NIGHTFALL

A PUBLICATION OF THE HUACHUCA ASTRONOMY CLUB

APRIL 2021

PRESIDENT'S NOTES

Happy April Everyone!

The nights are getting shorter but warmer. So, wash the crud off your mirrors and polish up those eyepieces. It's time to get out there! Say goodbye to Taurus and Orion and howdy to Leo the springtime night sky.

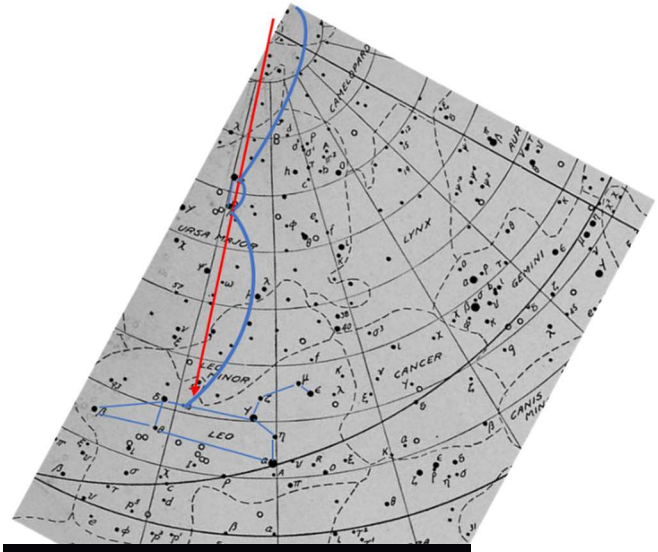
Last month, using the Star-book, we visited the Big Dipper (Ursa Major) in a general way and the pole star Polaris and learned how to use one to find the other (star hopping). This month we use their connection again to find another constellation by star hopping and the use of our celestial coordinate system.

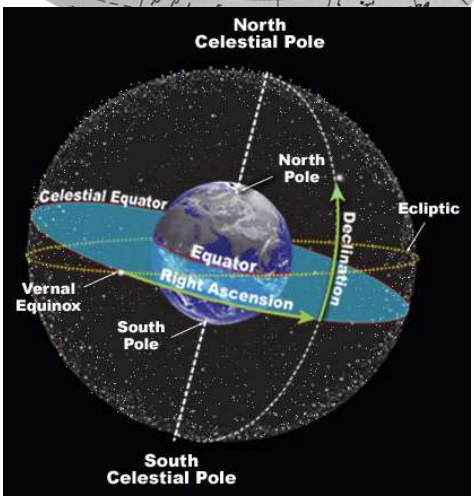
This time, start with Polaris, draw an imaginary line from Polaris through the same two bowl stars in Ursa Major, then move South. To better understand what I'm describing, turn to pages 166 and 167 of the Star-book. Here you will find a polar projection chart. This is a chart oriented with Polaris nearly centered and the rest of the stars radiating out from its position. Save the page images to your computer then magnify and rotate them as needed to find the stars we are using. A little hint, the stars we want are on the left page and up and toward the fold along a line labelled XI. Yep, XI is the roman numeral for eleven and it denotes the right ascension (RA).

While the Star-book does not make use of RA and Dec (declination) in the maps and charts (because of the types of instruments they expect the readers to possess (opera glasses, small binoculars, spotter scope, etc. without setting circles)), this coordinate system is present in the *Observer Catalogue of Telescopic Objects,* that starts on page 116. In current texts we refer to RA in hours, minutes, seconds and smaller units of arc. Dec is measured in plus or minus degrees, minutes and seconds. In the Star-book, objects are given RA and Dec coordinates only in whole numbers, RA in roman numerals and Dec in plus or minus degrees and minutes. Still, with the crude setting circles on most modern telescope mounts, whole degrees are as close as you can achieve accurately anyway.

