Prescott Astronomy Club

Ephemeris

The Official Newsletter of the Prescott Astronomy Club (PAC)
e-phem-er-is: a time-based listing of future positions of solar system objects.

July 2023

Original Photo: Lucas Pezeta

General Meeting of the Prescott Astronomy Club

Wednesday, July 5, 2023 at 6:00pm
Prescott Public Library - Founders Room

Speakers: USGS Astrogeology Science Center
Topic: Rise of the USGS in Planetary Exploration

Background: A discussion of the past, current, and future activities of the USGS Astrogeology Science center in relation to the exploration of our Solar System. The USGS Astrogeology Science Center, conducts innovative, fundamental research that advances the fields of planetary spatial data infrastructure, geoscience, and remote sensing. The talk will include a discussion of the Astronaut training program and involvement in planetary spacecraft missions.

General Meeting of the Prescott Astronomy Club

Wednesday, August 5, 2023 at 6:00pm
Prescott Public Library - Founders Room

Swap Meet: Bring your own gear to SELL or TRADE! Also featuring items from the club's inventory including telescopes, astronomy equipment, accessories and books.

Member Prsentations: Volunteer to present information about your recent astronomy activities. Show your astrophotos, present an astro trip report, or talk about a recent interesting observation.

General Meeting of the Prescott Astronomy Club

Wednesday, September 8, 2023 at 6:00pm
Prescott Public Library - Founders Room

Speakers: Dr. Nick Moskovitz, Lowell Observatory, Flagstaff, Arizona
Topic: Earth strikes back: NASA's first planetary defense experiment (DART follow-up)

Background: Late 2022 NASA's DART spacecraft deliberately crashed into an asteroid at a speed of more than 13,000 mph. Given this dramatic end, ground based telescopes, including several at Lowell Observatory, will be tasked with witnessing the aftermath. I will discuss background to the DART mission, what is expected to happen, and why smashing into things in outer space can be fun.

Bio: Dr. Nick Moskovitz is an astronomer at Lowell Observatory in Flagstaff, Arizona. He has degrees from the University of California at Santa Barbara (BS Physics) and the University of Hawaii (PhD Astronomy). His research is related to small bodies in the Solar System with active projects involving video observations of meteors, curation of an asteroid database (asteroid.lowell.edu), and observations of near-Earth asteroids.

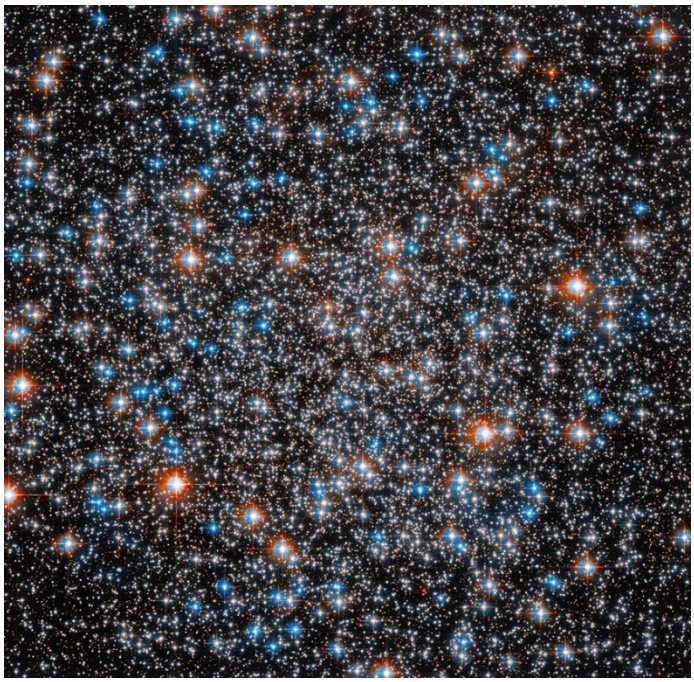
Original Photo: unknown

Find a Ball of Stars

By Linda Shore Ed.D

French astronomer Charles Messier cataloged over 100 fuzzy spots in the night sky in the 18th century while searching for comets — smudges that didn't move past the background stars so couldn't be comets. Too faint to be clearly seen using telescopes of the era, these objects were later identified as nebulas, distant galaxies, and star clusters as optics improved. Messier traveled the world to make his observations, assembling the descriptions and locations of all the objects he found in his *Catalog of Nebulae and Star Clusters*. Messier's work was critical to astronomers who came after him who relied on his catalog to study these little mysteries in the night sky, and not mistake them for comets.

