Temecula Valley Astronomer

The monthlv newsletter of the Temecula Valley Astronomers April 2022

Events: General Meeting, Monday, April 4, 2022, at the Ronald H. Roberts Temecula Library, Room B, 30600 Pauba Rd, and/or ZOOM, at 6:00 PM.

- **IFI & Gallery by Clark Williams**
- **JWST Update**
- **Near Earth Objects and Planetary Defense - part 2 by Mark Baker**
- **Refreshments by TBD- Volunteer?**

Star Parties at South Coast Winery every Friday evening in April.

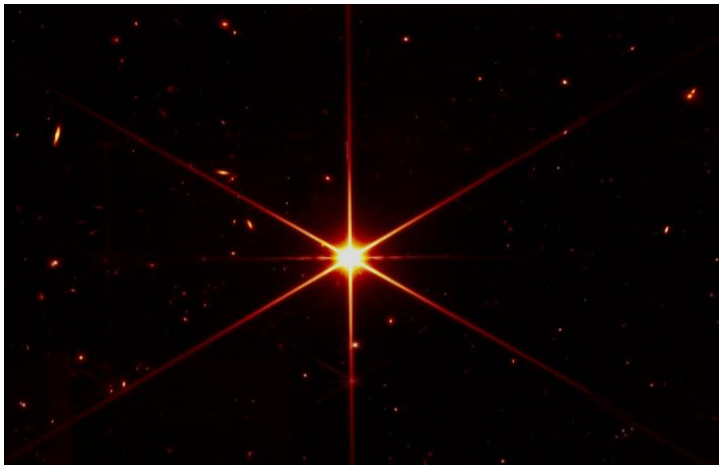
For upcoming school Star Parties check the Calendar on the web page.

WHAT'S INSIDE THIS MONTH:

Send newsletter submissions to Paul Kreitz <pkreitz@sbcglobal.net> by the 20th of the month for the next month's issue.

JWST Alignment Image-

Eighteen mirror segments on the James Webb Space Telescope worked in unison to take this deep field image.



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

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Cosmic Comments – April 2022

By Mark Baker

We have a running theme for TVA in 2022 involving Near Earth Objects, Potentially Hazardous Meteoroids, and Planetary Defense so it seems apropos that in the month of March we've already had THREE incidents… and each was a surprise relative to our ability to react!!!
But this is one area that the whole world is in agreement… we MUST identify ALL hazards, and in sufficient time to allow us to pre-empt any potential catastrophe. Humanity's timetable is improving but we still need aound five years…the current goal is 6 months btw!!!
Losing a tool like Arecibo caused severe damage to our early warning system as its radar abilities were instrumental in detection and tracking. That's why more Eyes on the Skies is even more important today…

Amateurs continue to lead the way in this effort, and new tools that have recently become available are great assets… the Unistellar eVscope's are a perfect example. They not only can and do track NEO's, but the direct interface with the CNEOS and PDCO allows Citizen Scientists to be major contributors to "saving the planet"!!!

So, TVA, here's your chance to add your scopes to the protective bulwark, and it doesn't have to be a major commitment… even once a month can prove worthwhile. And of course, talking about the effort when opportunity presents itself is what we can do well… to anyone and everyone!!! It's one area that humanity can ill afford to let down its guard about… ask those species that gazed up at the pretty lights just before theirs went out for good!!!

Thanks for all TVA does to provide awareness about the awesome sights and the beauties, and dangers they may contain…

Clear, Dark Skies my Friends…

Looking Up Redux – April 2022

Editor's Note: The March 2022 issue of the TVA Newsletter omitted Clark's "Looking Up Redux" column due to the Editor having the column get lost in a "Bulk Mail" folder (even worse than "Trash"), even though Clark sent it several times. Hopefully an error not to be repeated.

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)
timeanddate.com/astronomy
https://www.fourmilab.ch/earthview/pacalc.html

ALL TIMES ARE LOCAL PACIFIC TIME (PST / PDT) UNLESS NOTED OTHERWISE

Times are given in 24-hour time as: (hh is 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)
yyyymmddThhmmss (Full date as: year month day Time separator hours minutes seconds)

Moon Phases for the month by phase:

Friday	**the 8th**	**@ 2348 FIRST QTR in GEMINI**
Saturday	**the 16th**	**@ 1156 FULL in VIRGO**
Saturday	**the 23rd**	**@ 0457 THIRD QTR in CAPRICORNUS**
Saturday	**the 30th**	**@ 1329 NEW in AIRES**

Apogee comes on 2022-04-07 @ **1912 – 404,437 km (251,306 mi)**
Perigee comes on 2022-04-19 @ **1540 – 365,142 km (226,889 mi)**

2022 has: (12) new moons, (12) 1st Qtr moons, (12) Full moons, (13) 3rd Qtr moons
(0) Blue moon and (0) Black moons

Daylight Savings: Starts: 2022-Apr-13 : Ends: 2022-Nov-06

Luna: Luna is close to New on the 1st of the month. Luna rises at **0702**, transits at **1325** and sets by **1952**. Luna by mid-month is waxing gibbous, 99% illuminated. Rising at **1826** and setting in the morning at **0623+**. By the-end-of-the-month Luna is New, 0% illuminated rising at **0559**, transiting at **1247** setting by **1941**.

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

April 16 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be will be fully illuminated. This phase occurs at **1157**. This full moon was known by early Native American tribes as the Pink Moon because it marked the appearance of the moss pink, or wild ground phlox, which is one of the first spring flowers. This moon has also been known as the Sprouting Grass Moon, the Growing Moon, and the Egg Moon. Many coastal tribes called it the Fish Moon because this was the time that the shad swam upstream to spawn.

