Snake River Skies

The Newsletter of the Magic Valley Astronomical Society

May 2020

Membership Meeting
See President's Message for May

Centennial Observatory
Closed: see website for Details

Faulkner Planetarium
Closed: See website for Details

www.mvastro.org

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Magic Valley Astronomical Society is a member of the Astronomical League

M-51 imaged by
Rick Widmer &
Ken Thomason
Herrett Telescope
Shotwell Camera

MVAS President's Message

Colleagues,

With the stay-at-home order in effect, one has to get creative regarding astronomy during this time. In our home, we have taken advantage of our smart television. Of course, this allows us to tie in with educational Facebook Live activities, but we've also developed another tradition. The McDonald Observatory in west Texas has set up regular live sky showings with their 16-inch telescope. We put in two sessions during the week of April 13 to April 18, and as I write this, I'm planning on the April 23rd session. These sessions start at 8:15 p.m., and last about an hour. That's enough for four objects and questions. There are two sets of exposures for each target – a three-second exposure, and then a longer one usually between 30 and 45 seconds. The session on the 18th included M1 and NGC 4565, which were surprisingly breathtaking. It was a great way to end the evening, bundled up in a blanket on the couch seeing the wonders of the night sky. What online resources have you found?

At this point, we still haven't set up plans to resume meeting, as we'll await word from the state regarding public meetings. Still, we can meet and discuss and share via E-mail. Gary Leavitt has shared some good photos with us, and your observing logs are always welcome. The weather is improving, giving us plenty of opportunities to get out. For me, the skies were good enough to pull in M104, the Sombrero Galaxy, in an old small telescope under light polluted city skies, so I can only imagine what the rest of you are getting. We especially look forward to what you find by consulting the news and articles in this newsletter.

Again, I hope you are all hanging in there. I look forward to seeing you soon.

Clear Views,

Rob Mayer

Calendar

May 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7 Flower Moon 4:46  Visible 100% Age: 14.81 Days	8	9 **MVAS Meeting Cancelled.** **Public Star Party Cancelled**
10 	11	12	13	14 Last Quarter Moon  Visible: 51% ↓ Age: 22.07 Days	15	16
17	18	19	20	21	22 New Moon  Visible 0% Age: 29.30 Days	23
24	25 Memorial Day 	26	27	28	29	30 First Quarter Moon  Visible 54% ↑ Age: 7.77 Days
31						

Be Careful – Be Safe – Get Out There – Explore Your Universe

Celestial Calendar by Dave Mitsky

All times, unless otherwise noted, are UT (subtract four hours and, when appropriate, one calendar day for MDT)

5/5 The peak of the Eta Aquarid meteor shower (a zenithal hourly rate of 20 per hour for northern hemisphere observers) occurs at 5:00; Mercury is at the ascending node through the ecliptic plane at 12:00; the Moon is 6.7 degrees north-northeast of the first-magnitude star Spica (Alpha Virginis) at 23:00
5/6 The Moon is at perigee, subtending 33' 13" from a distance of 359,654 kilometers (223,478 miles), at 3:03
5/9 The Moon is 6.3 degrees north-northeast of the first-magnitude star Antares (Alpha Scorpii) at 1:00
5/10 Mercury is at perihelion (0.3075 astronomical units from the Sun) at 4:00; the Moon is at the descending node (longitude 269.7 degrees) at 9:00
5/11 Saturn stationary at 9:00; asteroid 2 Pallas is stationary at 11:00
5/12 Mercury is 2.9 degrees southeast of the third-magnitude star Alcyone (Eta Tauri) in the bright open cluster M45 (the Pleiades or Subaru) in Taurus at 4:00; the Moon is 2.2 degrees south of Jupiter at 11:00; the Moon, Jupiter, and Saturn all lie within a circle with a diameter 4.7 degrees at 14:00; the Moon is 2.7 degrees southeast of Saturn at 20:00
5/13 Venus is stationary at 10:00; the equation of time is at a maximum of 3.65 minutes at 15:00; the Sun enters Taurus, at longitude 53.5 degrees on the ecliptic, at 20:00
5/14 Jupiter is stationary at 18:00
5/15 The Moon is 2.6 degrees southeast of Mars at 5:00
5/16 The Curtiss Cross, an X-shaped Clair-obscure illumination effect located between the craters Parry and Gambart, is predicted to be visible at 3:52; Mars and Jupiter are at heliocentric conjunction (longitude 287.4 degrees) at 15:00; Mercury is 7.2 degrees north of the first-magnitude star Aldebaran (Alpha Tauri) at 16:00; the Moon is 4.1 degrees southeast of Neptune at 19:00
5/18 Jupiter is 4.7 degrees west-southwest of Saturn, a quasi-conjunction, at 6:00; the Moon is at apogee, subtending 29' 28" from a distance of 405,583 kilometers (252,018 miles), at 7:45
5/20 Mercury is at its northernmost latitude from the ecliptic plane (7.0 degrees) at 9:00; the Sun reaches a longitude of 60 degrees at 14:00; the Moon is 3.6 degrees southeast of Uranus at 19:00
5/22 Mercury is 0.9 degree southeast of Venus at 10:00; the Moon is 6.6 degrees southeast of the bright open cluster M45 at 16:00;
5/23 The Moon is 3.7 degrees north of Aldebaran at 9:00
5/24 The Moon is 3.6 degrees southeast of Venus at 5:00; the Moon, Mercury, and Venus all lie within a circle with a diameter of 4.4 degrees at 6:00; the Moon is 2.8 degrees southeast of Mercury at 13:00; the young crescent Moon is 0.6 degrees north of asteroid 4 Vesta, with an occultation occurring in the northern Middle East, western Russia, most of Europe, Greenland, the northern Caribbean, and most of North America, at 15:00; the Moon is at the ascending node (longitude 89.2 degrees) at 22:00
5/25 The Moon is 0.7 degree southeast of the bright open cluster M35 in Gemini at 4:00
5/26 The Moon is 8.2 degrees south of the first-magnitude star Castor (Alpha Geminorum) at 15:00; the Moon is 4.5 degrees south of the first-magnitude star Pollux (Beta Geminorum) at 20:00
5/27 Mercury is at its northernmost declination (25.7 degrees) at 5:00; asteroid 3 Juno is stationary at 14:00; the Moon is 2.0 degrees north-northeast of M44 (the Beehive Cluster or Praesepe) in Cancer at 21:00
5/28 A double Galilean shadow transit (Europa's shadow follows Ganymede's) begins at 8:48
5/29 The Moon is 4.1 degrees north-northeast of Regulus at 12:00; the Lunar X (also known as the Werner or Purbach Cross), an X-shaped Clair-obscure illumination effect involving various rims and ridges between the craters La Caille, Blanchinus, and Purbach, is predicted to be fully formed at 14:10
5/30 First Quarter moon occurs at 3:30

Nicolas Lacaille (1713-1762), Otto Wilhelm Struve (1819-1905), Joseph Lockyer (1836-1920), Williamina Fleming (1857-1911), and Frank Drake (1930) were born this month.

The first recorded perihelion passage of Comet Halley (1P/Halley) occurred on May 25, 240 BC. Thales of Miletus accurately predicted a solar eclipse on May 28, 585 BC. The German astronomers Gottfried and Maria Magarethe Kirch discovered the bright globular cluster M5 on May 5, 1702. On May 1, 1759, the English amateur astronomers John Bevis and Nicholas Munckley observed Comet Halley on its first predicted return. The French astronomer Charles Messier discovered the globular cluster M3 on May 3, 1764 and the globular cluster M10 on May 29, 1764. The Italian astronomer Annibale de Gasparis discovered asteroid 11 Parthenope on May 11, 1850. Asteroid 14 Irene was discovered on May 19, 1851 by the English astronomer John Russell Hind. The German astronomer Robert Luther discovered asteroid 26 Proserpina on May 6, 1853. The Australian astronomer John Tebbutt discovered the Great Comet of 1861 on May 13. The English astronomer Norman Pogson discovered asteroid 80 Sappho on May 2, 1864. Norman Pogson discovered asteroid 87 Sylvia on May 16, 1866. The 40-inch Clark refractor at the Yerkes Observatory saw first light on May 21, 1897. The Griffith Observatory opened to the public on May 14, 1935. Nereid, Neptune's third-largest satellite, was discovered on May 1, 1949 by the Dutch-American astronomer Gerard Kuiper.