Most beginning astronomy books have an introductory discussion on the celestial coordinate system. Look at the astronomy books you already have, and you are bound to find a description. If you want your information in a quick crib notes fashion, then try University of Virginia's Professor O'Connell's ASTR 1230 Lecture Notes, https://rwoconne.github.io/rwoclass/astr1230/lectureindex.html

THE DIRECT DIRECTION AND STAR-HOPPING FROM POLARIS TO LEO. AND THE CELESTIAL COORDINATE SYSTEM





Sources: A beginner's Star-book; an easy guide to the stars and to the astronomical uses of the opera-glass, the field-glass and the telescope, Kelvin McKready, 1912-1929, p 170. and https://faculty.virginia.edu/rwoclass/astr1230/motions-coords.html

RA is the angular distance measured eastward along the celestial equator from the vernal equinox[i] to the point at

which the celestial equator intersects a great circle passing through the celestial pole.

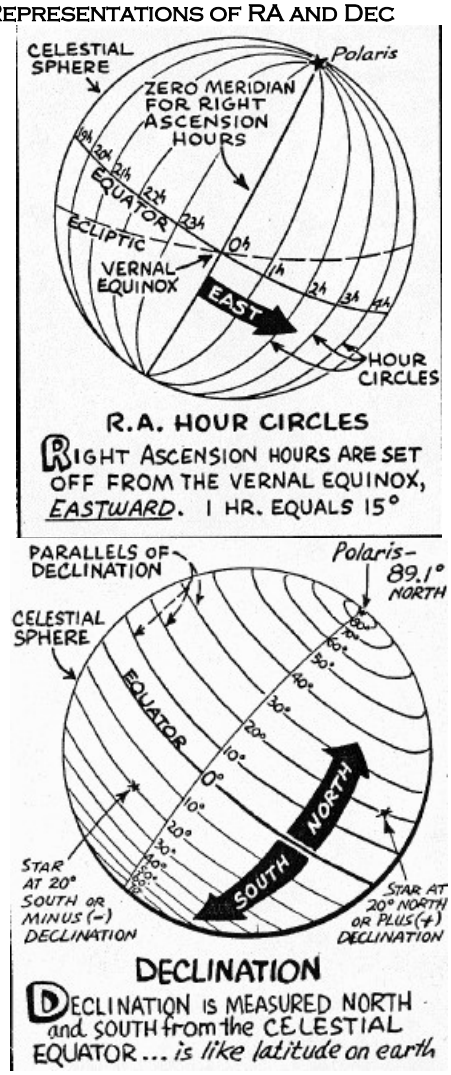
I had a long-winded explanation but Nancy always more precise than I helped you (the readers out). "Let's put this another way", she said.

"Think of your old school globe of Earth with all its longitude and latitude lines. Now, imagine sitting inside the globe, looking out. All those longitude lines, making vertical great circles around the globe, are equivalent to right ascension when measured across the sky. These measure the celestial objects as they rise (or ascend) in the sky from east to west.

All the (horizontal) latitude lines that you see from inside your globe descending (think decline) from the smallest circle at each pole to the largest circle at the equator equate to the celestial declination measure. In the sky this measures the "up-down" distance from the pole star to the celestial equator."

I couldn't say it better myself… obviously.

GRAPHIC REPRESENTATIONS OF RA AND DEC



Source: https://faculty.virginia.edu/rwoclass/astr1230/motions-coords.html

So, back to our navigation to Leo. Standing outside in your favorite dark sky viewing spot, facing north, look up at Polaris. Direct your gaze through the Big Dipper bowl stars – and turn around! – until you are comfortably looking south (with Polaris *behind* you) and looking more than halfway up from the southern horizon. Your line will hit the back of the zodiac constellation of Leo, the Lion.

If we consider the other half of the coordinate system, declination, we can be far more precise even if we only use whole number degrees. As you can see in the graphic below, Polaris is about 89 degrees north or +89 Dec. For our purpose we can further simplify and just say it is +90 the pole. Now, go to page 127 in the Star-book and locate entry 225, the constellation Leo. This gives the map pages that include it, as well as the position of its center. Here's how to decode its coordinates of N. H., R. A. X h. 25 m.; D. +15°.