April 22, 23 - Lyrids Meteor Shower. The Lyrids is an average shower, usually producing about 20 meteors per hour at its peak. It is produced by dust particles left behind by comet C/1861 G1 Thatcher, which was discovered in 1861. The shower runs annually from April 16-25. It peaks this year on the night of the night of the 22nd and morning of the 23rd. These meteors can sometimes produce bright dust trails that last for several seconds. The waning gibbous moon may block some of the fainter meteors this year, but there is still potential for a good show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Lyra, but can appear anywhere in the sky.

April 29 - Mercury at Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 20.6 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.

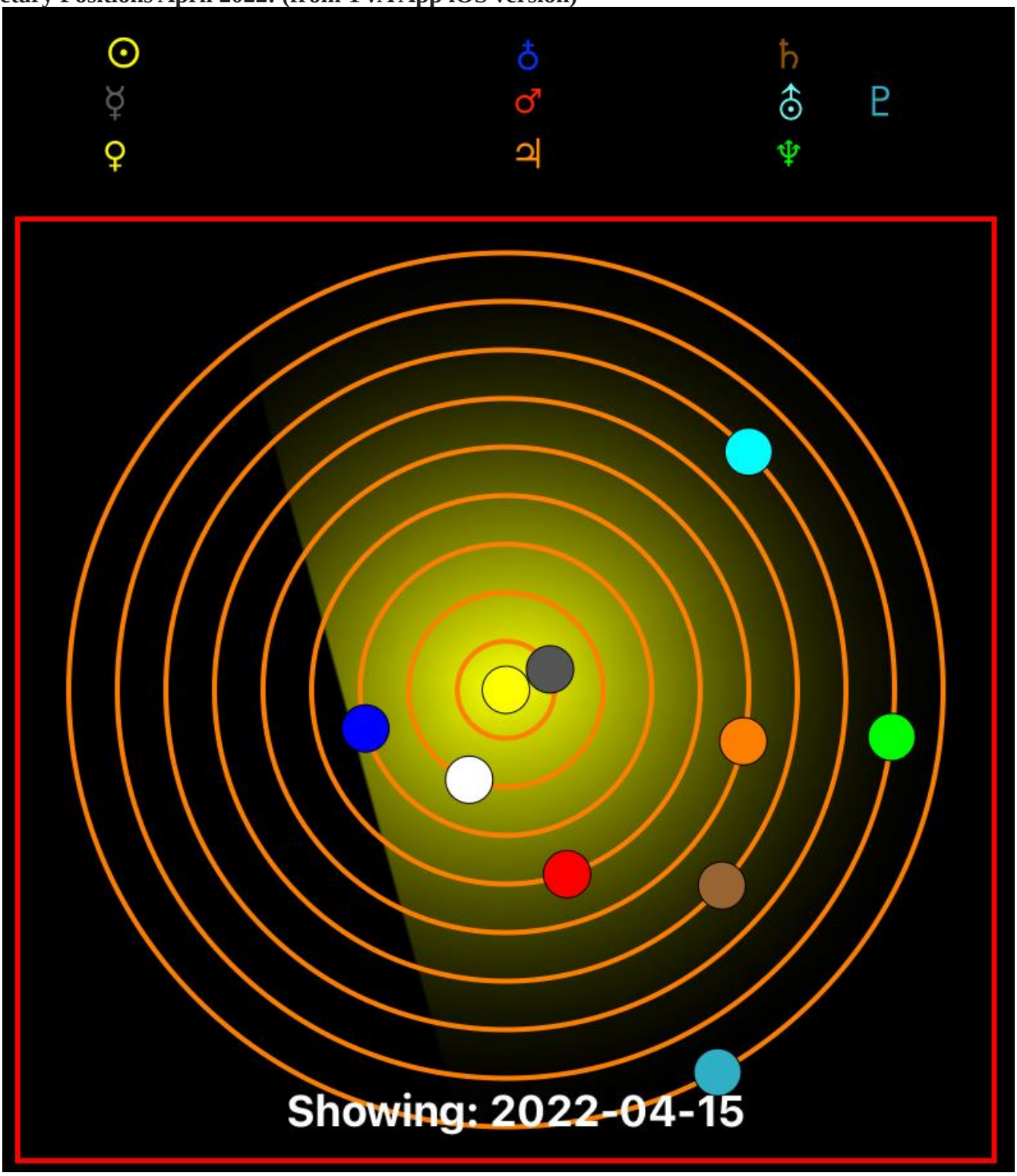
April 30 - New Moon. The Moon will located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at **1330**. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

April 30 - Partial Solar Eclipse. A partial solar eclipse occurs when the Moon covers only a part of the Sun, sometimes resembling a bite taken out of a cookie. A partial solar eclipse can only be safely observed with a special solar filter or by looking at the Sun's reflection. This partial eclipse will be visible throughout most of the southeast Pacific Ocean and southern South America. It will be best seen from Argentina with 53% coverage. (NASA Map and Eclipse Information)

Algol minima: (All times Pacific Time)

04/01/2022	**1430**
04/04/2022	**1119**
04/07/2022	**0808**
04/10/2022	**0458**
04/13/2022	**0147**
04/15/2022	**2236**
04/18/2022	**1925**
04/21/2022	**1614**
04/24/2022	**1303**
04/27/2022	**0953**
04/30/2022	**0642**

Planets:
Planetary Positions April 2022: (from TVA App iOS version)



- **Mercury:** Mercury rises and sets with the sun on the 1st of the month. Mercury is an evening object by the

Ides. Sunset is at **2921** and Mercury follows, setting at **2029**. By the end-of-the-month Mercury has stretched its evening visibility a small amount. Sunset is at **1933** followed by Mercury setting at **2116**.

