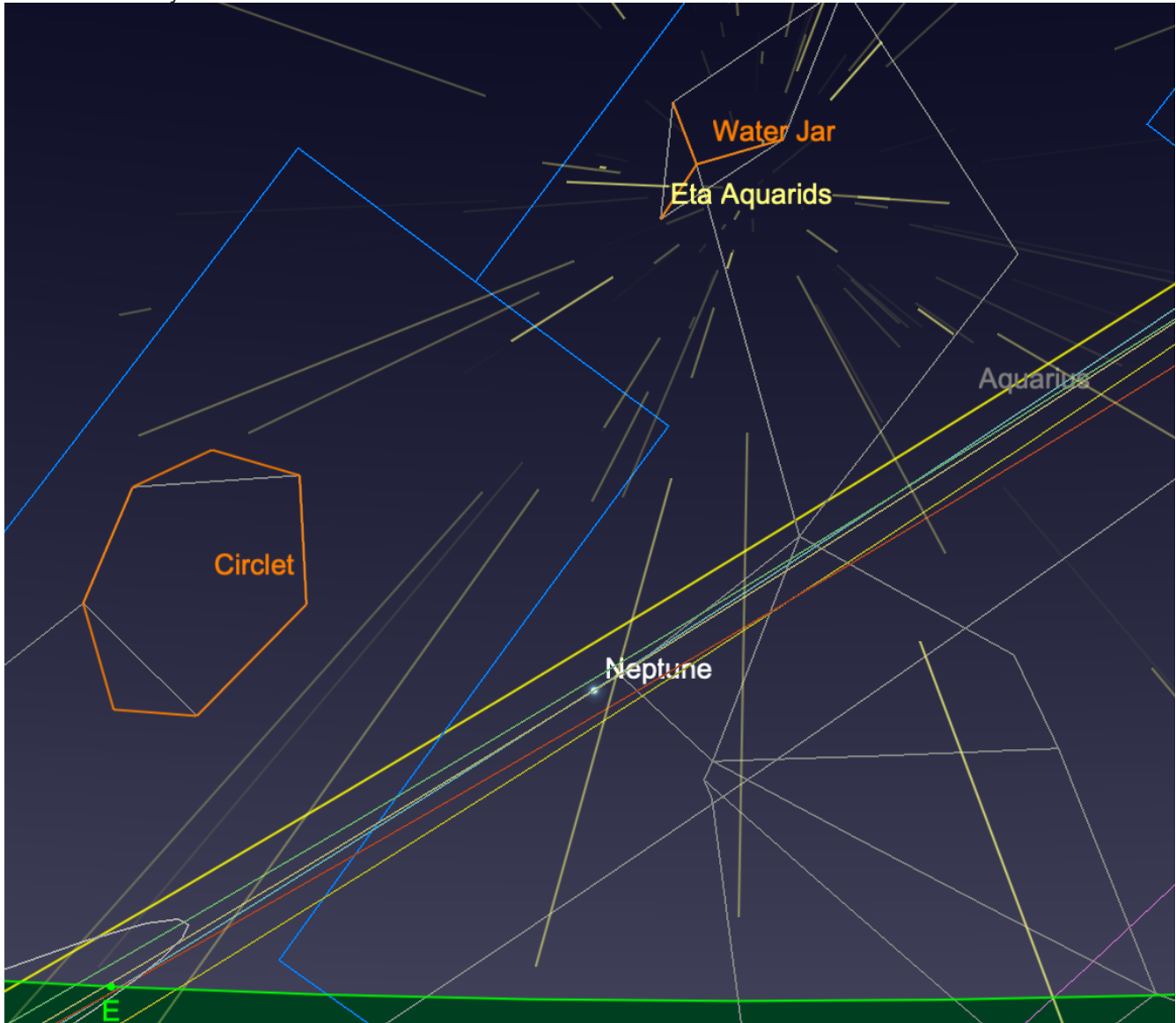
- **Mercury:** Mercury is lost in the Sun's glare at the beginning of the month. By mid-month Mercury is perhaps visible as an evening object but it hardly seems worth the risk of eye damage. By the end of the month Mercury has slipped around to setting about **2055** and sunset is about **1953**. That will give you almost 35-minutes of viewing if you take into account the haze and glare of sunset. The Transit of Mercury is coming on 2019 November 11. This hasn't happened since 2016. **DON'T LOOK DIRECTLY AT THE SUN!**
- **Venus:** Is the Morning Star. Venus rises at **0450** on the first followed by the Sun at **0600**. By mid-month Venus is rising at **0442** followed by the Sun at **0546** and Venus rises at **0436** by the end of the month with sunrise at **0538**.
- **Mars:** Mars is still visible this month but very small. The Warrior rises on the first in the mid-morning at about **0818**. Transiting by **1330** and not setting until **2242**. This gives you over 2 hours of viewing before the Warrior lumbers to slumber. Mid-month finds Mars visible about the same time and setting around **2238**. You will have a Waxing Gibbous Moon to contend with however at about 91% illuminated. But Luna is over 110° at 250° away while Mars is in the north. By the end of May Mars will be rising during the early morning **0450** and setting before sunset. The moon will be back where it belongs setting by **1719**.
- **Jupiter:** Jupiter is back in the evening sky but doesn't rise until **2243** on the first of the month and transiting at **0345+**. By mid-month Jove is up an hour earlier **2143** and transits by **0245+**. The end of the month sees a rise time of **2032** and a transit at **0134+**. Jove is headed in the right direction.
- **Saturn:** Saturn is trailing Jove rising at **0039** on the first and transiting about sunrise. Saturn is rising about **2339** by mid-month. By the end of the month you'll get a little longer view of Saturn as it rises at **2234** and won't get washed out until sunrise.
- **Uranus:** On the first Uranus will be lost in the Sun's glare. By the ides Uranus is very close to Venus within 4° of each other at Uranus' rise time of **0448**. Sunrise is at **0546**. By the 31st Uranus rises at **0337** before sunrise at **0538**. You won't be finding Uranus easily or with a scope less than about 12-inches aperture.
- **Neptune:** Neptune is rising before the Sun in the beginning of the month by about 2-hours. Not enough to find the +7.95 magnitude planet in the early dawn light. By the 15th Neptune has moved slightly ahead of Sol rising at **0248** with sunrise at **0546**. By the end of the month Neptune is rising by **0146**. This should give you about 3-hours to find the blue planet.
- **Pluto:** Pluto is back as a morning object, rising at **0051** and sunrise is not until **0559**. Mid-month finds Pluto rising at **2352** and getting very close to Saturn. Sunrise is not until **0546+**. Month end finds Pluto rises about **2248** and the sun follows at **0538+**.