Star-Book Notation	*Modern Interpretation*	*Comments*
N. H.	**Northern Hemisphere**	**(as opposed to a view of objects south of the celestial equator)**
R. A. **X h. 25 m.**	**RA 10h 25m** **(also written as RA 10h 25m)**	**That's right ascension of 10 hours and 25 minutes.**
D. **+15°**	**Dec +15°**	**That's declination of 15 degrees north of the celestial equator.**

Even very coarse setting circles should be good enough to get you there, and with the pattern made by the bright stars you should be able to confirm your position. Easy peasy! So now what? Well, it's time to look around at objects in Leo, so turn to page 64. The constellation's write-up begins with Leo and its composition of bright stars. First up: Regulus. This star is located at the front elbow at the base Leo, that is, if you think of the constellation resembling a lounging library building lion or the heart of a fierce African lion out hunting on the savannas. Either way, Regulus is a bright, first magnitude blue-white star. While Regulus looks to be a single star, even in large telescopes, it is a quadruple star system. This has been determined by spectroscopic observations, so don't expect to split them.

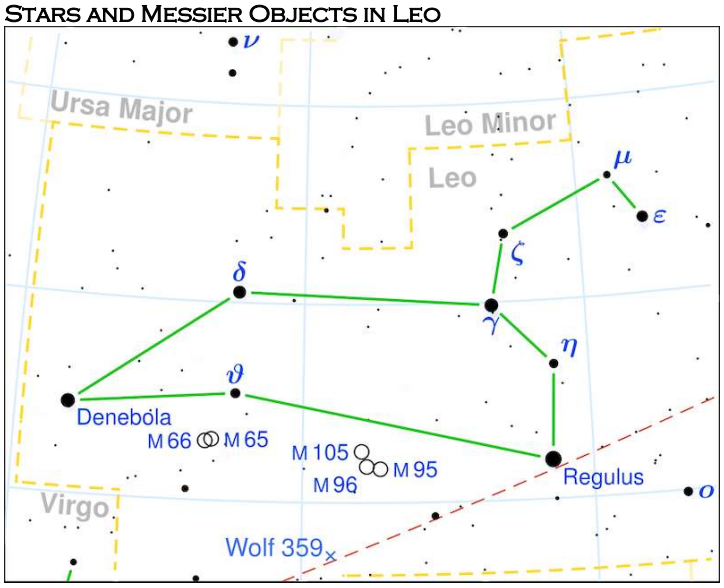
There is another bright named star in Leo that is usually thought of as representing the lion's hindquarter. That star is named Denebola. Both stars are well worth remembering, not just because they frame and anchor this constellation, but they are commonly used as set points for computer-controlled GOTO telescope mounts, as well as being the starting points for many star-hopping adventures. You will use them a lot during a Messier Marathon.

With the marathon in mind, the star chart closeup, below, shows your practice objects for April. There are six galaxies that are pretty easy to locate and view even in small telescopes or large binoculars. M65 and M66 make up the group of galaxies known as the Leo Triplet. You see images of the group all the time in astronomy magazines and glossy tabletop books. They are favorites to show people at star parties as well because they are so easy to find, and people can see them. We can even find them from the back porch of the Patterson Observatory, located in downtown Sierra Vista. There seems to be an ageless question as to why

Messier saw two of the three in the year 1780 and not the third, but we have no definitive answer. We know the field of view in the telescopes that he is known to have used were very narrow, but just in the action of finding the first two you would think it reasonable that he would run into the other. But no, no mention of the third until it (NGC 3628) was discovered by William Herschel in 1784. Oh well, we know all three are there now, and bright enough to see in a telescope as small as well corrected 80mm telescope or 25x100 binoculars from a dark location.

M95, M96, and M105 (galaxies, all) are also big bright and easy to locate, being about one third of the way in a straight line between Regulus and Denebola. Well, maybe a small nudge south of the line.

STARS AND MESSIER OBJECTS IN LEO



Source: A star chart showing the constellation Leo. On the right is a pattern that looks like a flipped question mark, "the Sickle." This is the most recognizable pattern to look for when trying to locate Leo in the sky. Image via Torsten Bronger / Wikimedia Commons.