Most easily spotted from the Southern Hemisphere, this "faint fuzzy" was first cataloged by another French astronomer, Nicholas Louis de Lacaille in 1752 from Southern Africa. After searching many years in vain through the atmospheric haze and light pollution of Paris, Charles Messier finally added it to his catalog in July of 1778. Identified as **Messier 55 (M55)**, this large, diffuse object can be hard to distinguish unless it's well above the horizon and viewed far from city lights.



Original Image and Credits: *NASA, ESA, A. Sarajedini (Florida Atlantic University), and M. Libralato (STScI, ESA, JWST); Smaller image: Digital Sky Survey; Image Processing: Gladys Kober*

The large image shows just the central portion of M55 taken by the Hubble Space Telescope. Above Earth's atmosphere, this magnificent view resolves many individual stars in this cluster. How many can you count through binoculars or a backyard telescope?

But July is a great month for getting your own glimpse of M55 – especially if you live in the southern half of the US (or south of 39°N latitude). Also known as the "Summer Rose Star," M55 will reach its highest point in northern hemisphere skies in mid-July. Looking towards the south with a pair of binoculars well after sunset, search for a dim (mag 6.3) cluster of stars below the handle of the "teapot" of the constellation Sagittarius. This loose collection of stars appears about $^2/_3$ as large as the full Moon. A small telescope may resolve the individual stars, but M55 lacks the dense core of stars found in most globular clusters. With binoculars, let your eyes wander the "steam" coming from the teapot-shaped Sagittarius (actually the plane of the Milky Way Galaxy) to find many more nebulas and clusters.

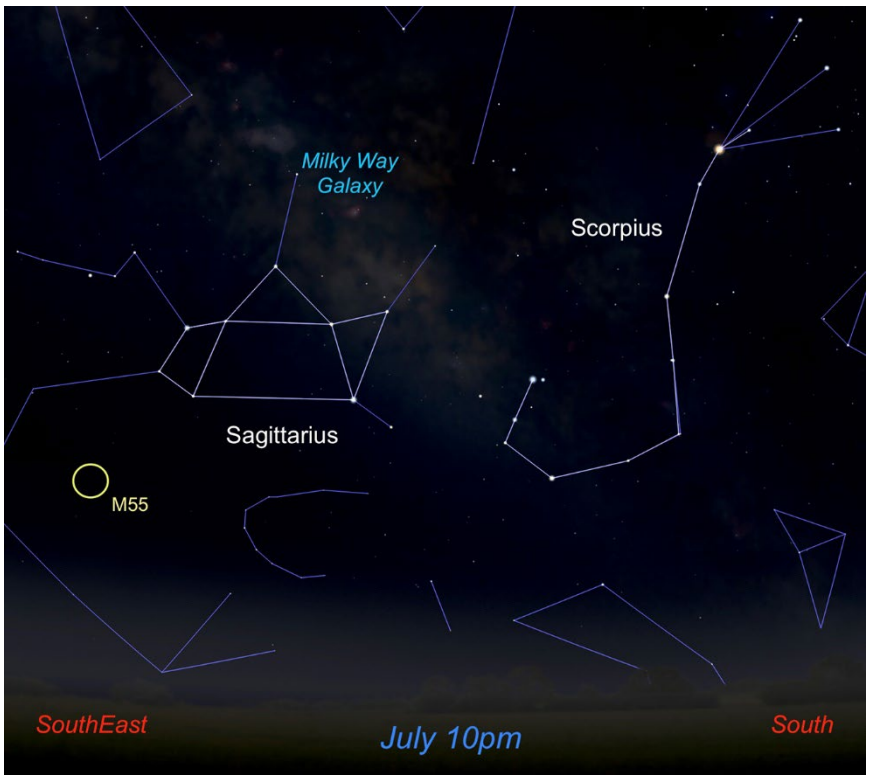


Image Credit: *created with assistance from Stellarium: stellarium.org*

Look to the south in July and August to see the teapot asterism of Sagittarius. Below the handle you'll see a faint smudge of M55 through binoculars. More "faint fuzzies" can be found in the steam of the Milky Way, appearing to rise up from the kettle.

