NIGHTFALL

A PUBLICATION OF THE HUACHUCA ASTRONOMY CLUB

SEPTEMBER 2021

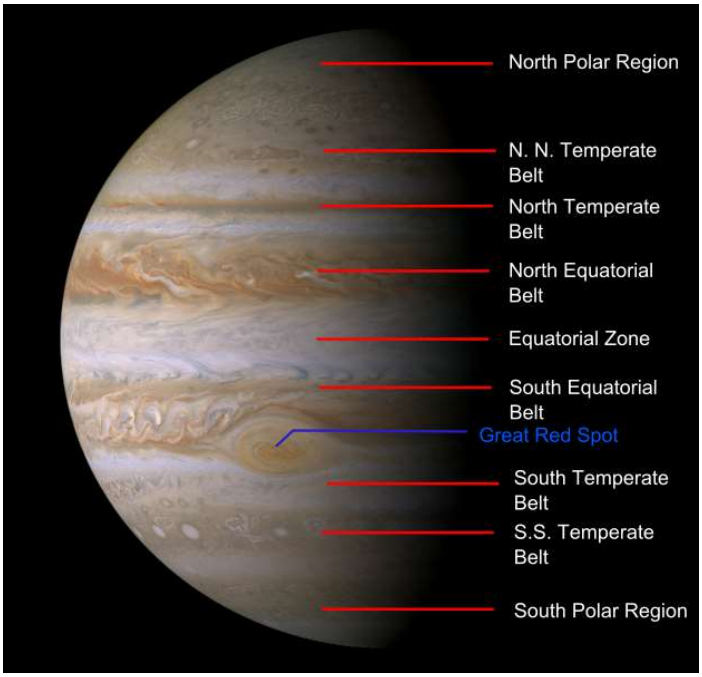
PRESIDENT'S NOTES

Ah, September. Pleasant weather. Longer nights. And a return to in-person club meetings. Those are the hopes, I'm afraid to say. Those are the plans. Plans change. But I'm certain it is September. I'm pretty sure that the nights will continue to lengthen. I'm still a little iffy about the general meetings, so we'll keep you informed. Lastly, I give you no promises on the weather.

But let's go on as if, at the very least, we have good weather. We have exploring and viewing to do. The summer Milky Way is in full command of the sky. The sky chart referenced last month will do equal duty this month. And given this year's weather, there is no way you have observed all the objects available to be seen. To add to this plenty, it is also time to take a long look at Jupiter. It has become well positioned in the evening sky, nearly at opposition (that is, Earth is now positioned between the Sun and Jupiter) and putting on a good show telescopically.

Many take a quick look at Jupiter, are wowed but don't give Jupiter the time it needs to truly empress the viewer to the core. Spend 10 or 20 minutes just watching the planet with your telescope. Typically, Earth's atmosphere will be a bit squirrely, even on a good night, so the focus and resolution will come and go. But over the span of 10-20 minutes, you should get a few moments to several minutes of good viewing. In that time, you should notice some movements of Jupiter's moons, its cloud belts and zones of the planet itself. If you do see movement then you really should continue watching and decide to dedicate the evening to learning the motions of the giant planet system.

JUPITER'S CLOUD BELTS AND ZONES



Source: https://commons.wikimedia.org/wiki/File:Jupiter_Belt_System.svg

Continuing our review of the Beginner's Star-Book we need to cover a section of the book that is often overlooked but is fundamental in our reading of astronomical information. I confess I am not good at it myself.