There are many galaxies in Leo and the constellations just to its east. Indeed, Leo is the western gateway to the region of sky referred to as the Realm of the Galaxies. Leo is a perfect constellation to get lost in. Everywhere you look there is a faint fuzzy lurking, waiting for you to find it. Most will be small so you may just get a feeling that there is something there but when you look directly at it, it's gone. Most deep sky objects we go after are just at that ragged edge of our night vision. We move our eyes around looking at the object indirectly, almost like sneaking up on it and occasionally we nudge the scope slightly to tease out a shape, or even the slight brightening of a patch from the background darkness. Welcome to real deep sky observing.

I know I've used up my welcome this month, but we will spend all of our time in this realm next time. I'll also introduce you to another book you will probably find rewarding. Until then, get to know the Star-book and constellation Leo stars, its galaxies, and its surroundings, as you get out there and stare. Oh. And read this month's Night Sky Notes.

Welcome our new members!

Kevin Kozel of Glendale Arizona joined the club in March. Kevin is a member of the East Valley Astronomy Club (EVAC). Len Amburgey, of Benson also joined in March. He is an experienced astronomer with observatories both here in AZ and in MA. His passions are asteroids, variable stars and novae. Welcome to the club, we are glad you joined.

April 22 Public Night

Patterson Public Night returns with a hybrid event on Thursday April 22? A limited number of guests will be welcomed at the in-person portion of the event. Others will be able to participate over Zoom from home. The event will be "touch-free" with the view shared via cameras. We will adhere to the UArizona COVID restrictions in force on the day of the event.

HAC volunteers assisting at the event should not register. Others need to sign up at https://www.universitysouthfoundation.com/patterson-observatory to attend the in-person portion of the event. You can participate over zoom by clicking https://arizona.zoom.us/j/89215013512 or entering 892 1501 3512 as the meeting ID on your Zoom login page. The Patterson Observatory is located on the campus of the University of Arizona Sierra Vista at 1140 N. Colombo Avenue.

We have a few volunteers that will "broadcast" from their home observatories. The event will be coordinated and shared over Zoom with different participants alternately sharing their screens. People will be able to watch from home or from our companion event in the Mona Bishop Room at the Sierra Vista Library (hosted by Penny Brondum and Elizabeth Wrozek of the Hauser Museum)

Our guests at Patterson will be able to tour the displays and the main scope. The 20 will not be used for the public – it will remain in "research mode" and Tom Kaye will be on hand to describe the work being done there.

Wendee Grinde of the University South Foundation will host the first hour of the Zoom event and then turn it over to us.

As always, this is a weather dependent event, and it will be canceled if the weather turns cloudy. There will be a recorded cancelation message available at 520 458-8278 ext 2214 and a message posted on Hacastro if we have to cancel. Penny Brondum is kicking off the event at the Library with a talk on the constellations at 7pm. That portion of the event is rain or shine.

NASA Notes

The OSIRIS REx spacecraft is scheduled to depart asteroid Bennu on May 10th for its roughly two-year trip back to Earth.

The Patterson Observatory and the Henry F. Hauser Museum have applied to host a collaborative "official" James Webb Space Telescope Community Event later this year. The long-awaited JWST is currently scheduled to launch on Sunday October 31 on an Ariane 10 rocket from the ESA launch facility in French Guiana.

NASA Night Sky Notes April 2021

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.org to find local clubs, events, and more!