The Sun, the Moon, & the Planets

The Moon is 7.7 days old, is illuminated 49.9%, subtends 32.1 arc minutes, and is located in Cancer on May 1st at 0:00 UT. The Moon is at its greatest northern declination on May 26th (+24.0 degrees). The Moon is at its greatest its greatest southern declination on May 11th (-24.0 degrees). Longitudinal libration is at maximum (+6.9 degrees) on May 12th and at minimum (-5.9 degrees) on May 27th. Latitudinal libration is at maximum (+6.7 degrees) on May 18th and at minimum (-6.6 degrees) on May 4th. The Moon is at perigee (distance 56.39 Earth-radii) on May 6th and at apogee (distance 63.59 Earth-radii) on May 18th. New Moon occurs on May 22nd. The Moon occults asteroid 4 Vesta on May 24th from certain parts of the world. Consult http://www.lunar-occultations.com/iota/iotandx.htm for more on lunar occultations. Consult http://www.lunar-occultations.com/iota/iotandx.htm for information on occultation events. Visit https://saberdoesthestars.wordpress.com/2011/07/05/saber-does-the-stars/ for tips on spotting extreme crescent Moons and http://www.curtrenz.com/moon06.html for Full Moon data. Consult http://time.unitarium.com/moon/where.html or download http://www.ap-i.net/avl/en/start for current information on the Moon. See https://svs.gsfc.nasa.gov/4768 for a lunar phase and libration calculator and https://svs.gsfc.nasa.gov/4768 for the Lunar Reconnaissance Orbiter Camera (LROC) Quickmap. Click on https://www.calendar-12.com/moon_calendar/2020/may for a lunar phase calendar for this month. Times and dates for the lunar crater light rays predicted to occur this month are available at http://www.lunar-occultations.com/rlo/rays/rays.htm

The Sun is located in Aries on May 1st. It enters Taurus on May 13th. Brightness, apparent size, illumination, distance from the Earth in astronomical units, and location data for the planets and Pluto on May 1st: Mercury (magnitude -1.8, 5.1", 98% illuminated, 1.33 a.u., Aries), Venus (magnitude -4.7, 38.9", 25% illuminated, 0.43 a.u., Taurus), Mars (magnitude +0.4, 7.6", 86% illuminated, 1.23 a.u., Capricornus), Jupiter (magnitude -2.3, 40.7", 99% illuminated, 4.84 a.u., Sagittarius), Saturn (magnitude +0.6, 16.9", 100% illuminated, 9.81 a.u., Capricornus), Uranus on May 16th (magnitude +5.9, 3.4", 100% illuminated, 20.76 a.u., Aries), Neptune on May 16th (magnitude +7.9, 2.3", 100% illuminated, 30.34 a.u., Aquarius), and Pluto on May 16th (magnitude +14.3, 0.1", 100% illuminated, 32.74 a.u., Sagittarius).

In the evening, Mercury and Venus are in the northwest. Mars can be seen in the southeast, Jupiter and Saturn in the south, and Uranus and Neptune in the east at dawn. The Moon, Jupiter, and Saturn lie within a circle with a diameter 4.7 degrees on May 12th. The Moon, Mercury, and Venus lie within a circle with a diameter of 4.4 degrees on May 24th.

Mercury is in superior conjunction on May 4th but can be seen low in west-northwest during evening twilight around May 11th. It is at perihelion on the previous day. Mercury passes less than a degree south of Venus on May 22nd. The two inner planets lie near the second-magnitude star El Nath (Beta Tauri). A very thin crescent Moon passes three degrees to the south of Mercury on May 24th.

Venus shines at magnitude -4.7 as May begins. Over the course of the month, its apparent diameter increases from 38.9 to 57.4 arc seconds while it decreases in illumination from 25 to 6%. On May 1st, Venus is positioned 23 degrees above the western horizon. As May progresses, Venus descends sunward. Venus begins to decrease in brightness after May 10th, ending the month at magnitude -4.4. It is stationary on May 13th and then begins retrograde motion. Venus enters Gemini during the second half of May. A young Moon passes four degrees south of Venus on May 24th. By May 31st, Venus is only three degrees in altitude at sunset.

Mars brightens from magnitude +0.4 to magnitude 0.0 and increases in apparent size from 7.6 to 9.2 arc seconds this month. Mars lies approximately one degree north-northwest of the fourth-magnitude star Gamma Capricorni on May 1st. The Red Planet departs Capricornus and enters Aquarius on May 9th. A waning crescent Moon passes three degrees south of Mars on May 15th. Mars and

Jupiter are at heliocentric conjunction on May 16th. An article on observing the Mountains of Mitchel appears on pages 52 and 53 of the May 2020 issue of Sky & Telescope. During May, Jupiter grows in apparent diameter from 40.7 to 44.6 arc seconds and brightens to magnitude -2.6. It rises around 2:00 a.m. local time on May 1st. The waning gibbous Moon passes two degrees to the south of Jupiter and Saturn on May 12th. Jupiter begins retrograde motion on May 14th. Jupiter is 4.7 degrees west-southwest of Saturn on May 18th. The gap between the two gas giants remains less than five degrees for the entire month. A shadow transit by Callisto begins at 2:30 a.m. EDT on the morning of May 3rd. Ganymede reappears from eclipse at 4:02 a.m. EDT and is occulted by Jupiter at 5:52 a.m. EDT. On the morning of May 21st, as Ganymede and the shadow of Europa are transiting the planet, they are joined by Europa at 5:23 a.m. EDT. Europa's shadow joins Ganymede's shadow at 4:48 a.m. EDT on the morning of May 28th. Browse http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/ or http://www.projectpluto.com/jeve_grs.htm in order to determine transit times of Jupiter's central meridian by the GRS. GRS transit information also appears on pages

50 and 51 of the May 2020 issue of Sky & Telescope. Data on the Galilean satellite events is available on page 51 of the May 20 issue of Sky & Telescope and online at http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/ and http://www.projectpluto.com/jevent.htm

Saturn shines at magnitude +0.4 and has an apparent equatorial diameter of almost 18 arc seconds. Saturn's rings subtend about 37 arc seconds and are inclined by about 21 degrees. Saturn begins to retrograde on May 11th. Titan, which is Saturn's brightest satellite at magnitude +8.6, is located south of the planet on May 5th and May 21st and north of it on May 13th and May 29th. Saturn's peculiar satellite Iapetus shines faintly at eleventh magnitude when it passes 48 arc seconds south of the planet on May 11th. On May 31st, Iapetus brightens somewhat to magnitude +10.5 and is located nine arc minutes due west of Saturn as it reaches greatest western elongation. For further information on Saturn's satellites, browse http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/

Uranus can be seen once again during morning twilight during the last week of May. On May 20th, the waning crescent Moon passes four degrees southeast of Uranus.

Neptune lies three degrees east of the fourth-magnitude star Phi Aquarii in eastern Aquarius this month. The waning crescent Moon passes four degrees southeast of Neptune on May 16th. Neptune reaches an altitude of just 15 degrees in the east-southeastern morning sky in late May.