Asteroids:

- Still a dearth of asteroids. I searched for asteroids in 2019 with a reasonable magnitude; say less than or equal to +10 in May there is nothing except the regulars: Juno, Vesta, Hebe, Eros and Herculina. So consult your local planetarium software or try <https://www.asteroidsnear.com/year?year=2019>.

Meteors:

- **Eta Aquarids** Meteor Shower. An above average shower, capable of producing up to 60 meteors per hour at its peak. Most of the activity is seen in the Southern Hemisphere. In the Northern Hemisphere, the rate can reach about 30 meteors per hour. It is produced by dust particles left behind by comet Halley, which has known and observed since ancient times. The shower runs annually from April 19 to May 28. It peaks this year on the night of May 6 and the morning of the May 7. The thin crescent moon will set early in the evening leaving dark skies for what should be a good show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Aquarius, but can appear anywhere in the sky. (<http://SeaSky.org/>)
- Very early in the morning **0330** to **0530**. Peak is expected to be low on the Eastern Horizon near the Water Jar on the 7th of May at **0400**.





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Comets:

- Comets come in various classifications:
 - 1) Short Period comets – further broken down into:
 - Halley Type: The Halley Types are believed to come from the Kuiper Belt and have periods in excess of 20-years.
 - Jupiter Type: The Jupiter types have a period less than or equal to 20-years.
 - Short period comets may have a near circular orbit or an elliptical orbit. The latter being far more common.
 - 2) Long Period comets – thought to originate from the Oort cloud these comets have periods of over 200 years and have random inclinations around the celestial sphere.
- Unless some bright long period comets are discovered it promises to be a disappointing year for comet enthusiasts. (<https://www.ast.cam.ac.uk>)



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Deep Sky:

Notes:

L/Z abbreviation for ALT/AZ

R/D abbreviation for Right Ascension/Declination

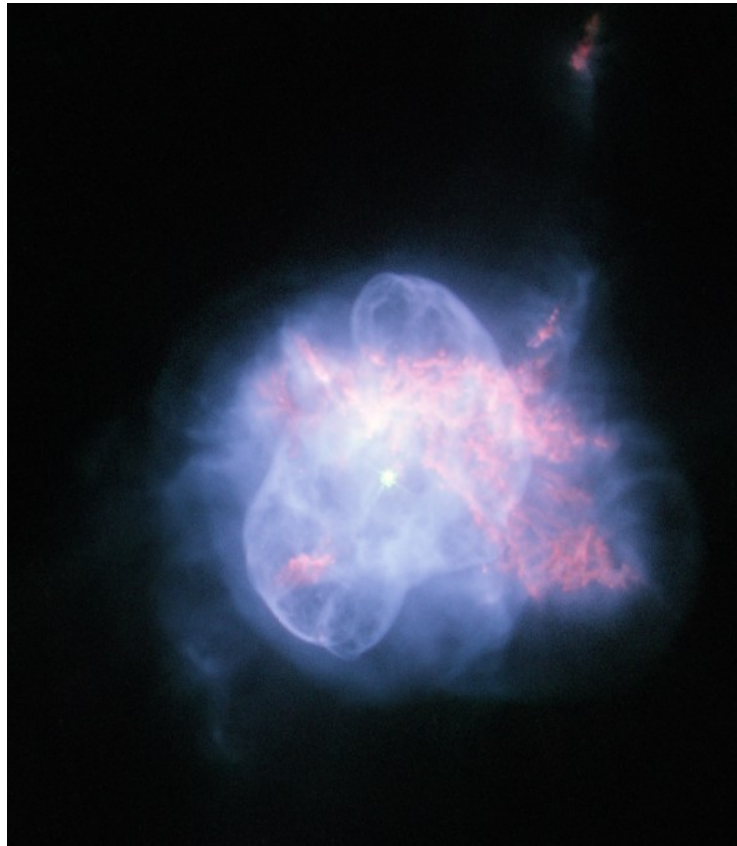
α is right ascension

δ is declination

In each case, unless otherwise noted, you should look for the following on or about the 15th Day of May 2019 at 2100 PDT and you will have about 20 minutes of viewing time total.

Lets look for some objects recently in the astronomical news:

- **NGC 6210** – A Turtle in Space? Planetary nebula NGC 6210 may look like a giant space turtle, but it is actually much more massive and violent. Fortunately, this gas cloud in Hercules lies about 6500 light years away. NGC 6210 was investigated with the Hubble Space Telescope because it showed evidence of unusual relative abundances of nebular gas. The resulting detailed representative-color picture, above, shows jets of hot gas streaming through holes in an older, cooler shell of gas. The central star that created the planetary nebula is clearly visible in the center of the inset image. Analyses of data involving this recently released picture may help explain the origin of chemical abundances in this nebula and our Galaxy. (APOD: (<https://apod.nasa.gov/apod/ap981028.html>) In the east-northeast sky near the Butterfly.



By ESA/Hubble and NASA -
<http://www.spacetelescope.org/images/potw1026a/>,
Public Domain,
[https://commons.wikimedia.org/w/index.php?
curid=11841286](https://commons.wikimedia.org/w/index.php?curid=11841286)

- **Messier 49** – AKA NGC 4472 is an elliptical galaxy located about 56 million light-years away in the equatorial constellation of Virgo. This galaxy was discovered by French astronomer Charles Messier on February 16, 1777. Messier 49 was the first member of the Virgo Cluster of galaxies to be discovered. It is the most luminous member of that cluster and more luminous than any galaxy closer to the Earth. This galaxy forms part of the smaller Virgo B subcluster located 4.5° away from the dynamic center of the Virgo Cluster, centered on Messier 87. Messier 49 is gravitationally interacting with the dwarf irregular galaxy UGC 7636. The dwarf shows a trail of debris spanning roughly 1×5 arcminutes, which corresponds to a physical dimension of 6×30 kpc. ([Wikipedia](#)) You can find this object on the 15th of May in Virgo near the ecliptic just east of the Diamond.



By Ole Nielsen - <http://www.ngc7000.org/ccd/gal-virgocluster.html#m49>, CC BY-SA 2.5, <https://commons.wikimedia.org/w/index.php?curid=1188643>

May is great for both viewing and imaging. Spend some time outside with your scope. Spring is here and Summer is on its way.