Watch the Lion: Celestial Wonders in Leo

David Prosper

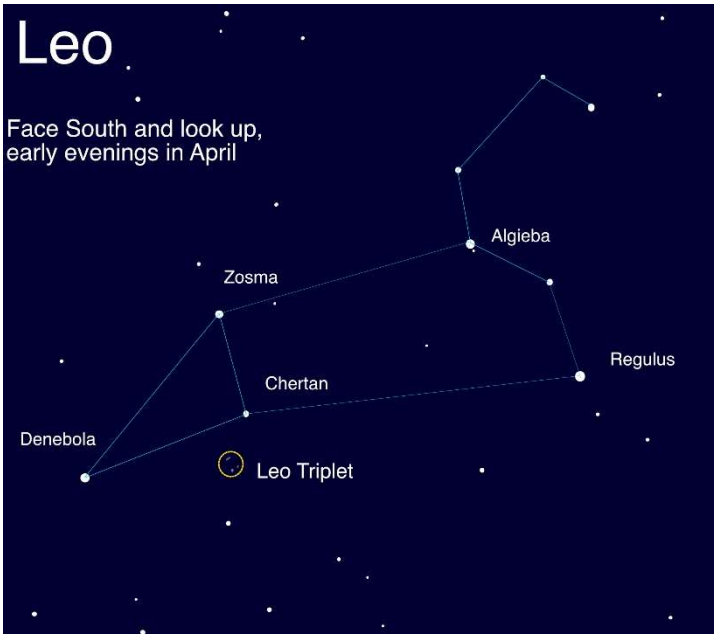
Leo is a prominent sight for stargazers in April. Its famous sickle, punctuated by the bright star Regulus, draws many a beginning stargazers' eyes, inviting deeper looks into some of Leo's celestial delights, including a great double star and a famous galactic trio.

Leo's distinctive forward sickle, or "reverse question mark," is easy to spot as it climbs the skies in the southeast after sunset. If you are having a difficult time spotting the sickle, look for bright Sirius and Procyon - featured in last month's article – and complete a triangle by drawing two lines to the east, joining at the bright star Regulus, the "period" in the reverse question mark. Trailing them is a trio of bright stars forming an isosceles triangle, the brightest star in that formation named Denebola. Connecting these two patterns together forms the constellation of Leo the Lion, with the forward-facing sickle being the lion's head and mane, and the rear triangle its hindquarters. Can you see this mighty feline? It might help to imagine Leo proudly sitting up and staring straight ahead, like a celestial Sphinx.

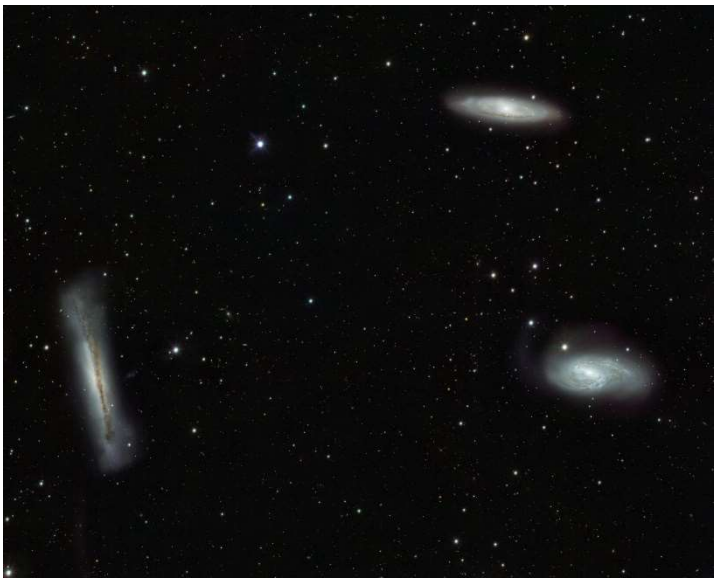
If you peer deeper into Leo with a small telescope or binoculars, you'll find a notable double star! Look in the sickle of Leo for its second-brightest star, Algieba - also called Gamma Leonis. This star splits into two bright yellow stars with even a small magnification - you can make this "split" with binoculars, but it's more apparent with a telescope. Compare the color and intensity of these two stars - do you notice any differences? There are other multiple star systems in Leo – spend a few minutes scanning with your instrument of choice and see what you discover.

One of the most famous sights in Leo is the "Leo Triplet": three galaxies that appear to be close together. They are indeed gravitationally bound to one another, around 30 million light years away! You'll need a telescope to spot them, and use an eyepiece with a wide field of view to see all three galaxies at once! Look below the star Chertan to find these galaxies. Compare and contrast the appearance of each galaxy – while they are all spiral galaxies, each one is tilted at different angles to our point of view! Do they all look like spiral galaxies to you?