Pluto lies in northeastern Sagittarius some 2.1 degrees to the west of Jupiter and transits the meridian before dawn.

Asteroids

Two inner belt asteroids shine at tenth magnitude travel through Virgo this month. **Asteroid 23 Thalia** heads southwestward as **asteroid 40 Harmonia** travels northwestward. Both asteroids lie to the west of the fourth-magnitude star Iota Virginis. Information on asteroid occultations taking place this month is available at http://www.asteroidoccultation.com/2020_05_si.htm

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Comets

The promising comet **C/2019 Y4 (ATLAS)** has fragmented. Comet C/2017 T2 (PANStarrs) passes southeastward through Camelopardalis and Ursa Major in May. A finder chart can be found on page 48 of the May 2020 issue of Sky & Telescope. **Comet C/2020 F8 (SWAN)** is moving rapidly northward and may reach a peak brightness of magnitude +3.5 between May 15th and May 23rd, as it travels from Triangulum into Perseus. Another comet that may be worth observing is comet. See https://skyandtelescope.org/astronomy-news/new-comet-alert-trio-of-comets-grace-our-skies/ for an article that discusses these comets and provides finder charts. Visit http://cometchasing.skyhound.com/ and http://www.aerith.net/comet/weekly/current.html for additional information on comets visible this month.

Meteor Showers

The broad peak of the Eta Aquarid meteor shower is severely affected by a 91%-illuminated waxing gibbous Moon this year. Eta Aquarid meteors are debris from the famous periodic comet 1P/Halley. The radiant is located close to the Water Jug asterism in Aquarius. Southern hemisphere observers are favored. See https://www.amsmeteors.org/meteor-showers/meteor-shower-calendar/#eta+Aquariids and page 50 of the May 2020 issue of Sky & Telescope for additional information on the Eta Aquarids.

Orbiting Earth

Information on passes of the ISS, the USAF's X-37B, the HST, and other satellites can be found at https://www.heavens-above.com/main.aspx

For more on the planets and how to locate them, browse http://www.nakedeyeplanets.com/

A wealth of current information on solar system celestial bodies is posted at http://www.curtrenz.com/astronomy.html and http://nineplanets.org/

Information on the celestial events transpiring each week can be found at https://stardate.org/nightsky and http://astronomy.com/skythisweek and http://www.skyandtelescope.com/observing/sky-at-a-glance/

Free star maps for May can be downloaded at http://www.skymaps.com/downloads.html and https://www.telescope.com/content.jsp?pageName=Monthly-Star-Chart

Data on current supernovae can be found at http://www.rochesterastronomy.org/snimages/

Finder charts for the Messier objects and other deep-sky objects are posted at https://freestarcharts.com/messier and https://freestarcharts.com/ngc-ic and http://www.cambridge.org/features/turnleft/seasonal_skies_april-june.htm

Telrad finder charts for the Messier Catalog and the SAC's 110 Best of the NGC are posted at http://www.astro-tom.com/messier/messier_finder_charts/map1.pdf and http://www.saguaroastro.org/content/db/Book110BestNGC.pdf respectively.

Information pertaining to observing some of the more prominent Messier galaxies can be found at http://www.cloudynights.com/topic/358295-how-to-locate-some-of-the-major-messier-galaxies-and-helpful-advice-for-novice-amateur-astronomers/

Stellarium and Cartes du Ciel are two excellent freeware planetarium programs that are available at http://stellarium.org/ and https://www.ap-i.net/skychart/en/start

Deep-sky object list generators can be found at http://www.virtualcolony.com/sac/ and http://tonightssky.com/MainPage.php and https://dso-browser.com/

Freeware sky atlases can be downloaded at http://www.deepskywatch.com/files/deepsky-atlas/Deep-Sky-Hunter-atlas-full.pdf and http://astro.mxd120.com/free-star-atlases

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Deep Sky

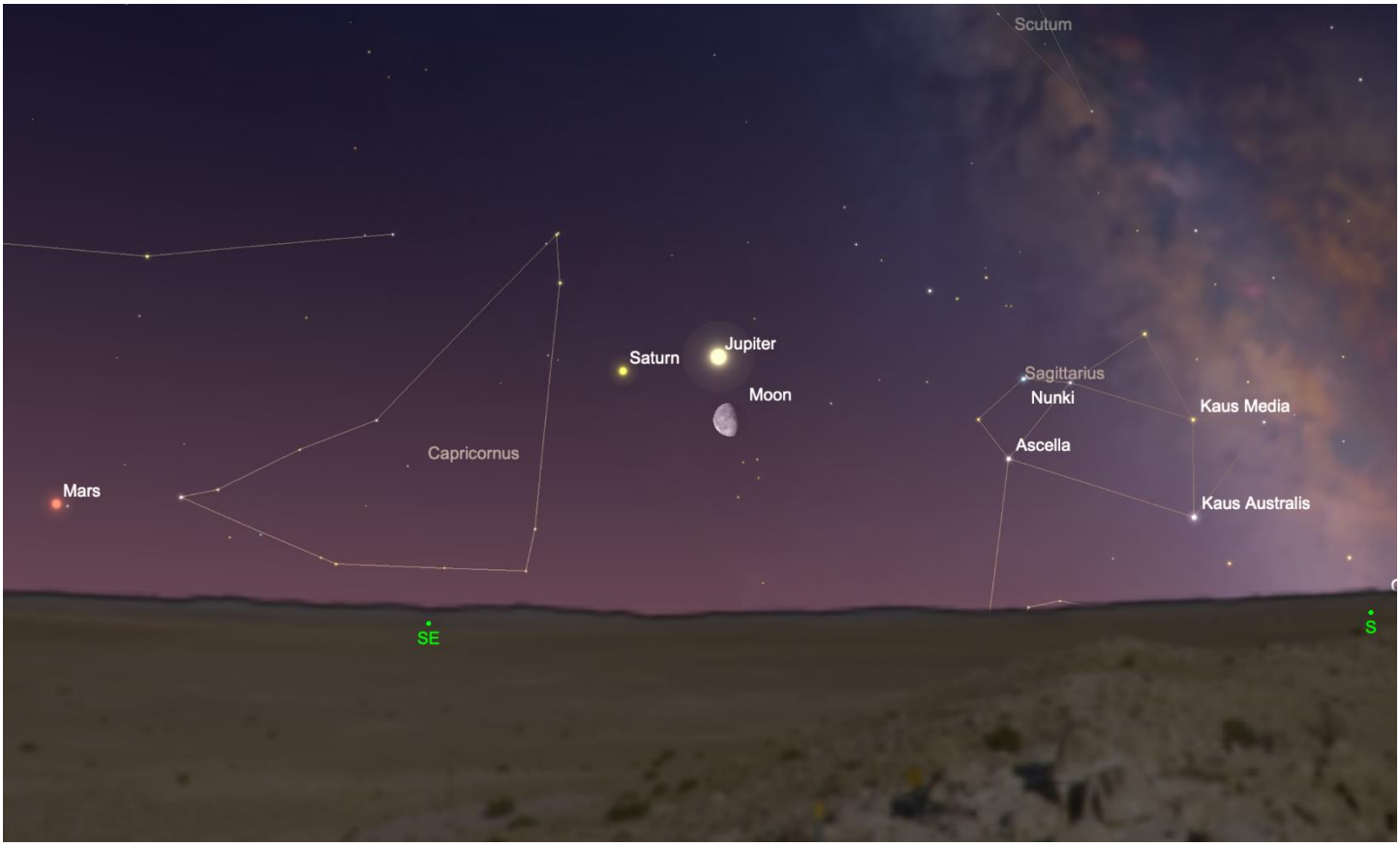
Notable carbon star for May: SS Virginis

Top ten deep-sky objects for May: M3, M51, M63, M64, M83, M87, M104, M106, NGC 4449, NGC 4565