- **Venus:** Is the Morning Star in the beginning of the month, rising at **0428** preceding sunrise at **0634**. Venus is approaching the Sun during April. By mid-month Venus rises at **0420** followed by Sol at **0616**. By the 30th Venus is rising at **0409**. followed by sunrise at **0559. Neptune and** Venus are separated by only approximately 3-degrees at **0428** on the 30th.
- **Mars:** Mars is rising as a morning object on the 1st of the month. Rising at **0419** with Sol following at **0634**. By mid-month Mars is rising **at 0356** and **Sol follows at 0616**. End-of-month finds the Warrior rising at **0328**, the Sun follows at **0559**.
- **Jupiter:** On the first of the month is a morning object rising st **0547** followed by the Sun at **0635**. Jupiter is receding from the Sun from our perspective. By the 15th Jupiter will rise at **0500** followed by the Sun at **0617**. Come the end of month Jupiter is rising at **0410** and less than ½ -degree from Venus. Sunrise is at **0559**. Both will be very low on the horizon in the muck.
- **Saturn:** Saturn is a morning object on the first just 2° 26' from Mars and 3° 54' from Venus. Saturn's rise time is **0425**; followed by Sol at **0634**. By mid-month Saturn is rising at **0334** followed by sunrise at **0616**. Come the 30th of the month, Saturn rises at **0238** followed by the Sun at **0559**.
- **Uranus:** On the first Uranus sets by **2135** while sunset will be at **1911**. By the ides Uranus is setting by **2044** preceded by sunset at **1921**. End of the month and the "sky god" is lost to the Sun.
- **Neptune:** Neptune is rising by **0553** in the beginning of the month, followed by sunrise at **0600**. By the 15th Neptune is should be visible by about **1740** and setting at **2115**. By the end of the month Neptune rises at **0401** with sunrise at **0600**.
- **Pluto:** Rises at **0312** on the first of the month; sunrise will be at **0635**. Mid-month Pluto is rising at **0218** and sunrise will be at **0617**. By End of month Pluto rises at **0123** and sunrise follows at **0601**.

Asteroids:

- Still a dearth of asteroids. I searched for asteroids in 2022 with a reasonable magnitude; say less than or equal to +10 in April there are a few beyond the regulars: Juno, Vesta. Hebe, Eros and Herculina. So consult your local planetarium software for more or try: https://www.asteroidsnear.com/year?year=2022

  (1) Ceres Dwarf Planet in Aquarius 1st -- 31st rising: mag 9.4 – is the largest and most massive asteroid in the inner Solar System.
  (16) Phyche Asteroid in Taurus 1st – **31st** rising: mag 10.8 – Psyche is one of the ten most massive asteroids in the main belt, and is the most massive M-type asteroid.
  (8) Flora Asteroid in Aries 1st – **31st** rising: mag 10.3 – a large, bright main-belt asteroid.

Meteors:

- See Highlights above for more details. (SeaSky.org**)** (American Meteor Society)

Comets: come in various classifications:

- 1) Short Period comets – further broken down into:
  - Halley Type: The Halley Types are believe 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 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.

ESTIMATES ONLY

Local time 2100 PST

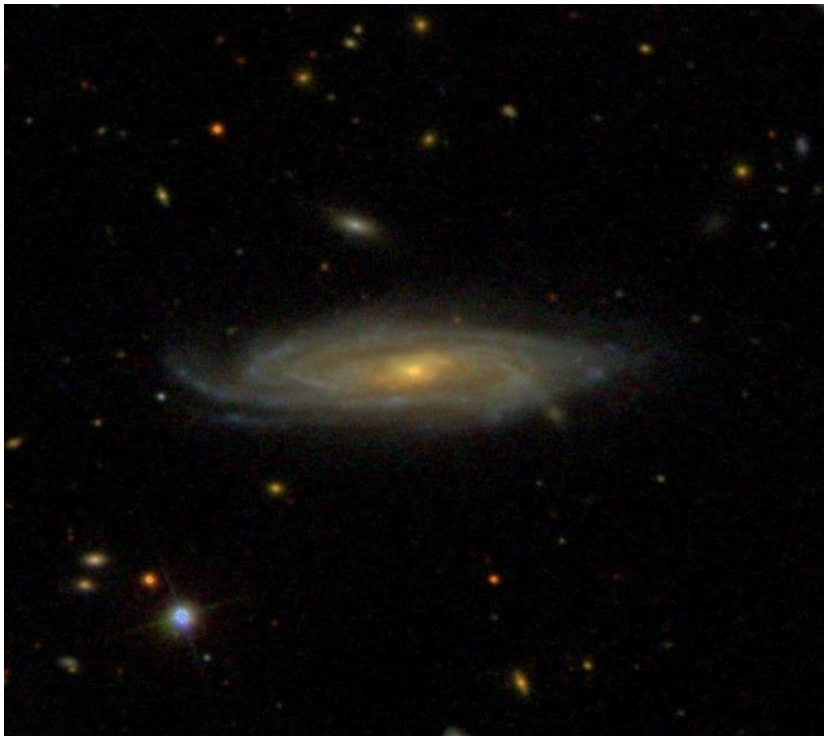
<Nothing this month>

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 April 2022 at 2100 PDT and you will have about 20 minutes of viewing time total.

◦ **NGC 3697**



NGC 3697, also the Integral Galaxy, is a spiral galaxy in the constellation of Leo. It was discovered on 24 February 1827 by John Herschel. It was described as "extremely faint, very small, extended 90°" by John Louis Emil Dreyer, the compiler of the New General Catalogue It is a member of HCG 53, a compact group of galaxies. (Wikipedia)

◦

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Illustration 1: By Sloan Digital Sky Survey - http://skyserver.sdss.org/dr14/SkyServerWS/ImgCutout/getjpeg?TaskName=Skyserver.Chart.Image&ra=172.2098975701648&dec=+20.7949938788086&scale=0.3&width=800&height=800&opt=&query=, CC BY 4.0, https://commons.wikimedia.org/w/index.php?curid=75786892

NGC 2419 - The Intergalactic Wanderer

Illustration 2: By NASA Hubble - https://www.flickr.com/photos/144614754@N02/49096538881/, CC BY 2.0, https://commons.wikimedia.org/w/index.php?curid=87407313