As optics improved, this fuzzy patch was discovered to be a globular cluster of over 100,000 stars that formed more than 12 billion years ago, early in the history of the Universe. Located 20,000 light years from Earth, this ball of ancient stars has a diameter of 100 light years. Recently, NASA released a magnificent image of M55 from the Hubble Space Telescope, revealing just a small portion of the larger cluster. This is an image that Charles Messier could only dream of and would have marveled at! By observing high above the Earth's atmosphere, Hubble reveals stars inside the cluster impossible to resolve from ground-based telescopes. The spectacular colors in this image correspond to the surface temperatures of the stars; red stars being cooler than the white ones; white stars being cooler than the blue ones. These stars help us learn more about the early Universe. Discover even more: https://www.nasa.gov/feature/goddard/2023/hubble-messier-55

The Hubble Space Telescope has captured magnificent images of most of Messier's objects. Explore them all:
https://www.nasa.gov/content/goddard/hubble-s-messier-catalog/

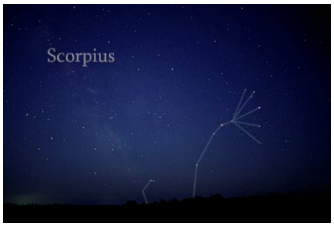
Original Photo: Eberhard Grossgasteiger

The Backyard Astronomer – May 2023

Scorpions & Rabbits

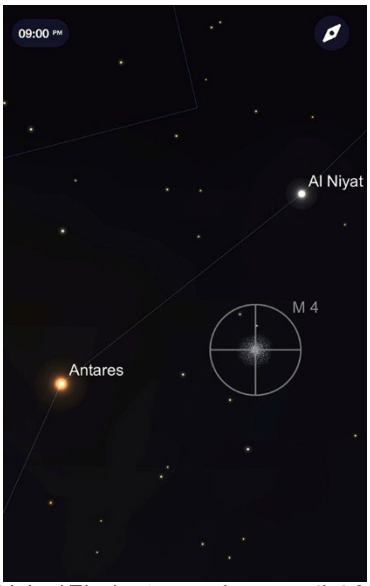
By Adam England, The Backyard Astronomer

One of my personal favorite constellations is Scorpius. It is very easy to identify in the summer months when it rises in the Southeast and sways above the Bradshaw Mountains like the traditional scorpion *promenade à deux* pairing dance. The red supergiant Antares defines the head of the Scorpion and is often confused with Mars for its brightness and somewhat ochre coloration. Just one degree westward of Antares is the globular cluster Messier 4 (M4), the first cluster to have individual stars resolved by astronomers in the mid-1700s. Today, Backyard astronomers can easily locate this cluster with a decent pair of binoculars or a small telescope.



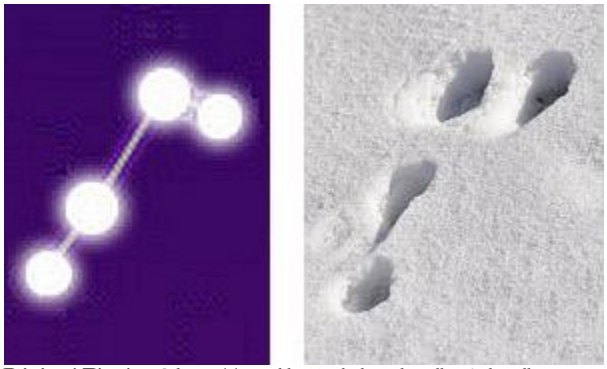
Original Photo: Scorpius by Till Credner, Wikimedia Commons license.

While the head of the scorpion is dominated by Antares and the five stars making up its head and claws, the tail of the scorpion rises above the mountain tops a litter later in the evening and is defined by its large hook at the tip. The Hawaiian culture saw these stars as the fishhook of the demigod Maui, calling it *Ka Makau Nui o Māui* or "The Big Fishhook of Maui".