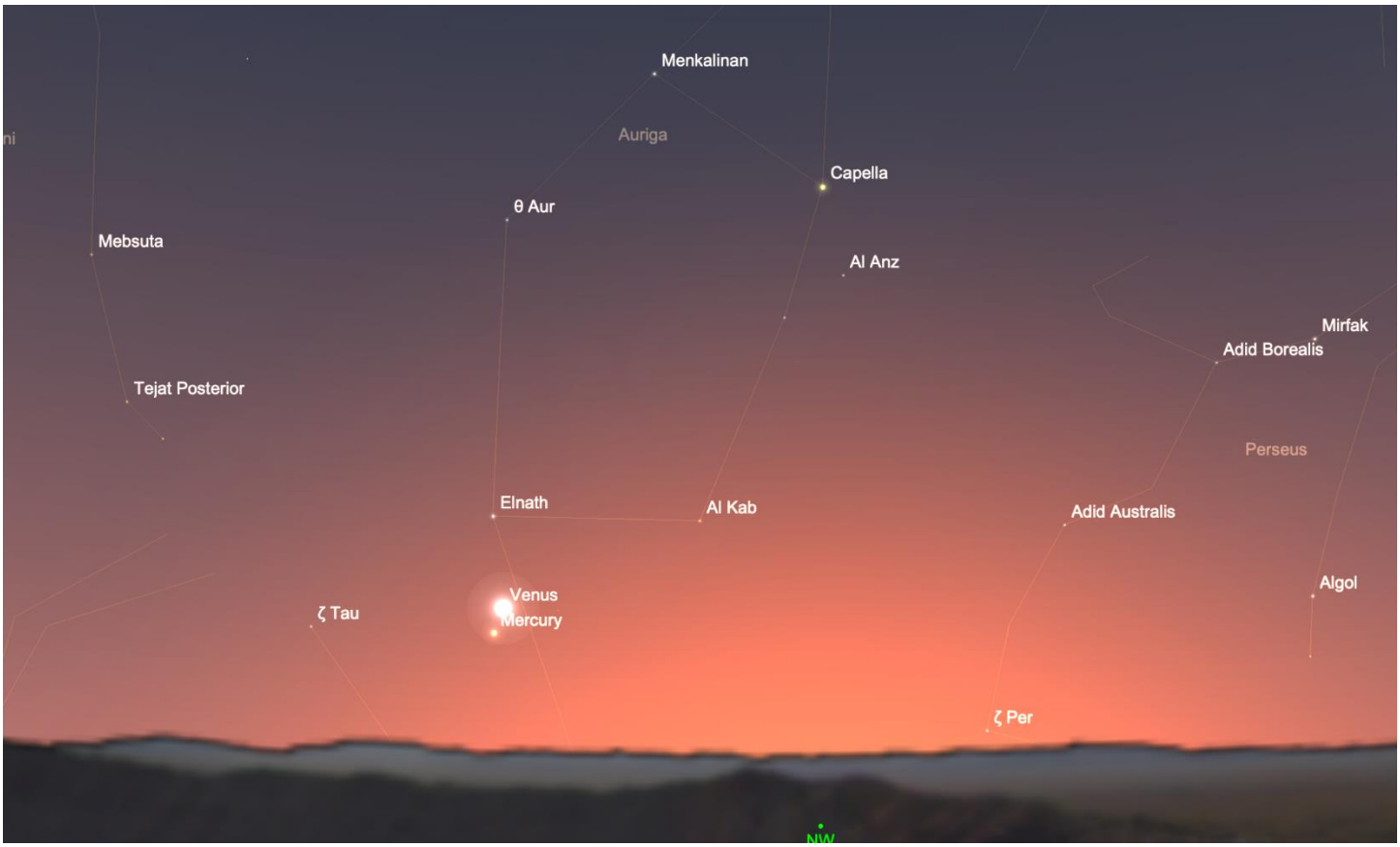
Top ten deep-sky binocular objects for May: M3, M51, M63, M64, M84, M86, M87, M104, M106, Mel 111

Challenge deep-sky object for May: 3C 273 (Virgo)

The objects listed above are located between 12:00 and 14:00 hours of right ascension.



Jupiter, Saturn, and the waning gibbous Moon on May 12, 2020 about an hour before dawn. Mars lies further to the east.



Venus and Mercury pass within a degree of each other in the western sky after sunset on May 21, 2020

Currents in Space

There are no articles this month, so here's some Space news. *by: Loretta J Cannon*

Did you know . . .

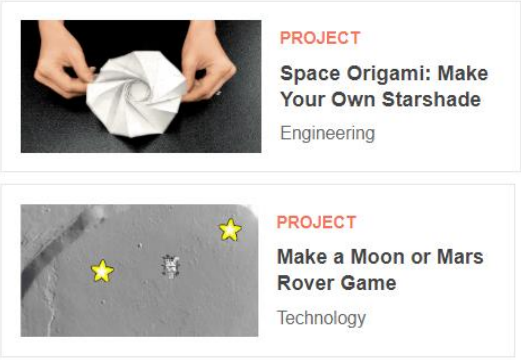
. . . that NASA announced they're sending two people to the International Space Station on a SpaceX Falcon 9 rocket on May 27th, despite the current pandemic? This will be the first time in nine years that a crewed American rocket will launch. The last American launch was the space shuttle *Atlantis* which went up on July 8, 2011. Read the April 17th article on The SpaceX launch here via MIT Technology Review. (image credit: Wikipedia)

. . . that part of the opening credits for the television space opera *The Expanse* may become a reality as early as 2050? Planetary scientists are predicting that within 30 years, Arctic summers will be ice-free, according to research published in the journal Geophysical Research Letters. (*The Expanse* is based on a book series by James J.S. Corey that is set hundreds of years in the future wherein humanity has colonized the solar system from Earth's moon to the moons of Jupiter. In the opening credits, Earth's ice shelves melt and ocean levels rise such that a barrier wall surrounds both Liberty and Manhattan Islands. Seasons 1-4 of *The Expanse* are available on Amazon Prime; a 5th season will be available later this year – they finished filming before the pandemic quarantine.) (image credit: Amazon prime video)

. . . that more women have made a name for themselves in astronomy than any other area of science (medicine is a close second)? One of our May birthdays (see Mitsky's Celestial Calendar above) is Williamina Fleming, born May 15, 1857 in Dundee, Scotland. While working at the Harvard College Observatory, "she helped develop a common designation system for stars and cataloged thousands of stars and other astronomical phenomena" (Wikipedia), including the Horsehead Nebula [image credit: JPL/JASA, NOAO, ESA and the Hubble Heritage Team, (STScI/AURA)].

The image at left (Wikipedia) has the caption "The Harvard Computers. At the Harvard College Observatory, these are the women who worked for astronomer Edward Charles Pickering. Included in this group are Henrietta Swan Leavitt, Annie Jump Cannon, Williamina Fleming, and Antonia Maury {edited}."

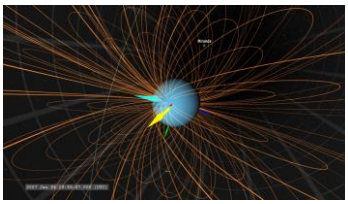
. . . that speaking of women in astronomy . . . in the early days of television (the 1950s & 1960s), while most women were found in kitchens or at a secretary's desk, there were a few exceptions. One of those was in an episode of *Petticoat Junction* [seriously, I'm not making this up]. In 1968, the actress who played Mrs. Bradley, owner of the Shady Rest hotel, left due to lung cancer. June Lockhart, who'd just finished working on *Lost in Space*, was invited to join the cast. Her character on *Petticoat Junction* was physician Dr. Janet Craig. There's an episode wherein she supports Bobbi Jo Bradley's search for a career rather than being a housewife. Bobbi Jo eventually decides on astronomy! She wants to work "where women are making their greatest strides – science!" (both images credit: Wikipedia)



. . . that NASA has some great ideas for you to do while you're at home? From a NASA/JPL education email, "Visit the all-new "Learning Space" from NASA's Jet Propulsion Laboratory to find instructions for making things like rockets, Mars rovers and Moon landers out of materials you have at home – or with templates you can print out. We'll walk you through our STEM projects in regularly posted video tutorials hosted by NASA-JPL education specialists. First up: How to make an astronaut lander!"