NGC 2419, also known as Caldwell 25, is a globular cluster in the constellation Lynx. It was discovered by William Herschel on December 31, 1788. NGC 2419 is at a distance of about 300,000 light years from the Solar System and at the same distance from the galactic center.
NGC 2419 bears the nickname "the Intergalactic Wanderer," which was bestowed when it was erroneously thought not to be in orbit around the Milky Way. Its orbit takes it further away from the galactic center than the Magellanic Clouds, but it can (with qualifications) be considered as part of the Milky Way. At this great distance it takes three billion years to make one trip around the galaxy.
The cluster is dim in comparison to more famous globular clusters such as M13. Nonetheless, NGC 2419 is a 9th magnitude object and is readily viewed, in good sky conditions, with good quality telescopes as small as 102mm (four inches) in aperture. Intrinsically it is one of the brightest and most massive globular clusters of our galaxy, having an absolute magnitude of -9.42 and being 900,000 times more massive than our Sun.
It was proposed that NGC 2419 could be, as Omega Centauri, the remnant of a dwarf spheroidal galaxy disrupted and accreted by the Milky Way. However, later research seems to have disproved this theory.
Astronomer Leos Ondra has noted that NGC 2419 would be the "best and brightest" for any observers in the Andromeda Galaxy, looking for globular clusters in our galaxy since it lies outside the obscuring density of the main disk. This is analogous to the way the cluster G1 can be seen orbiting outside of the Andromeda Galaxy from Earth.
It was found to be composed of two different populations, one behind more helium-rich than the other, which does not fit the current model for globular cluster formation (which leads to a very homogeneous population in the cluster). This raises new questions on how this globular cluster was formed. (Wikipedia)

April is great for both viewing and imaging. Spend some time outside with your scope. Spring objects are here.

For now – Keep looking up.

RANDOM THOUGHT

By Chuck Dyson

SHOULD TESLA DESIGN OUR MARS ROVERS?

At first glance it does seem that auto manufacturers are just a touch ahead of NASA when it comes to designing self-driving vehicles, not to mention that cute self-parallel parking trick that some cars can do. We can literally drive from San Diego to New York City and never touch the steering wheel of the car. So, why don't we just take that wonderful Tesla autopilot and just slap it into one of those NASA Mars buggies and then drop it onto Mars and say to it "Just go find interesting stuff"? Not so fast there my friends.

OH yes you say Tesla probably cannot function on Mars because there is no GPS to guide rovers. GPS can tell you where you are on planet Earth within 16 feet for a cheap system; but, as the width of a highway lane is 12 feet the best a cheap system can say is you are in one of three lanes, no good at all. High grade GPS systems will locate you to within 11.8 inches of your exact position and that means our 6.85 ft wide Tesla with 11.8 inches of play on each side is well within our 12 ft wide highway lane. Now that we are comfortable with the idea that we can stay within our lane while doing 75 mph, honestly people who only go 65mph in the 65mph zone, now is not the time to ask yourself "how does this car know what's in front, back, and side of it and how does it change lanes and avoid debris???" Even though the Mars rovers are going a lot slower than our Tesla on a freeway the questions that it asks are the same so is there some cross over of technology between a Tesla and a rover?

During the Apollo program there was an incident where some equipment was broken by one of the astronauts. The astronaut was walking toward a power cable attached to one of the seismic sensers and one of the monitoring people in Huston realized that the astronaut couldn't see the cable and was about to kick it. The operator yelled STOP! Into his microphone but of course the astronaut kicked and separated the cable anyway. This happened because the Moon is 1.5 light seconds from Earth and what the operator was seeing was 1.5 seconds behind what was actually happening on the Moon. Add 1 second operator reaction time and another 1.5 seconds transmission time and the astronauts 1 second reaction time and you have a five second time lag for the astronaut to get and react to the message. 5 seconds is plenty of time for a bounding astronaut to sever a cable. Compared to Mars the Moon is our next door neighbor and transmission times to Mars varies from 3.2 minutes, one way, at perihelic opposition to 22.4 minutes at conjunction, plenty of time for a rover to kill itself. The major difference between Tesla and the rovers is the Tesla manual clearly states that their system is a driver assist system and not an autonomous system and, yes, this is despite what the salespeople and car magazines tell you; whereas the rover system must be strictly autonomous once the rover is in motion.

What are the similarities and what are the differences between Tesla and a rover? For starters Tesla is now equipping cars with autopilot version two and working on version #3. Version #1 was good on freeways, and not so good on city streets with a sensor, mostly ultrasonic (Tesla's name for the sensors), range of 120 meters. Version #2 has much better performance on city streets (Less chance of running over puppies and abandoned bicycles?) and sports an array of

twelve ultrasonic sensors and eight cameras. Version #3, without a lot of information about the new capabilities, is in Beta form, glitch hunting, and on a dirt road is able to detect and avoid a deer. The full story is the road is in a heavily forested area not an open flat plane and the same car, when the road was covered in snow, required five driver interventions to safely navigate the road, not quite ready for prime time.