For now – Keep looking up.



Random Thoughts by Chuck Dyson

STAR ROCKETS PART TWO

Last time, I cut my article off, not short, just because it was getting so long; however, there is so much going on in the area of rocket engine research that I was forced to pick and choose as to which programs I wanted to highlight. One that I only partially covered was the wonderful world of laser powered programs. The other program that I completely skipped was the Kugelblitz study, not even a program yet. And worst of all, Miguel Alcubierre got his paper on warp drive in to the publishers too late for me to include it in my article; so, all of this will be corrected in this article, I hope.

First off just why is everyone so excited about lasers? Well, thanks to [Ronald Reagan's](#) Star War program, a lot of work has been done on really high energy lasers. These lasers and even more powerful ones that are under development can have already achieved ignition at the [National Ignition Facility](#) (NIF) at the Lawrence Livermore National Laboratories.

At the lab, ignition means that the lasers, all 192 of them, have been successfully synced and hit a target the size of a peppercorn at exactly the same time with a combined energy of around a petawatt (10^{15} watts). If there are hydrogen, deuterium, and tritium atoms inside of your target, you will have achieved the fusion of these atoms into helium and released a lot of energy. At the NIF facility, they have actually achieved the goal of producing more energy from the fusion event than was used to produce it; and this is a really, really big deal because now you have an energy source that produces more energy than the system needs just to sustain itself and can now supply operating and life support energy to the spaceship.

The only problem with putting the NIF laser in space and having it power rockets is its size. Just the capacitors for storing the necessary electrical charge and the optical piping to pump and modify the light are the size of three football fields. The final laser assembly is housed in a ten story high building, definitely not rocket friendly, and by the way this building does not include the power source to operate this laser which would require another building.

However, it is possible to have the laser on the ground and have a radiator or fuel pack on the rocket that is targeted by multiple lasers that come to focus on the rockets radiator or fuel pack and heat it up to operating temperature. That will provide the rocket with the thrust it needs to get into low earth orbit once the rocket is initially launched by conventional engines. Although this is definitely not a star rocket it is a step in the right direction as studies indicate that rockets of this type of design will be much more efficient than any chemical rocket.

If lasers with the power required to power a rocket directly can be made small enough to actually fit into the rocket, then the whole game changes because the laser will be acting directly on the fuel and the whole system can then operate at higher temperatures and pressures, within limits. More importantly, if the lasers can create a plasma, then magnets can confine it and electrical fields can be used to accelerate the naked nuclei to relativistic speeds and at this point we can really start to think about sending unmanned probes to other stars.

If we really want to send humans to other stars we need to get really serious about our power source and the [Kugelblitz](#) seems made to order for our needs. Translated from the German it means ball lightning and at the center of our ball lightning we aim to create nothing less than a black hole. Einstein's famous equation is

$E = MC^2$ and we can rewrite this equation to $M = \frac{E}{C^2}$ and this tells us that if we compress enough light to a

high enough pressure and temperature, we can convert light in to matter. OK the first thing we are going to need is a Dyson Swarm to collect around 10% of the sun's energy and feed it to space lasers that would operate in the gamma radiation spectrum. Our goal would be to create a 606,000 metric ton black hole with a [Schwartzshield radius](#) of one proton. We will only need to capture about 10% of the sun's total output in order to do this and, if



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done correctly and if Einstein's equations work at these pressures and temperatures, we will have a black hole that radiates 162 petawatts of energy and should power our spaceship for at least 3.5 years. Just for comparison, the United States uses just over 4 petawatts per year.

(In 1960 [Freeman Dyson](#) published a paper in Science suggesting that advanced civilizations would need so much energy that they would build an energy capturing shell around their star that would start out as a swarm of solar collectors and then be added onto until there was a complete shell.)

So, with all of that power are we ready to go to the stars?

We have one other little problem to solve first because with all of that power coming off an object the size of a proton, the surface temperature of our black hole is 142,000,000,000,000,000,000,000,000 Kelvin and this is a bit of an awkward temperature to work with. We must first figure out how to handle this little bit of hot property and then how to capture and convert that energy into forward motion, hopefully to speeds of greater than 0.1c in less than 20 days before zooming off to distant places.