(images credit: JPL/NASA)

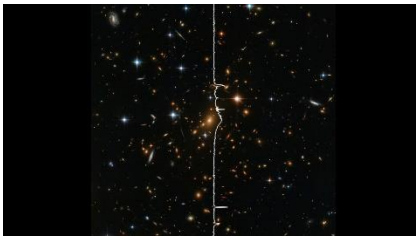
. . . that NASA scientists have found "one more secret" about Uranus within the *Voyager 2* data? Remember, we learned back in the January newsletter that Uranus has some pretty strange features: the axis is tipped on its side, the planet's spin is clockwise, and the magnetic field is quite odd. According to NASA writer Miles Hatfield, "Unbeknownst to the entire space physics community, 34 years ago Voyager 2 flew through a plasmoid, a giant magnetic bubble that may have been whisking Uranus' atmosphere out to space. The finding, reported in Geophysical Research Letters, raises new questions about the planet's one-of-a-kind magnetic environment." Read the full NASA story. Here is an excerpt from the *Voyager* chapter on Uranus from our January BAS newsletter: "One of the research folks at NASA has created an interesting webpage where you can watch a planet's magnetosphere in action: https://svs.gsfc.nasa.gov/4144


Uranus' magnetosphere
credit-NASA, Tom Bridgman

As you watch the planet rotate through its day (best viewed in full-screen), note the colored arrows. Yellow points towards the sun while large turquoise points to the south magnetic pole. The blue, red & green arrows indicate the north rotation axis (where blue is north/y and red and green are x and z to enhance the 3D effect). The image {at left} is a still picture from the site. In addition to looking odd, Uranus' magnetic field creates intense radiation belts. Remember the 'Ringing of Interstellar Space'? [Listen to the sounds recorded by *Voyager* 1 in interstellar space] [Listen to Uranus' radiation here]"

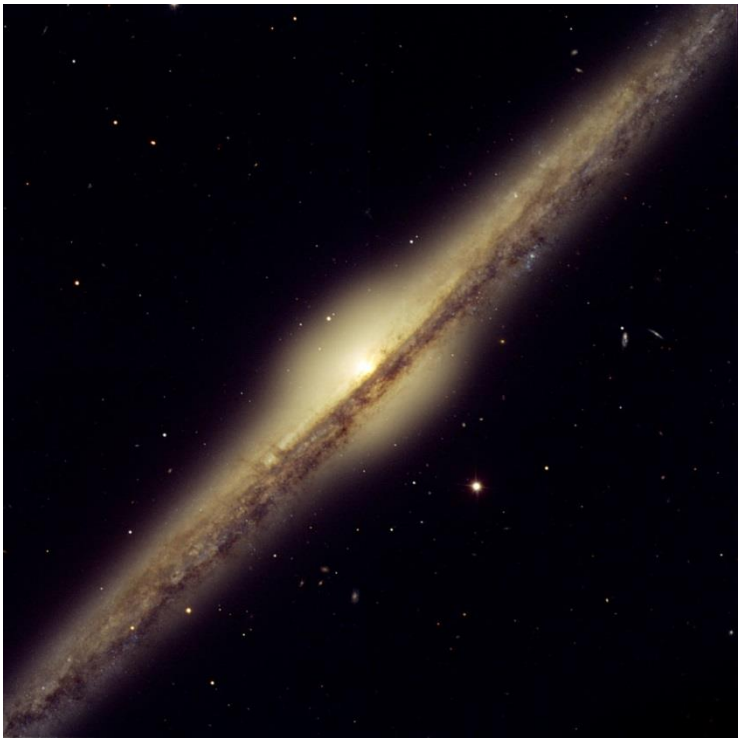
. . . that "A team of transatlantic scientists, using reanalyzed data from NASA's Kepler space telescope, has discovered an Earth-size exoplanet orbiting in its star's habitable zone, the area around a star where a rocky planet could support liquid water." Read the full NASA story. The Kepler space telescope collected data on exoplanets from 2009 to 2018. NASA folks compiled an orrey from the data. This link is to a fascinating 'movie' graphic of the orbits of exoplanets identified by Kepler: View the orrey 'movie' here. Someone could use this to hypnotize a person. :o) The image shows a comparison of Earth and Kepler-1649c, which is 1.06 times larger than Earth. (image credit: NASA/Ames Research Center/Daniel Rutter)

. . . that there's these three guys from Canada (and Princeton) who contribute to NASA and look like they'd blend in on the set of *The Big Bang Theory*. Anyway, they formed a "sci-art outreach project that translates the rhythm and harmony of the cosmos into music and sound." One of their creations that has recently received a re-release in a news story (I apologize that I can't locate, just now, in which NASA News or AAAS/Science on Tap email I received the notification). You can 'listen' to the Hubble Galaxy Cluster either on their System Sounds site, or you can go to the NASA Goddard site and download it in various formats. When I listen, it reminds me of 'something-odd-happening' music from an episode of *The X-files*.



Edge-On Spirals Galaxies in the Northern Spring Sky

By Brian Ventrudo



A close-up of NGC 4565 (the Flying Saucer Galaxy), an edge-on spiral in Coma Berenices. Image credit: ESO.

The great amateur astronomer Leslie Peltier once suggested a cure for many of the world's problems is simply "one gentle dose of starlight to be taken each night just before retiring". If you feel the need for a little starlight these days, there is no better bang for your buck than looking at galaxies. Northern spring is the perfect time for observing these immense collections of billions of stars, hundreds of which lie within easy reach of a small telescope (thousands if you're using a camera instead of an eyepiece).

In images, face-on spiral galaxies are arguably more beautiful than edge-ons, but their low surface brightness makes them hard to see visually with small-to-mid-sized scopes, especially in anything but very dark sky. The higher surface brightness of edge-on spirals make them easier to see, and their glowing splinter-shaped appearance gives them their own allure. These galaxies also have historical scientific importance because astronomers in the early 20th century measured their rotation rate to try to understand the nature of these immense 'island universes'.

After recently emerging from a long winter, I've been staying up all day (to finally see some Sun) and most of the night to do a little "snapshot astrophotography" to capture a few of the brighter edge-on galaxies. Here are three of my favorite edge-ons, plus one 'bonus' galaxy…

The edge-on spiral galaxy NGC 4565.
Captured with a TV-85 refractor, 0.8x focal reducer, and an ZWO ASI385MC camera,
20 x 15s frames, G=350. The galaxy 12th-magnitude galaxy NGC 4562 is at upper left.

NGC 4565

After decades of stargazing, I still have a soft spot for NGC 4565. Sometimes called the Flying Saucer Galaxy, this little gem in the constellation Coma Berenices is just 8 degrees from edge-on and exhibits a beautiful symmetry and relatively high surface brightness. In dark sky, this 10th-magnitude galaxy pops out in a 4-inch scope. With an 8-inch or larger scope you can see the dark central dust lane formed by the sooty exhalations of generations of long-dead stars. This galaxy looks very much like our own Milky Way would appear if viewed from the side. See the image at top for a close-up of this big galaxy.