How is Perseverance different and how is it the same as the Tesla? Because the atmospheric pressure on Mars is around 1% of Earths pressure, sonic sensors, ultra or not, just will not work on Marrs; so, they are out. Perseverance has twenty-two cameras that photograph objects and obstacles around it, the rover then moves in the direction of the next area it is to study. After traveling a short distance the rover then rephotographs the terrain and by comparing the change in location of the objects, large rocks, in the two photos the rover knows how far it has gone and in what direction. Perseverance then asks the question “Is my route a safe one for me to travel?” If the route is safe the rover continues on the route; if not then the rover computes a new safer route, based on the information in the photos, and redirects itself. By taking and analyzing photos and changing its route on the move Perseverance has a potential top speed of 120 meters per hour, Curiosity, without this on the move capability, has a top speed of 20 meters per hour. In order to perform this navigation magic Perseverance has one more computer than Curiosity and it only has NASA’s new AutoNav program on it. How far have the different rovers gone? Sojourner lasted 85 days and went 100 meters. Spirit lasted 1944 days and went 7.73 kilometers. Opportunity lasted 5998 days and went 45 kilometers, this is not only the longest distance traveled to date but is the only rover to go more than the distance of a marathon, 42.195 kilometers. Curiosity, still running, in 3485 days has logged 27.14 kilometers and is only driven on about 30% of the days. The rest of the time is devoted to science projects. Perseverance in 384 days has logged 4.39 kilometers. For comparison the longest the Apollo astronauts drove a Moon buggy was 35.7 kilometers in three days, Humans are still way better than computers.

Another difference between Mars rovers and an Earth Tesla is power. Although both are battery, or electrically powered there is a shocking lack of charging stations on Mars. Rovers are their own power stations too. The first three rovers; Sojourn, Spirit, and Opportunity were small enough where they could be solar powered but Curiosity and Perseverance have thermo nuclear power generators on them. Solar power only is able to operate the rover during the day and is subject to dust storms. Mars dust storms can be solar disasters, Opportunity has a design output, on Mars, of 900 watts and after 5079 days it still had 667 watts of power generated per hour; then, after a one month Mars dust storm it could only generate 22 watts of power. The problem with using nuclear power for your electricity is the public is not really happy to hear that rockets have radioactive material as part of their payload; many political hurdles to overcome before launch.

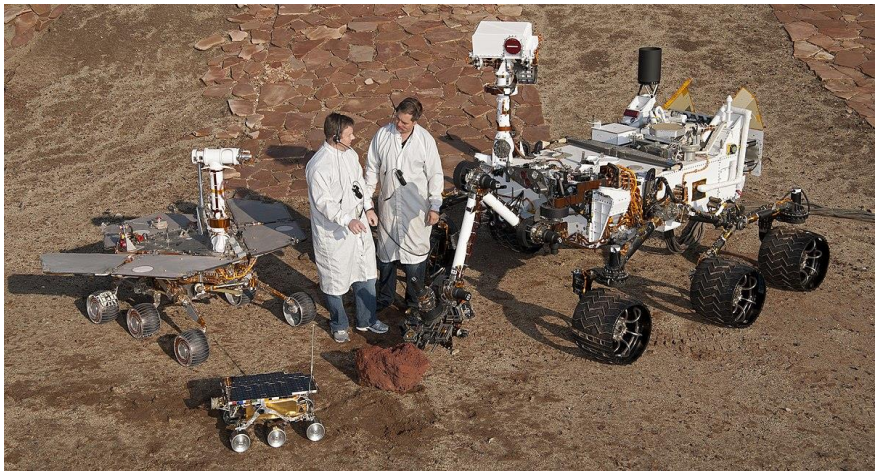
The one area that Tesla has an absolutely huge advantage over NASA, as long as it does not actually go to the Moon or Mars with a car, is in computer capability. The computers on Curiosity and Perseverance are of 1997 vintage mainly because they are capable of surviving launch and landing shocks and vibrations plus just a touch of deep space high energy particles slamming into them. Tesla has faster processing and greater memory, but are they able to take physical punishment and remember the Best Buy Geek Squad does not make house calls to Mars.

The one area that NASA rovers have the huge advantage over Tesla is in wheel and motor design for operations in the off-road arena. To get an idea of how rugged the off-road environment can be get yourself a new pair of walking shoes, go to Hawaii and walk across an a'a (pronounced ah-ah) lava field. The shoes will be new when you start and really old when you finish later in the day. Successful wheel design and successful wheel/motor coupling design in a really dusty and rugged environment is something you learn by trial and failure, mostly failure. Remember it is only a rover if you can get it to move.

I think I will stick with NASA because they and only they have actual field experience and have taken rovers the size of a microwave oven, Sojourner, that went 100 meters and did very little science to a rover the size and weight of a Smart Car that is cruising across Mars doing a lot of science.

THE EVOLUTION OF ROVERS

And 'no', the engineers were not sent to Mars to make field reports of how the rovers were working.