If you thought that the Kugelblitz project was out of this world you are going to love the Alcubierre warp drive, yep real Captain Kirk and Han Solo stuff. [Miguel Alcubierre](#) is an astrophysicist who, after looking at Einstein's field equations, felt that they permitted space to be compressed and expanded. If space can be compressed and expanded then the physical space does not have to move in the conventional sense of the word but by compressing and expanding space fast enough the space ship will move through space at [superluminal](#) speeds, and yes it does take a while to grasp the concept.

The initial problem with the Alcubierre drive was it needed more energy than was present in the known universe but subsequent work on the problem by Alcubierre and others reduced the energy requirement to less than the known energy in the universe. As of today, a single theoretical trip in the Alcubierre space ship will take only the energy represented by the planet Jupiter and that would enable just one trip with our warp drive powered ship. With the improved understanding of how little power it would theoretically take to power our Alcubierre warp drive, the nay-sayers have come out in force to criticize the project. The criticisms of the project include "*Although the Alcubierre warp drive is consistent with Einstein's field equations it may not be physically meaningful and thus no drive can be constructed or if it is meaningful that does not mean that a physical drive can be constructed*". The final criticism is "*The proposed Alcubierre drive implies negative energy density and this implies exotic matter. If the exotic matter that is needed cannot be found, and it has not been found so far, the drive cannot be constructed*".

To the people who fret endlessly over these little details I say picky, picky, picky.

Cheers, Chuck



Watching the Late Spring Skies

By David Prosper

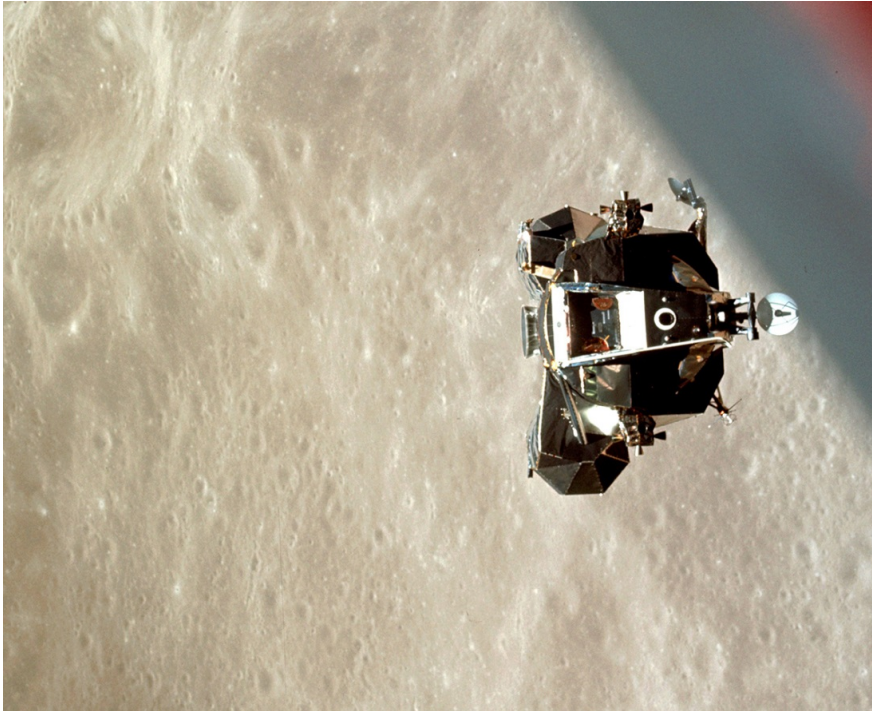
Late spring brings warmer nights, making it more comfortable to observe a good showing of the **Eta Aquarids** meteor shower. Skywatchers can also look for the delicate **Coma Star Cluster**, and spot the **Moon** on the anniversary of **Apollo 10's** "test run" prior to the Moon landing in 1969.

The **Eta Aquarids** meteor shower should make a good showing this year, peaking the morning of May 6. This meteor shower has an unusual "soft peak," meaning that many meteors can be spotted several days before and after the 6th; many may find it convenient to schedule meteor watching for the weekend, a night or two before the peak. You may be able to spot a couple dozen meteors an hour from areas with clear dark skies. Meteors can appear in any part of the sky and you don't need any special equipment to view them; just find an area away from lights, lie down on a comfy lawn chair or blanket, relax, and patiently look up. These brief bright streaks are caused by Earth moving through the stream of fine dust particles left by the passage of Comet Halley. While we have to wait another 43 years for the famous comet grace our skies once more, we are treated to this beautiful cosmic postcard every year.