At an apparent diameter of 15′, NGC 4565 appears large for a galaxy. It's about 42 million light years away, corresponding to a real diameter of some 100,000 light years. The galaxy is a member of the relatively small Coma I galaxy cluster which, like many galaxies in this part of the sky, is slowly moving towards an eventual merger with the much larger Virgo cluster, the large cloud of galaxies between the stars Denebola and Vindemiatrix.

The edge-on spiral galaxy NGC 4244. Captured with a TV-85 refractor, 0.8x focal reducer, and an ZWO ASI385MC camera, 20 x 15s frames, G=400.
Cropped but otherwise unprocessed.

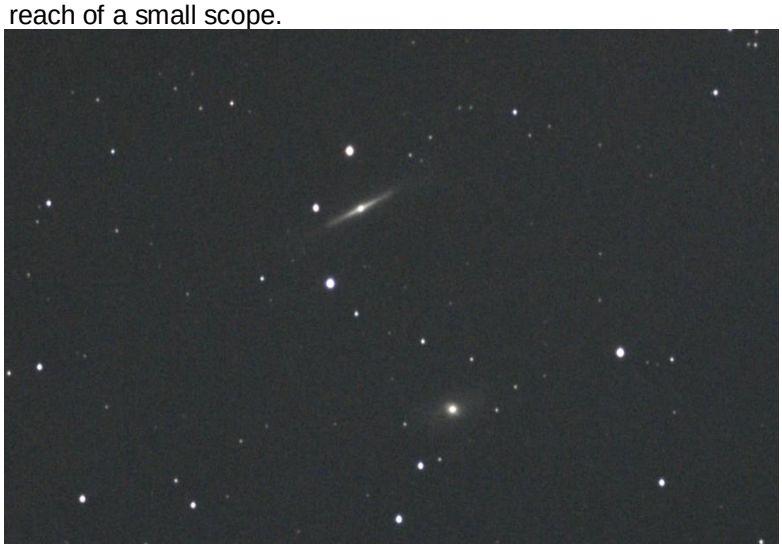
NGC 4244

Now to NGC 4244, another 10th-magnitude jewel in the constellation Canes Venatici under the handle of the Big Dipper. Also cataloged as Caldwell 26, this edge-on galaxy is far looser and more irregular than NGC 4565, but it appears about the same size. It's also closer, just 14 million light years away, implying that it's intrinsically smaller than NGC 4565. It is sometimes called the Silver Needle galaxy, and in a 4-inch or larger telescope that's exactly what it looks like.

The edge-on spiral galaxy NGC 5907. Captured with a TV-85 refractor, 0.8x focal reducer, and an ZWO ASI385MC camera, 20 x 15s frames, G=400. Cropped but otherwise unprocessed.

NGC 5907

Another galaxy, another analogy to slender, sharp object. The 11th-magnitude Knife Edge or Splinter Galaxy (NGC 5907) in the constellation Draco belongs to the small NGC 5866 group of galaxies and lies at a distance of 50 million light years. Judging by the position of the dust lane, this spiral isn't quite as close to edge-on as NGC 4565. NGC 5907 is notable for its slightly warped disk visible in detailed long-exposure images (see here, for example). This warping is a consequence of a dwarf galaxy ingested by the Knife Edge which ripped the smaller galaxy apart and formed a stream of stars extending more than 150,000 light years from the galaxy's disk. NGC 5907 spans an apparent size of about 13' and has a surface brightness that puts it within reach of a small scope.



The edge-on lenticular galaxy NGC 4762 (at top). Captured with a TV-85 refractor, 0.8x focal reducer, and an ZWO ASI385MC camera, 25 x 15s frames, G=400. Cropped but otherwise unprocessed. The galaxy at bottom, NGC 4754, is not interacting with NGC 4762.

Bonus Object – NGC 4762

While not strictly an edge-on spiral, NGC 4762 is most certainly a nearly perfect edge-on galaxy of some kind. It's a strange object, apparently devoid of a dust lane. It may be a lenticular galaxy that's merged with a much smaller galaxy. In a telescope, the galaxy is amazingly slender and well defined with a remarkably bright nucleus.

A bona fide member of the Virgo cluster, NGC 4762 lies in the constellation Virgo just two degrees west and north of the star Epsilon Virginis. Dubbed the 'Paper Kite' galaxy by Stephen J. O'Meara, this 10th-magnitude galaxy lies at a distance of 65 million light years and spans about 9' from our vantage point.

***

There are plenty more edge-on spirals in the northern spring sky, but these four are among the most accessible. Use your favorite star atlas to find these galaxies and make a plan to see them for yourself. If you don't have an atlas handy, Stellarium Web Online works in a pinch to help you locate these objects.

NASA Night Sky Notes

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Become a Citizen Scientist with NASA!

By: David Prosper

Ever want to mix in some science with your stargazing, but not sure where to start? NASA hosts a galaxy of citizen science programs that you can join! You'll find programs perfect for dedicated astronomers and novices alike, from reporting aurora, creating amazing images from real NASA data, searching for asteroids, and scouring data from NASA missions from the comfort of your home. If you can't get to your favorite stargazing spot, then NASA's suite of citizen science programs may be just the thing for you.

Jupiter shines brightly in the morning sky this spring. If you'd rather catch up on sleep, or if your local weather isn't cooperating, all you need is a space telescope - preferably one in orbit around Jupiter! Download raw images straight from the Juno mission, and even process and submit your favorites, on the **JunoCam** website! You may have seen some incredible images from Juno in the news, but did you know that these images were created by enthusiasts like yourself? Go to their website and download some sample images to start your image processing journey. Who knows where it will take you? Get started at bit.ly/nasajunocam

Interested in hunting for asteroids? Want to collaborate with a team to find them?? The **International Astronomical Search Collaboration** program matches potential asteroid hunters together into teams throughout the year to help each other dig into astronomical data in order to spot dim objects moving in between photos. If your team discovers a potential asteroid that is later confirmed, you may even get a chance to name it! Join or build a team and search for asteroids at iasc.cosmosearch.org

Want to help discover planets around other star systems? NASA's TESS mission is orbiting the Earth right now and scanning the sky for planets around other stars. It's accumulating a giant horde of data, and NASA scientists need your help to sift through it all to find other worlds! You can join **Planet Hunters TESS** at: planethunters.org

Intrigued by these opportunities? These are just a few of the many ways to participate in NASA citizen science, including observing your local environment with the GLOBE program, reporting aurora with Aurorasaurus, measuring snowpack levels, training software for Mars missions – even counting penguins!

Discover more opportunities at science.nasa.gov/citizenscience and join the NASA citizen science Facebook group at facebook.com/groups/Sciencing/ And of course, visit nasa.gov to find the latest discoveries from all the research teams at NASA!