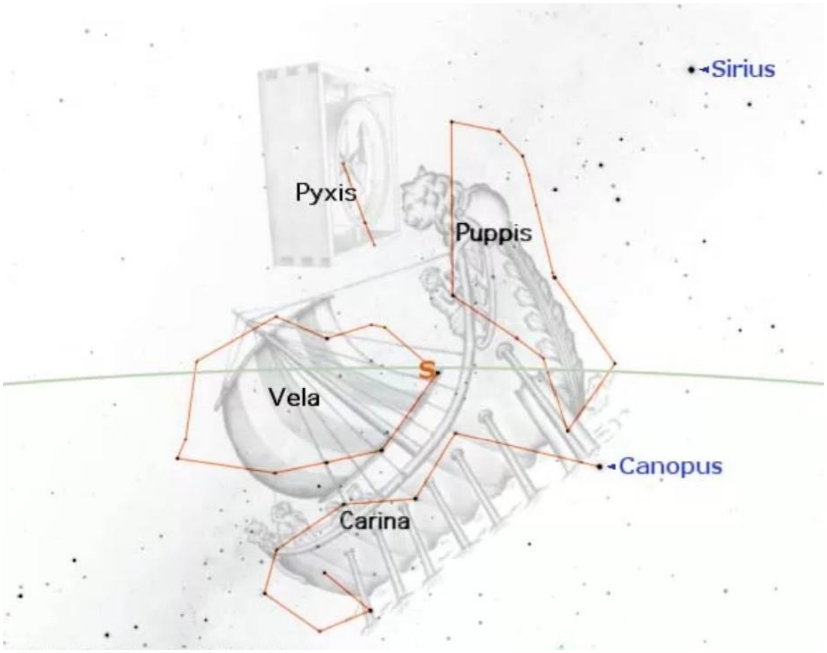
Cheers,

Chuck

Another Look

By Dave Phelps

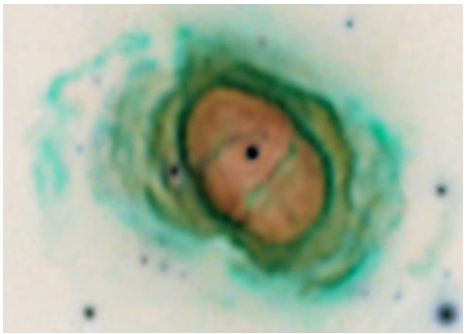
New Moon April 1 and April 30
Pink Moon
Full Moon April 16, Paschal Moon 1st full moon of Spring
Passover begins April 15 and ends April 23, Easter Sunday April 17



I have always been kind of fascinated by Argo Navis. The idea of a huge constellation in the south constructed from the mythology of Jason and the Argonauts is very compelling and a little hard to explain if not for the precession of the equinoxes. For some reason the modern astronomers felt it too large and by the mid 1700's began to cut it up into manageable sizes and in 1930 was firmed up by the IAU. Puppus, the poop deck or stern, has three Messiers, M46, M47 and M93 and close at hand to M47 is another open cluster NGC 2423. Superimposed on M46 is NGC 2438, a small planetary nebula of 11th magnitude.

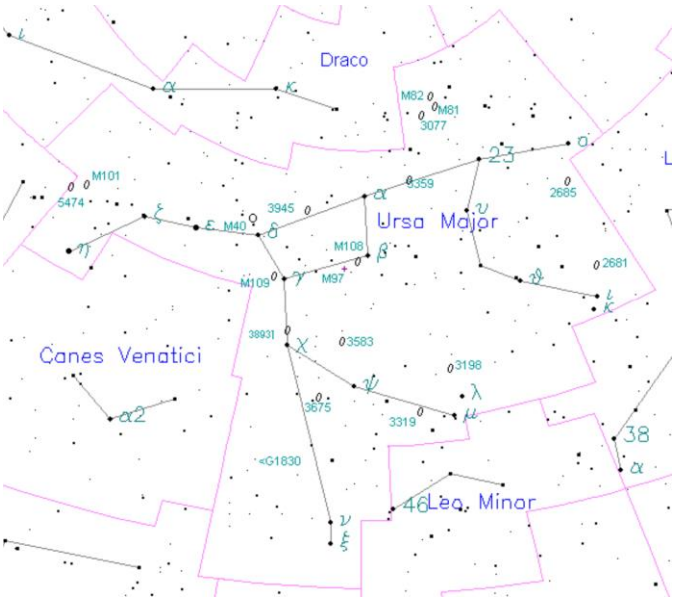
Not much to see in Pyxis. When Argo Navis was broken up into Carina, Vela and Puppis, Pyxis was not included. Pyxis is a modern add-on. The Greeks did not have compasses though some thought it should be included as part of the mast. That leaves Pyxis as an outlier.

We can't see Carina from 32 degrees north, still it is fun to try to piece together the individual parts. Vela is suprising. It has named stars, an awsome 9th magnitude planetary nebula, several meteor showers, and a huge supernova remnant. The Vela SNR is 12th magnitude and spread over several degrees. It includes a pulsar and a few designated GUM objects. Look for it between Gamma γ and Psi ψ Velum. Vela has mostly fainter objects except for IC 2391, a loose, brighter open cluster of a few blue stars. A globular cluster I've never seen is NGC 3201. Burham doesn't say much about it except that it is large, loose and 8th magnitude.



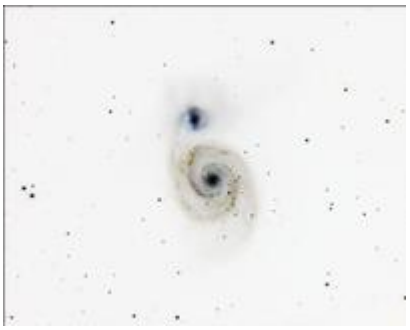
I never spent much time in Vela, shame on me. What I remember is NGC 3132 between Psi ψ and 3rd magnitude Rho ρ. NGC 3132 is called the Eight-Burst Nebula. **APOD June 7, 2015**

One of the more interesting things about NGC 3132 is that it has two central stars, one a pulsar. Check out the image you see here in **APOD.** It's a beaut.



Maybe it's time for some of our local astrophotographers to step up to the plate. I used to be able to bug John Sanford or Msgr. Ron Royer to work on new stuff. Of course they routinely ignored me also.

Years ago, a supernova searcher and Uniting Church minister from Australia who lived in the Blue Mountains visited Southern California and asked to spend a night at Ford Observatory on Mt. Peltier near Wrightwood. He wanted to come up because he had never searched Ursa Major for supernovas. At the time I was pretty familiar with the bowl of the dipper so I was asked to be his guide for the evening. I would point the 18 inch at a faint galaxy and he would take a few seconds to look then ask to go on to the next one. As you know, the vicinity of the bowl and the bowl itself is packed with galaxies, a few Messiers and even an Abell. Set up your setting circles, align your alt-azimuth, or just point your big Dob to Beta β Ursa Majoris, also known as Merak, the hip of the bear, and star hop from βeta to M108 and then to M97 the Owl. Then jump on over to Mizar and Alcor, the Horse and the Rider. stopping on the way to check out M109 right next to Gamma γ, named Phecda or maybe Phad, the thigh. M109 is a nice one with a bar. I mention it because the bar is tough to see, a challenge for you if so inclined. The spectroscopes tell us that Mizar is a double and so is Alcor; and that Mizar is actually a double-double giving us a six star system. **Thank you to Curtis Croulet of the Temecula Valley Astronomers for this slightly massaged image of M51 and NGC 5195.**