April is Citizen Science Month, and there are some fun Leo-related activities you can participate in! If you enjoy comparing the Triplets, the "Galaxy Zoo" project (galaxyzoo.org) could use your eyes to help classify different galaxies from sky survey data! Looking at Leo itself can even help measure light pollution: the Globe at Night project (globeatnight.org) uses Leo as their target constellation for sky quality observations from the Northern Hemisphere for their April campaign, running from April 3-12. Find and participate in many more NASA community science programs at science.nasa.gov/citizenscience. Happy observing!



The stars of Leo: note that you may see more or less stars, depending on your sky quality. The brightness of the Leo Triplet has been exaggerated for the purposes of the illustration - you can't see them with your unaided eye.



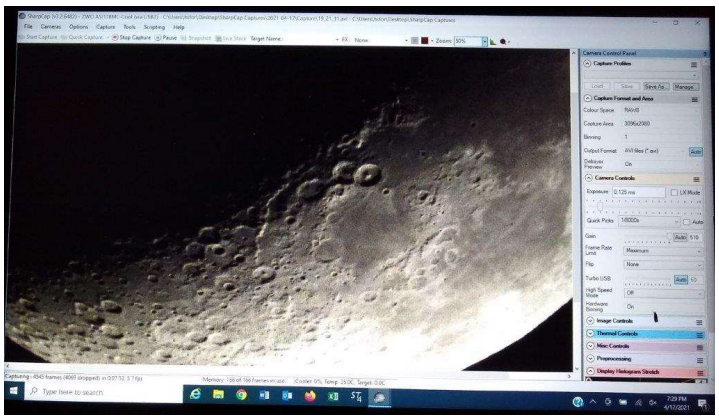
Your view of the three galaxies in the Leo Triplet won't look as amazing as this image taken by the VLT Survey Telescope, unless you have a telescope with a mirror 8 feet or more in diameter! Still, even a small telescope will help your eyes pick up these three galaxies as "faint fuzzies": objects that seem blurry against a background of pinpoint stars. Let your

eyes relax and experiment with observing these galaxies by looking slightly away from them, instead of looking directly at them; this is called averted vision, a handy technique that can help you see details in fainter, more nebulous objects.

Image Credit: ESO, INAF-VST, OmegaCAM; Acknowledgement: OmegaCen, Astro-WISE, Kapteyn I.