GREAT SOUTHERN JUPITER: incredible image of Jupiter, submitted to the JunoCam site by Kevin M. Gill.
Full Credits: NASA/JPL-Caltech/SwRI/MSSS/Kevin M. Gill

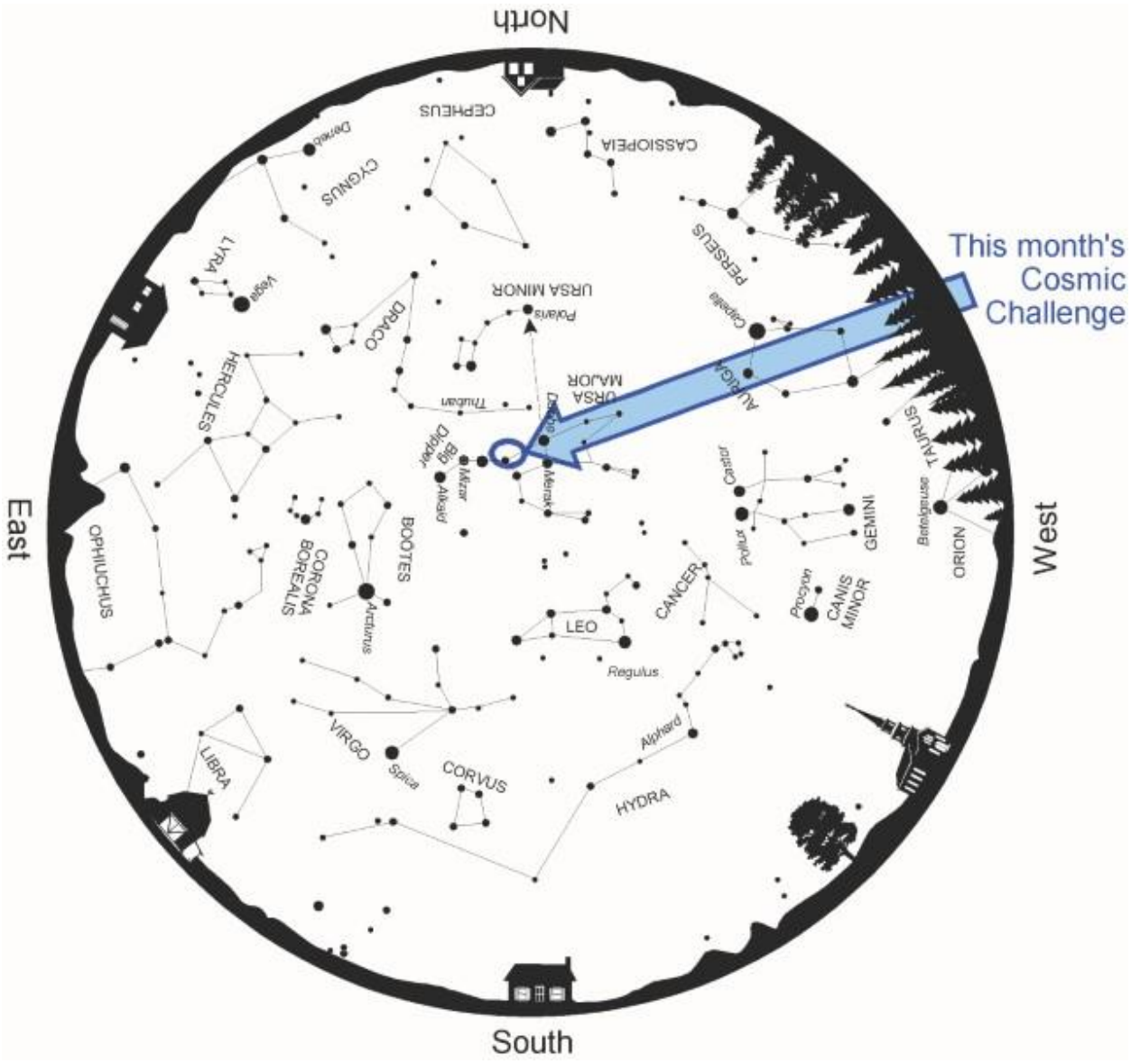
Phil Harrington's Cosmic Challenge

Two Pairs

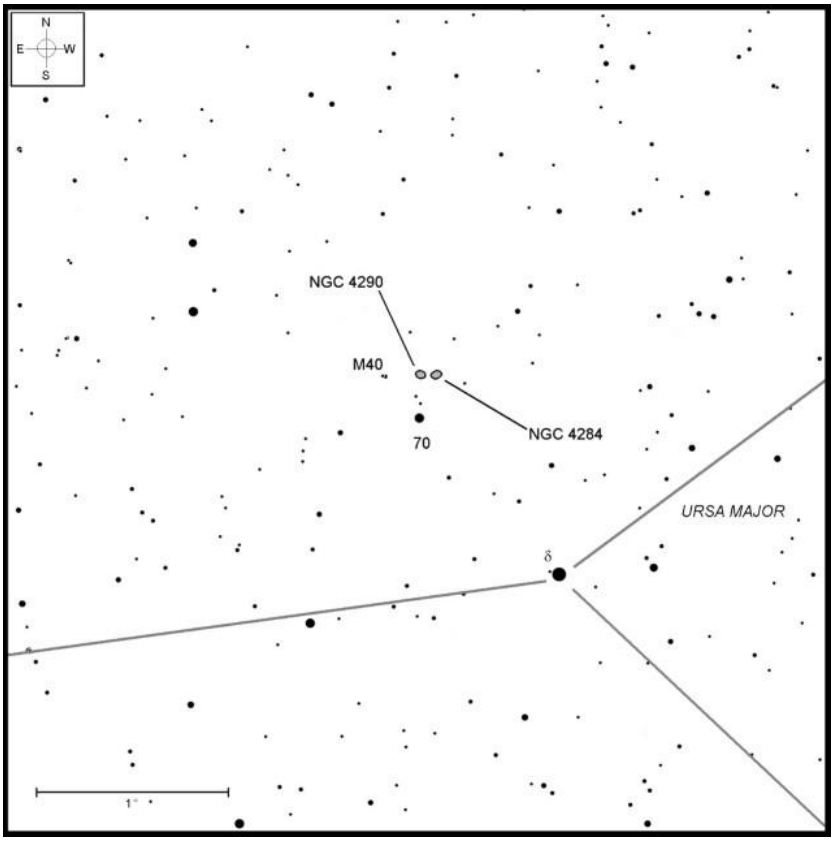
	giant binoculars (≥ 70 mm) 3- to 5-inch (76-127 cm) telescopes

Target	Type	RA	DEC	Constellation	Mag	Size
NGC 4284	Galaxy	12h 20.2m	+58º 05.6'	Ursa major	13.3p	2.5' x 1.1'
NGC 4290	Galaxy	12h 20.8m	+58º 05.6'	" "	14.7p	2.6' x 1.5'
M40	Double star	12h 22.2m	+58º 05.0'	" "	9.5	50"

Most agree that the Messier catalog of deep-sky objects stands as the finest single compilation of star clusters, nebulae, and galaxies visible from the northern hemisphere. When it comes time to single out the finest of the list's 109 entries, however, we often have trouble agreeing. Is it the Orion Nebula, M42; the Great Globular Cluster, M13; or maybe the Ring Nebula, M57? So many choices! One thing is for certain -- you'll never find Messier's 40th entry on anyone's "finest" list.



Evening star map. Credit: Map adapted from Star Watch by Phil Harrington



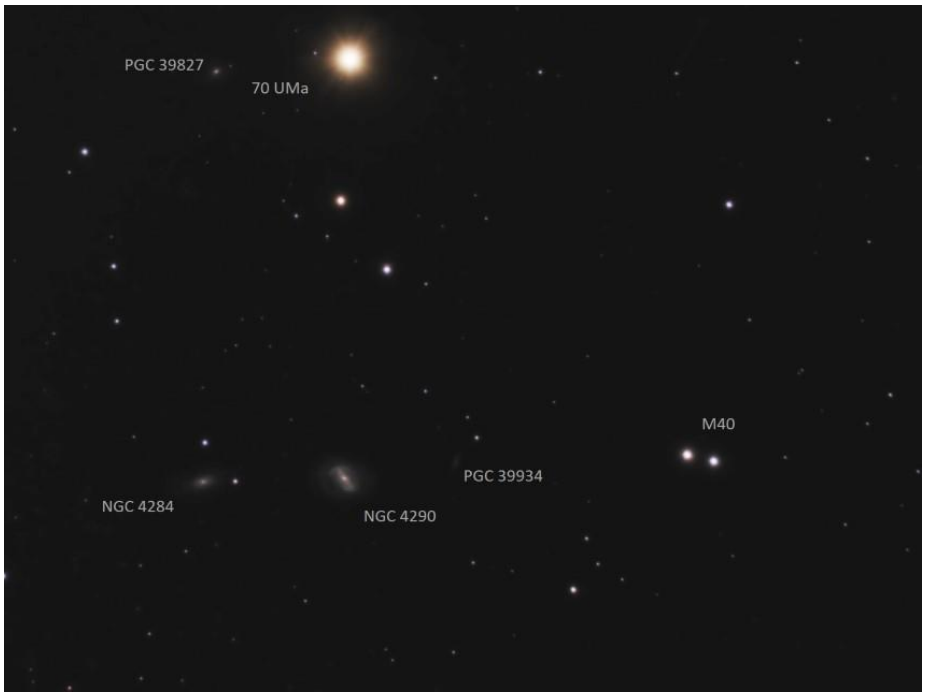
Finder chart for this month's Cosmic Challenge