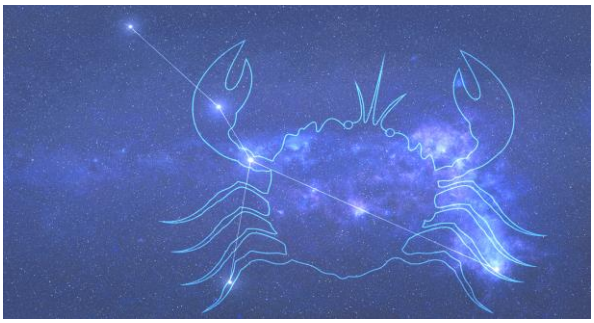
Continuing down the arm of the dipper the last star is Eta η, named Alkaid and is the finder star for M51, the Whirlpool. Big bright and beautiful, and with a recent supernova. Other stars that make up the Bear are Megrez, δ, the root of the tail, connecting the tail to the bowl. Phecda γ next to Merak β the hip of the bear and then to Dubhe, α the Back of the Great Bear. A bowl and a half further on is Muscada, the Snout. Alkaid, η Eta, the end of the handle is translated by Ben Mayer in "Starwatch" as the Leader of Mourning Daughters. Looking over some of the Chinese and Arabian lore about Ursa Major, it seems that more than one culture thought of the constellation as a group of mourners, or maybe a funeral procession.

I had a pal whose prodigious memory and knowledge made him a great observing buddy. He was so locked in that he could point his telescope to M81 and M82 and have them right in the middle of his field. I thought I'd check **APOD** to see if they had chosen either of them recently and found five images in the last two years, a couple with comets attached. As great as those images are, I still remember trying to pick out detail in M82, trace the arms in M81 and search for the field for NGC's

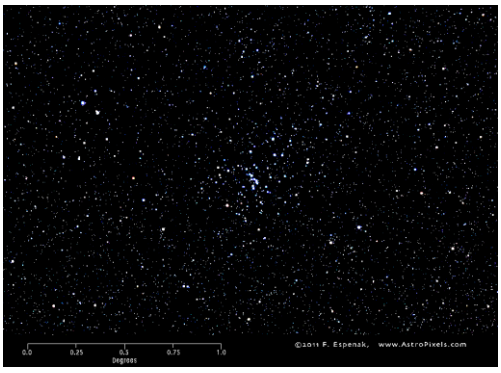
3077 and 2976, other galaxies in the nearby. NGC 3077 is worth a second look. It's another disrupted galaxy and at 10th magnitude should be in the reach of your backyard telescope.

There are over 100 galaxies magnitude 12 and 13 or better around the constellation of Ursa Major; over 100 in or around the bowl and that many fainter but still findable. Abell 1377 is right there in the bowl but its galaxies are less than 13th mag. It's a happy hunting ground for supernova searchers, however, maybe you'll find yours.

I sometimes marvel at all the time I spent on cold winter nights with a telescope and frozen cup of coffee as my companion. Whether Idyllwild, Ford, Mt. Pinos, Anza, Bell Mountain or Joshua Tree, I would zip up my bear suit, pull on gloves and balaclava and set up the old Dob or maybe the orange Cat. The stars cracked overhead, an occasional meteor would zip across, maybe even a Bolide, and I would spend hours trying to learn everything about a particular constellation. It was especially wonderful when Mercury or Venus would rise before the morning sun.



I like Cancer, it's my horoscope sign and I think M44 is one of my favorites and M67 is a nice open cluster. M44, called Praesepe or Beehive, is visible to the eye and can be used as a gauge for visibility. It is beautiful in binoculars. Go ahead and give it a try. Cancer has some interesting star names that aren't anywhere near the Greek mythology of Cancer being the crab that attacked Hercules while he was fighting Hydra. My favorite is the one that calls the Praesepe the Manger and Gamma γ– Asellus Borealis and Delta δ– Asellus Australis, the Northern and Southern Donkeys eating hay from the Manger. Then Beta β-Al Tarf is the Edge and Acubens α– Alpha is the claw. I seem to remember reading that the donkeys and the manger originated as a Christian Christmas story.



While we are in the area if we go to the area around the head of Hydra we will pick up M48 a bright Open Cluster. **(Thank you astropixel.com)**We will leave the tail and body of Hydra for later, though, if you want to slip down the tail of Hydra to M83, the Southern Pinwheel, a 7th magnitude and face-on galaxy you will get a spectacular treat.

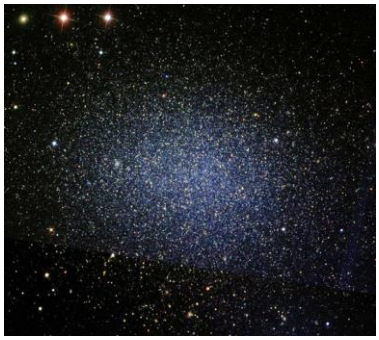
I used to spend a little time on Abell clusters. They are too faint to be of much interest visually, as a rule, though usually anchored by a larger brighter galaxy. The interest actually comes from the imagination. Once you've picked up that field you can imagine a giant cluster of galaxies gravitationally connected, all moving in one direction at one speed and all at the same general distance from us. The two in Lynx are good examples this month. The first is right off 21 Lyncis, the third star from the top of the constellation designated. It is named Abell 559 and is anchored by NGC 2329, a 13th magnitude lenticular galaxy that they now tell me is a "cluster dominant elliptical galaxy". It'll be tough to see and pretty bland to photograph, still it's worth a try. Abell 779 should be a lot easier. It is right off Alpha α Lyncis, the brightest star and the furthest southern star in Lynx. Abell 779 is anchored by NGC 2832 which is right next to NGC 2831, both close to 9th magnitude. I'm sorry but I don't remember anything about these clusters. Alas, my notes and my books on Abell objects didn't make it here from North

Carolina

One last note in Lynx is NGC 2419. You will find it closer to Castor than to any of Lynx's dim stars and while they tell me its 9th magnitude, I think you will find it closer to 11th mag. So, if it is 9 you should be able to see a fuzzy star with your 4'' to 6". It will take a little more to resolve it into a globular. So, why the interest? NGC 2419 was once called the "Intergalactic Wanderer" because it was thought not to be in orbit around our own Milky Way. Now they tell us it is and has an orbit maybe as long as 3 billion years and is at least as far from the center of the galaxy as is the Magellanic Clouds. Another rarity for your life list.