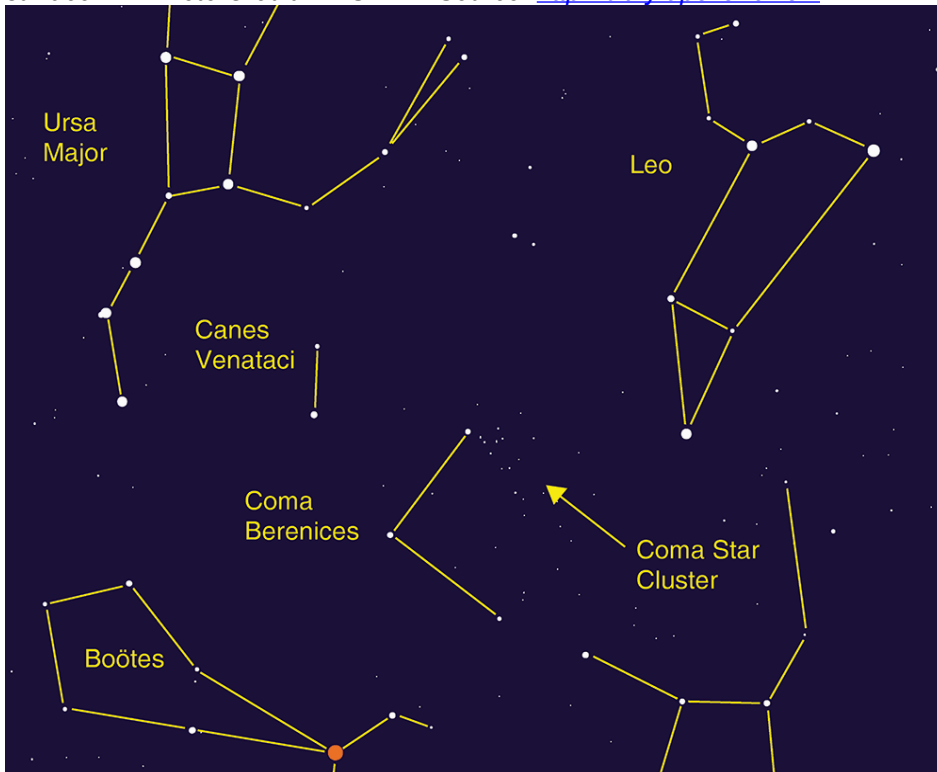
While you're up meteor watching, try to find a delightful naked eye star cluster: the **Coma Star Cluster** (aka Melotte 111) in the small constellation of Coma Berenices. It can be spotted after sunset in the east and for almost the entire night during the month of May. Look for it inside the area of the sky roughly framed between the constellations of Leo, Boötes, and Ursa Major. The cluster's sparkly members are also known as "Berenice's Hair" in honor of Egyptian Queen Berenices II's sacrifice of her lovely tresses. Binoculars will bring out even more stars in this large young cluster.

May marks the 50th anniversary of the Lunar Module's test run by the **Apollo 10** mission! On May 22, 1969, NASA astronauts Thomas Safford and Eugene Cernan piloted the Lunar Module - nicknamed "Snoopy" - on a test descent towards the lunar surface. Undocking from "Charlie Brown" - the Command Module, piloted by John Young - they descended to 47,400 feet above the surface of the Moon before returning safely to the orbiting Command Module. Their success paved the way for the first humans to land on the Moon later that year with Apollo 11. Look for the Moon on the morning of May 22, before or after dawn, and contemplate what it must have felt like to hover mere miles above the lunar surface. You'll also see the bright giant planets Saturn and Jupiter on either side of the Moon before sunrise. When will humans travel to those distant worlds?

You can catch up on all of NASA's current and future missions at nasa.gov



A view of Apollo 10's Lunar Module from the Command Module as it returned from maneuvers above the lunar surface. Photo Credit: NASA Source: <http://bit.ly/apollo10view>



Try to spot the Coma Star Cluster! Image created with assistance from Stellarium

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated



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to astronomy outreach. Visit <https://nightsky.jpl.nasa.org> to find local clubs, events, and more!



The TVA is a member club of [The Astronomical League](#).