Original Photo: Antares and Messier 4 – SkySafari.

Here in Northern Arizona, we certainly have scorpions and will use a fishhook for landing a trout, however the Navajo culture some something different in these stars. The last four stars in the tail are strikingly similar to the tracks left by a running rabbit, and as such, was known as *Gah Haat'e'ii* – Rabbit Tracks. It was the return of the rabbit tracks each year that signified to Navajo hunters that hunting season was over. During the time this constellation is visible in the night sky is when deer, elk, and other large game have given birth to your young, and these newborns are still reliant on their mothers for sustenance. When Rabbit Tracks move to the East and is no longer upright in the sky, the young are then old enough to care for themselves, and the hunting season returns.



Original Photo: Gah Haat'e'ii - Rabbit Tracks by Judy Volker, judy-volker.com.

Due to its placement along the main swath of the Milky Way, Scorpius contains many other deep sky objects, including double stars, nebulae, and both open and globular clusters. Enjoy the beautiful summer nights of Northern Arizona and get your telescope out to look at this amazing patch of sky.

Adam England is the owner of Manzanita Insurance and Accounting and moonlights as an amateur astronomer, writer, and interplanetary conquest consultant. Follow him @ Facebook.com/BackyardAstronomerAZ and Instagram.com/TheBackyardAstronomerAZ.

Original Photo: George Desipris

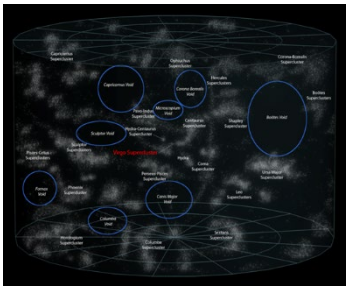
Voids

by Susanne Vaughan

Our universe is a non-homogeneous structure, a lumpy mix of galaxies massed into clusters, with filaments containing galaxies strung between the areas, like fine cobwebs. Between the clusters and filaments, there are areas without much in them, called voids. Looking into space optically, there are areas that appear starkly dark, but many of these are actually clouds of interstellar dust that block the starlight behind them. True voids are like the "Great Nothing" in the area near Boötes, also called the Boötes Void.

The Boöties Void is 330 million light years across, a bubble of space with few galaxies in it. It is called a "supervoid", discovered in 1981, while doing redshift analysis. It has about 60 galaxies in it. Normally, such an area would have over 2,000 galaxies in it.

About 80% of the observable universe consists of voids. Lists of these voids exist, including the Pegasus Void, the Perseus-Pisces Void, the Giant Void (Canes-Venatici Supervoid), and the Southern Local Supervoid, which is next to the Local Supercluster. Our galaxy, the Milky Way, is in the Local Supercluster, about 96 megaparsecs away from the Local Supervoid.



The universe's structure of clusters, filaments, and voids are thought to have originated during the Big Bang, when random fluctuations occurred as the universe expanded. These evolved into a more defined lumpiness over time. The Milky Way is located in an island of other galaxies, the Local Supercluster.

If the Milky Way galaxy were inside one of these voids, then seeing other galaxies would be difficult and our skies would be very dark indeed. Astronomers have wondered if these voids contain black holes or dark energy, causing them to expand, because they are larger than would have been predicted. A recent study by a team (Kroker, Runburg, and Farrah) at the University of Hawaii thinks that the voids contain dark energy which must comprise 68% of the universe in order for it to be accelerating its expansion. This would solve the “dark energy conundrum” as to where the dark energy exists. Now they are trying to confirm this by observation.

Sources:

"Space is full of gigantic holes that are bigger than we expected", by Joshua Sokol, NewScientist, 18Oct2016.

"Dark Energy Located in Intergalactic Voids, Predicts New Study", by Paul Ratner, HardScience, Sept 3, 2020.

Boötes Void, Wikipedia.

"Cosmic Voids: Much Ado About Nothing", https://www.astro.rug.nl/~weygaert/knawvoid.topics.php.