Camelopardalis and Lynx as depicted in Urania's Mirror, a set of constellation cards published in London c.1825. Credit: Sidney Hall/Library of Congress. I cut Leo Minor from Pinterest.

There is no real mythology connected to Camelopardalis, since it is considered a "modern" constellation. Due to the faintness of the stars associated with it, the early Greeks considered this area of the sky to be empty – or a desert. But based on its Latin name, it could be considered to be a long necked animal with the neck of a camel and the spots of a panther – connected to the twelve labors of Hercules. This is a rather bleak region of the sky, Ptolomy left the region bare when he named his 48 original constellations in his Almagest. It has a sprinkling of fainter stars and no discernible patterns. It wasn't until Hevelius plotted Camelapardolis and Leo Minor and Lynx in the 16th century in his atlas ***Firmamentum Sobiescianum*** and his ***Catalogus Stellarum Fixarum***. . There has been some fiddling around in the area since by astronomers, cartographers and atlas and catalog makers but the names and locations were firmed up by the IAU in 1930.



One last little bit or wanderlust for this month. I will be looking at Leo in May when the Sickle will be directly overhead at 2100 hrs May 1. Before then, though, move your telescope over to Regulus. Leo 1 or the Regulus Dwarf or even UGC 5470 is like all Dwarf Galaxies very diffuse and with low surface brightness. It's listed at 9.8 magnitude in one reference, but it is spread out which makes it difficult to see. Maybe a light pollution or high contrast filter will help One Wikipedia reference said it was not seen visually until 1990 but I searched for it and found it in the late 70's or early 80's at least twice Check your charts, it is only 12 minutes from Regulus. I have no doubt you will find it also. **Thank you to Anne's Astronomy News for this image.**

Dark Skies, Dave Phelps

Springtime Catspotting: Lynx and Leo Minor

By David Prosper – NASA - JPL

Many constellations are bright, big, and fairly easy to spot. Others can be surprisingly small and faint, but with practice even these challenging star patterns become easier to discern. A couple of fun fainter constellations can be found in between the brighter stars of Ursa Major, Leo, and Gemini: **Lynx** and **Leo Minor**, two wild cats hunting among the menagerie of animal-themed northern star patterns!

Lynx, named for the species of wild cat, is seen as a faint zigzag pattern found between Ursa Major, Gemini, and Auriga. Grab a telescope and try to spot the remote starry orb of globular cluster NGC 2419. As it is so distant compared to other globular clusters - 300,000 light years from both our solar system and the center of the Milky Way - it was thought that this cluster may be the remnants of a dwarf galaxy consumed by our own. Additional studies have muddied the waters concerning its possible origins, revealing two distinct populations of stars residing in NGC 2419, which is unusual for normally-homogenous globular clusters and marks it as a fascinating object for further research.

Leo Minor is a faint and diminutive set of stars. Its “triangle” is most noticeable, tucked in between Leo and Ursa Major. Leo Minor is the cub of Leo the Lion, similar to Ursa Minor being the cub to the Great Bear of Ursa Major. While home to some interesting galaxies that can be observed from large amateur scopes under dark skies, perhaps the most intriguing object found within Leo Minor’s borders is Hanny’s Voorwerp. This unusual deep-space object is thought to be a possible “light echo” of a quasar in neighboring galaxy IC 2497 that has recently “switched off.” It was found by Hanny van Arkel, a Dutch schoolteacher, via her participation in the Galaxy Zoo citizen science project. Since then, a few more intriguing objects similar to Hanny’s discovery have been found, called “Voorwerpjes.”

> Lynx and Leo Minor are relatively “new” constellations, as they were both created by the legendarily sharp-eyed European astronomer Johannes Hevelius in the late 1600s. A few other constellations originated by Hevelius are still in official use: Canes Venatici, Lacerta, Scutum, Sextans, and Vulpecula. What if your eyes aren’t quite as sharp as Johannes Hevelius – or if your weather and light pollution make searching for fainter stars more difficult than enjoyable? See if you can spot the next Voorwerp by participating in one of the many citizen science programs offered by NASA at science.nasa.gov/citizenscience! And of course, you can find the latest updates and observations of even more dim and distant objects at nasa.gov.

Map of the sky around Lynx and Leo Minor. Notice the prevalence of animal-themed constellations in this area, making it a sort of celestial menagerie. If you are having difficulty locating the fainter stars of Leo Minor and Lynx, don't fret; they are indeed a challenge. Hevelius even named the constellation as reference to the quality of eyesight one needs in order to discern these faint stars, since supposedly one would need eyes as sharp as a Lynx to see it! Darker skies will indeed make your search easier; light pollution, even a relatively bright Moon, will overwhelm the faint stars for both of these celestial wildcats. While you will be able to see NGC 2419 with a backyard telescope, Hanny's Voorwerp is far too faint, but its location is still marked. A few fainter constellation labels and diagrams in this region have been omitted for clarity.

Image created with assistance from Stellarium

Hanny's Voorwerp and the neighboring galaxy IC 2497, as imaged by Hubble. Credits: NASA, ESA, W. Keel (University of Alabama), and the Galaxy Zoo Team Source: hubblesite.org/contents/news-releases/2011/news-2011-01.html

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