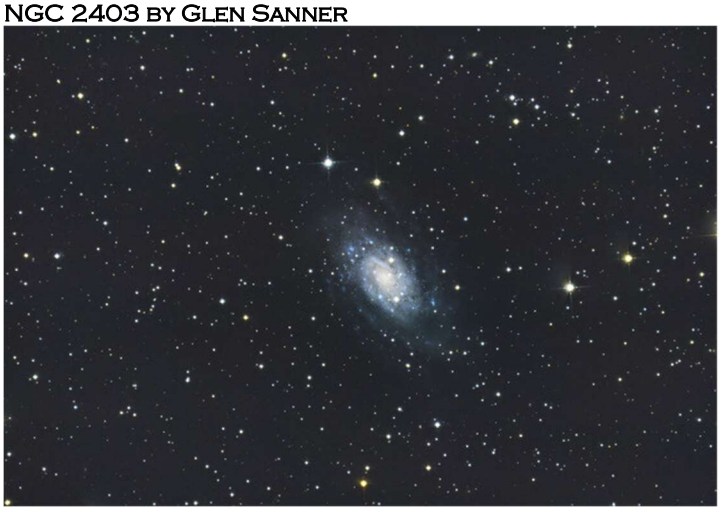
Pictures from HAC Members

What's on tonight? The Moon by Ted Forte

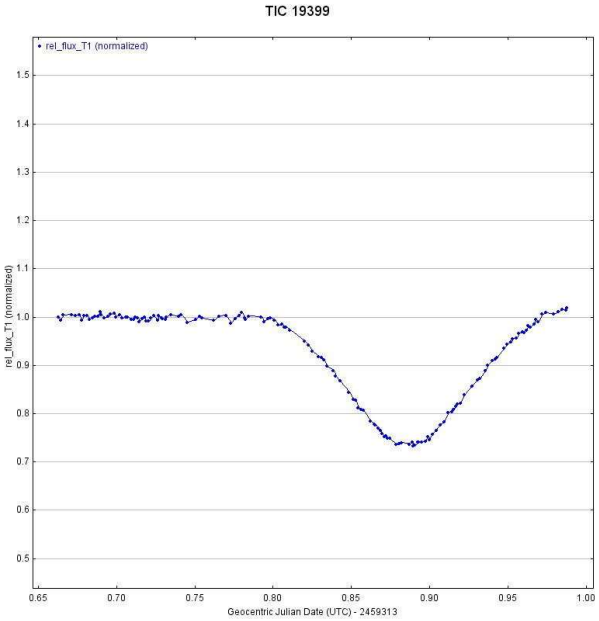


Messier 83 CDK17 from Chile by Alex Woronow

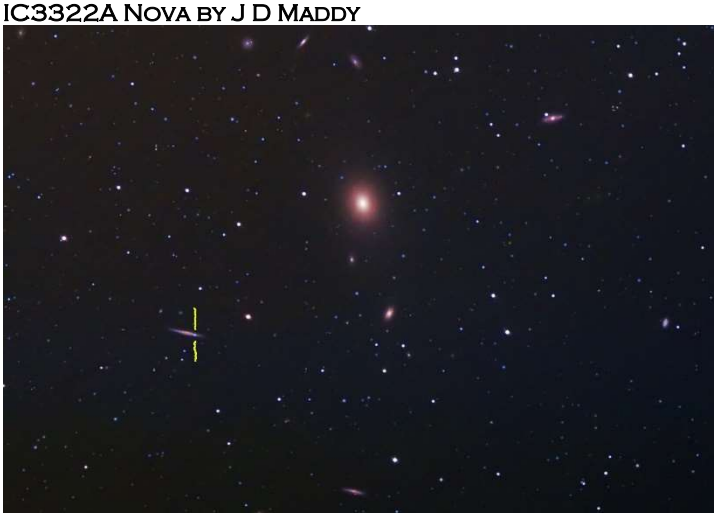
NGC 2403 by Glen Sanner



Eclipsing Dip by Tom Kaye



IC3322A Nova by J D Maddy



FOR SALE

Patricia Houser has two telescopes to sell. Her husband was the astronomer, and can no longer pursue the hobby. She did not mention what the scopes are but would be open to potential buyers coming out to see them (Whetstone). That's all the information we have, so if you have questions please contact Ms. Houser directly at iamtennis@peoplepc.com

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HAC Apr/May 2021 Calendar of Events

SU	MO	TU	WE	TH	FR	SA
4 April 3:04am EASTER	5	6 Saturn/moon 4°	7 Jupiter/moon 5°	8	9	10
11 7:32pm	12	13	14	15	16	17 Earth Day at Kartchner (virtual) Mars/Moon .1°
18	19	20 midnight	21 Lyrid Meteors	22 Patterson Public Night Hybrid Event Lyrid Meteors	23 HAC Meeting (Zoom)	24
25	26 8:33pm	27	28	29	30	**1 May**
2	3 12:51PM Saturn/Moon 4 degrees	4 Jupiter /Moon 5 degrees	5 Eta Aquariid meteors	6 Eta Aquariid meteors	7	8
9	10 O-Rex departs Bennu	11 12:01PM	12	13 Mercury/Moon 2 degrees	14	15 Mars/Moon 2 degrees
16	17	18	19 12:13PM	20 Patterson Public Night Hybrid Event	21	22
23	24	25	26 4:14AM	27	28 HAC Meeting (Zoom) Venus/Merc conjunction	29
30 Saturn/Moon 4 degrees	31 MEMORIAL DAY	**1 June** Jupiter/Moon 5 degrees	2 00:26AM	3	4	

All times local MST

Join **HacAstro** to keep up to date with all of the Huachuca Astronomy Club events

Send an email to: HACAstro+subscribe@groups.io

Watch the group for notice when in person events and meetings will resume