Original Photo: Zukiman Mohamad

Orion Nebula

Equipment: ASI2600MC Pro, Explore Scientific ED102 APO triplet scope, ZWO AM5 and Skywatcher HEQ5 Pro mount, Skywatcher EV40 guide scope with the ZWO ASI290mm mini camera, EAF and ASIAir Plus.

The image was taken by Charlie Jones. It was processed with Astro Pixel Processor, PScc and Topaz Photo Ai. I used a variety of exposure lengths and the Optolong L-extreme filter.

Photo Credit: Charlie Jones

Original Photo: Camille Cox

July 2023:

This calendar is put together from several sources & shows the objects & events visible during January 2023.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1

						Mercury at Superior Solar Conjunction Close Approach of Venus & Mars Comet C/2023 E1 (ATLAS) Passes Perihelion Messier 22 is Well-Placed
2 Cluster IC 4756 is Well-Placed	3 Full Moon (Buck Moon) Moon at Aphelion	4	5 Moon at Perigee	6 Earth at Aphelion	7 Conjunction of Moon & Saturn Close Approach of Moon & Saturn	8 Asteroid 15 Eunomia at Opposition
9 Venus at Greatest Brightness	10 Moon at Last Quarter Great Peacock Globular Cluster is Well-Placed	11 Close Approach of Moon & Jupiter Conjunction of Moon & Jupiter	12 Comet 185P/Petriew Passes Perihelion	13	14	15
16	17 New Moon Messier 55 is Well-Placed	18 Moon at Perihelion	19 Conjunction of Moon & Mercury	20 Moon at Apogee Conjunction of Moon & Venus Comet C/2021 T4 (Lemmon) Passes Perigee Comet C/2021 T4 (Lemmon) Reaches Peak Brightness	21 Conjunction of Moon & Mars Close Approach of Moon & Mars	22 134340 Pluto at Opposition Mercury at Highest Altitude (Evening Sky)
23	24	25	26 First Quarter Moon Conjunction of Venus & Mercury	27	28 Lunar Occultation of Delta Scorpii	29 Piscis Austrinid Meteor Shower 2023
30 Southern δ-Aquariid Meteor Shower 2023 A-Capricornid Meteor Shower 2023	31 Comet C/2021 T4 (Lemmon) Passes Perihelion Moon at Aphelion					

Original Photo: Egil Sjøholt

We'd Love Your Photos & Ideas for the Newsletter!

I am requesting any & all photographer members of PAC to submit astronomical &/or sky photographs to share with all the members by their inclusion in Ephemeris. Images can be sent to Hilary Legacy at ed@prescottastronomyclub.org. Please include descriptions of equipment, cameras, image capture parameters & processing, as well as what's in the image & when & where you took it. Or, for anyone who likes to photo edit or make their own images, I'd love to hear from you too. Thanks!

I'm also asking for anyone with ideas of things we could put in our newsletter to contact me. If there's something you'd like to see here, then tell me about it. Email Hilary Legacy at ed@prescottastronomyclub.org.

Original Photo: Joonas Kääriäinen

Observing lists are available in PDF format on the PAC website to provide guidance & goals for visual & astrophotography programs. This list These lists graciously provided by Past President David Viscio to assist in planning your observation activities. The lists are in PDF format and may be viewed, downloaded or printed with the permission of David Viscio.

Astroleague Lunar 100
Bright Nebulae Dunlop 100.
Globular Clusters
Messier
Planet Maps
Binocular Showpieces Caldwell
Face-On Spiral Galaxies
Herschel II
Herschel 400
Royal Astronomical Society of Canada Finest NGC Saguaro Astronomy Club Best NGC S&T

SCAVENGER HUNTS IN THE SKY

Lists for Any Occasion

Need ideas for your visual or astrophotography program? We have you covered with observing lists for your personal exploration or use at a star party.

Click on the links below to open an observation list in another window to view or print it.