We all make mistakes, and **M40** was one of Messier's. The story goes that in 1660, Johann Hevelius, a noted observer from Dantzig, Germany (now Gdansk, Poland) famous for his tubeless refractor, reported seeing a "nebula" near the star Megrez [Delta (δ) Ursae Majoris] . Five score and four years later, try as he might, Messier could not repeat Hevelius's observation. All he found were a pair of close-set 9th-magnitude stars. Messier noted on October 24, 1764:

I searched for the nebula above the tail of the Great Bear, which is indicated in the [Hevelius] book Figure of the Stars, second edition...I have found, by means of this position, two stars very near to each other and of equal brightness, about the 9th magnitude, placed at the beginning of the tail of Ursa Major: one has difficulty to distinguish them with an ordinary [non-achromatic] refractor of 6 feet [focal length]. There is reason to presume that Hevelius mistook these two stars for a nebula.

For reasons lost to history, Messier decided to include the pair in his catalog, even though he knew well that they were just two stars.

Hevelius's legacy was resurrected again in 1863 when Friedrich Winnecke rediscovered the double star from Pulkovo Observatory in St. Petersburg, Russia. He marked down its position, and not knowing of the previous observations, subsequently included it as the fourth listing in his double star inventory, Doppelsternmessungen (Double Star Measurements). As a result, M40 is often cross listed as Winnecke 4. More recent observations based on data from the European Space Agency's astrometric satellite Hipparcos suggest that the two components may actually be just an optical alignment -- an optical double star -- not a true binary pair.



Call it M40 or Winnecke 4 as you prefer, we are looking at a pair of stars shining at magnitudes 9.65 and 10.10 and separated by about 53", and slowly widening. The brighter of the pair is a spectral type G0 sun, while other is a hotter F8 star. Both are resolvable through giant binoculars and, Messier's description to the contrary, offer little visual challenge for 3- to 5-inch apertures. Look for M40 about ½° northeast of 5.5-magnitude 70 Ursae Majoris, itself a degree northeast of Megrez.

Astrophotographer extraordinaire Steve Bellavia took this image of M40, NGC 4290, and NGC 4284, along with PGC 39934 and PGC 39827 from Mattituck, NY.
· Equipment: Celestron 6-inch SCT, ZWO ASI 533MC Pro camera, and Astronomik L2 UV-IR cut-filter.
· Image Capture: 20 x 180 seconds

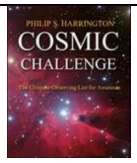
Although M40 leaves something to be desired, another object looms nearby that proves a worthy challenger for this size-class instrument. **NGC 4290**, a small barred-spiral galaxy, is just 11' to the west of M40. As portrayed in my sketch above, both easily fit into the same 85x field of my 4-inch (102mm) f/10 refractor, with NGC 4290 looking like a faint, perhaps slightly oval blur. The galaxy, rated at magnitude 11.8, is visible with difficulty through my refractor from my suburban backyard, but it is clear from darker sites.

If you have good luck with NGC 4290, then try to find an even fainter galaxy just to its west. Even under the darkest skies, **NGC 4284** is a very difficult object through my 4-inch refractor-- and even larger telescopes. Shining at only magnitude 13.5, its presence is only whispered through my 6-inch (152mm) Schmidt-Cassegrain from a site where the NELM is slightly better than 6.0. As a visual clue that you are looking in the right place, NGC 4284 lies very near two 13th-magnitude field stars, one to its east, and the other to its south.

For those with apertures larger than the stated instrument range for this month's challenge -- a lot larger -- how about trying your luck with **PGC 39934**? You can just make it out in the photo above. PGC 39934 shines at 17th magnitude and measures a mere 0.6'x0.2' across. It has always eluded my 18-inch reflector, but you may do better. If that was a little too tough, maybe give **PGC 39827** a go. You'll find its 16th-magnitude disk about 4.5' west of 70 Ursae Majoris. Use the photo {on previous page} to help find the way.

M40 (right), NGC 4290 (middle) and NGC 4284 (left) as seen through the author's 4-inch (102mm) refractor.

Good luck with this month's Cosmic Challenge!
Until next month, remember that half of the fun is the thrill of the chase. Game on!



About the Author: Phil Harrington writes the monthly *Binocular Universe* column in Astronomy magazine and is the author of nine books on astronomy. Visit his web site at www.philharrington.net to learn more.

Observatory and Planetarium

CSI Centennial Observatory / Faulkner Planetarium Herrett Center

All events at the Herrett Center for Arts and Science are cancelled until further notice. Visit https://herrett.csi.edu/ for more information.

College of Southern Idaho Campus Twin Falls, ID
Faulkner Planetarium / Show Times

About the Magic Valley Astronomical Society

Magic Valley Astronomical Society
550 Sparks St.
Twin Falls, ID

The Magic Valley Astronomical Society (MVAS) was founded in 1976. The Society is a non-profit [501(c) 3] educational and scientific organization dedicated to bringing together people with an interest in astronomy.

In partnership with the Centennial Observatory, Herrett Center, College of Southern Idaho - Twin Falls; we hold regularly scheduled monthly meetings and observation sessions, at which we share information on current astronomical events, tools and techniques for observation, astrophotography, astronomical computer software, and other topics concerning general astronomy. Members enthusiastically share their telescopes and knowledge of the night sky with all who are interested. In addition to our monthly public star parties we hold members only star parties at various locations throughout the Magic Valley.

MVAS promotes the education of astronomy and the exploration of the night sky along with safe solar observing through our public outreach programs. We provide two types of outreach; public star parties and events open to anyone interested in astronomy, and outreach programs for individual groups and organizations (e.g. schools, churches, scout troops, company events, etc.), setting up at your location. All of our outreach programs are provided by MVAS volunteers at no cost. However, MVAS will gladly accept donations. Donations enable us to continue and improve our public outreach programs.

Membership is not just about personal benefits. Your membership dues support the work that the Magic Valley Astronomical Society does in the community to promote the enjoyment and science of astronomy.
Speakers, public star parties, classes and support for astronomy in schoolrooms, and outreach programs just to name a few of the programs that your membership dues support.

Annual Membership dues will be:
$20.00 for individuals, families, and $10.00 for students.
Contact Treasurer Jim Tubbs for dues information via e-mail: jtubbs015@msn.com

Donations to our club are always welcome and are even tax deductible. Please contact a board member for details.

Membership Benefits:
Lending Telescopes: The society currently has three telescopes for loan and would gladly accept others please contact President Robert Mayer, for more information on these and other benefits.

Telescopes are an individual thing and not practical for public use. However, everyone should have the experience of a good look at the moon for at least 5 minutes in their life time. It is a dimension and feeling that is unexplainable. Pictures or TV can't give this feeling, awareness, or experience of true dimension. A person will not forget seeing our closest neighbor, the moon. Norman Herrett in a letter to Dr. J. L. Taylor, president of the College of Southern Idaho, Twin Falls, ID, USA.