Astroleague Lunar 100
Astroleague Urban
Binocular Showpieces
Bright Nebulae
Caldwell Objects
Double Stars
Dunlop 100 (Southern Hemisphere)
Face-On Spiral Galaxies
Globular Clusters
Herschel 400
Herschel II
Hidden Treasures
Messier Objects
Open Clusters
Planet Maps
Planetary Nebulae
RAS of Canada Finest NGC
Saguaro Astronomy Club Best NGC
Secret Deep
Space & Telescope Lunar 100
Telescope Showpieces by Month

Original Photo: Rajesh S. Balouria

What You Need to Know About Astronomy Apps

By Hilary Legacy

I hope you enjoyed last month's review of the **NASA** app. There are many astronomy apps available on both the Apple & Android platforms, but not all are created equal. Each offers different functions & information, each with a different design & style. Some focus on constellations & stars, others on the moon, yet others on education. I'll begin with the ones I have, one per month, & then other apps will follow in the next issues.

Moon Phase App

This app focuses on the moon, obviously. There are four buttons at the top of the screen (from left to right): the first button lets you set your location; the second is the settings button; then is a button that lets you post or share your images, etc.; and the last gives you a calendar, so you can choose a day to look at. Then, it gives a list of dates, so you can see what the moon's stats each day are. For each day, it shows the Moon's phase, & what time the moon & sun rise & set. Then it gives you: the moon's distance from the earth; what day of its cycle it's on; its altitude; its azimuth (the direction of a celestial object from the observer); & the constellation the moon is in. Then, when you scroll down, it tells you when the moon will be at a certain phase. Then it gives you the golden hour times, as well as the blue hour times. The settings button allows you to choose the unit of measure, allows you to set notifications on different phases & conditions, then gives you the app info.

I hope these give you a good look at some of the astronomical apps out there!

Original Photo: Samer Daboul

These are photographs from non-PAC members that you might enjoy.

Photo Credit: X

Photo Credit: X

Original Photo: Tobias Bjørkli

Secretary: Jack Evans
Treasurer: Roland Albers

Susanne Vaughan
EJ Van Horne

PAC Coordinators:

Astronomical League Coordinator: Ken Olson
Christmas Party: Susanne Vaughan
Equipment Loans: Roland Albers
Membership: Roland Albers
METASIC: John Dwan
Newsletter: Hilary Legacy
Night Sky Network: Open
Outreach Coordinator: Brian Blau
Refreshments: Jill Albers
Speakers: Lisa Anderson
Starry Nights Coordinator: Brian Blau
Summer Picnic: Doug Tilley
Webmaster: EJ Van Horne

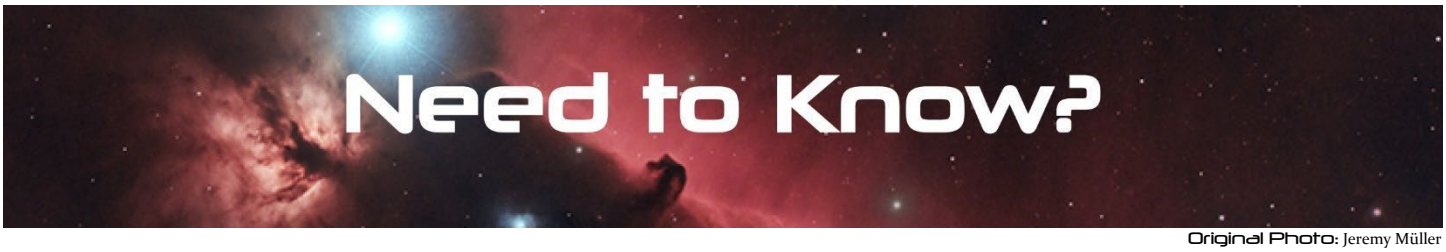
PAC Contact Information:

Website: https://www.prescottastronomyclub.org
Email: pacinfo@prescottastronomyclub.org

PAC Mentors:

If you need advice on the purchase of astronomy equipment, setting up equipment, astrophotography, etc., contact a PAC mentor.

Astrophotography: Brian Blau
General & Astrophotography: David Viscio
Visual Observation: Greg Lutes



Original Photo: Jeremy Müller

Ask a Member!

A 15-minute segment is being added to the regular general meetings where members can have their burning questions answered by other knowledgeable members. If you have an astronomy-related question you would like answered, submit it to Art Arnold-Roksandich at p@prescottastronomyclub.org. You can also bring up the question at the meeting.