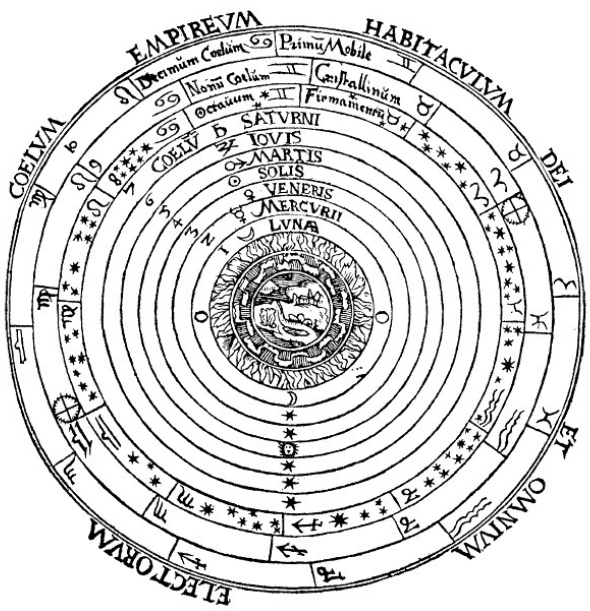
> *The English names of a Greek letter is always given in direct connection with its corresponding symbol (letter), wherever Greek letters are used. Beginners who know no Greek — and their number, I regret to say, is growing — will soon learn these letters, as they go along, without the necessity for learning the Greek alphabet all at once. For those, however, who may desire to memorize these characters quickly and as a whole, the Greek alphabet is here given in full. The vowel e, where so marked, is pronounced as a in bay; o as in slow; 6 as o in won; u as u in flute.*
>
> *a Alpha; β Beta; ΄Y Gamma; δ Delta; ε Epsilon; ζ Zeta; η Eta; Θ Theta; ι Iota; κ Kappa; λ Lambda; μ*

Mu; ν Nu; ξ Xi; ο Omicron; π Pi; ρ Rho; σ or ς Sigma; τ Tau; υ Upsilon; φ Phi; χ Chi; ψ Psi; ω Omega. The pronunciation of the names of the constellations, etc., is fully indicated in the Observer's Catalogue. But, as to all technical pronunciations, whether of names or letters, it should be clearly understood that these are not fundamental to one's astronomical interest. If any word be used, no matter what the language, it is well for us to use it correctly, if we may. But of more importance are the stars themselves, and no one should allow ignorance or awkwardness in using mere terms, however ancient, to destroy one's pleasure in the stars. For their clumsy nomenclature the stars are not responsible; nor are the Greeks. Not till the 16th century of our era did the stars receive their Greek-letter designations. But an attempt at general changes would now bring confusion into the whole literature of astronomy.

"The Star Book," Page 33

I read an interesting article a while ago examining the state of astronomy 100 years ago. I tend to go back to Galileo and say: if he had had modern equipment, we would be 400-years head now. Of course, that isn't what happened and instead Earthlings have had to crawl along towards our current understanding of the universe.

PTOLEMY'S GEOCENTRIC UNIVERSE

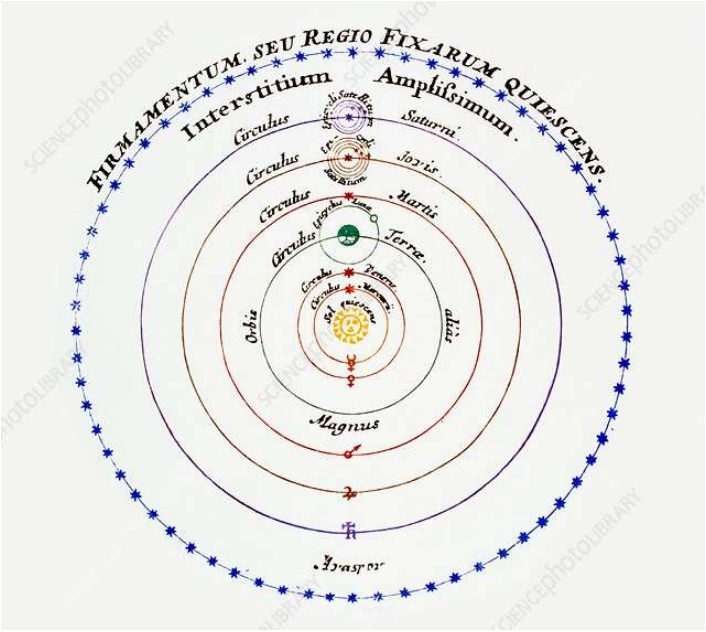


Source: http://facultysites.vassar.edu/brvannor/Asia350/ptolemy.html

A mere 500 years ago, Earthlings didn't know whether anything existed beyond Earth except in the realm of Heaven. A geocentric universe with Earth at its center was established doctrine and had been for hundreds of years. Aristotle (384-322 BCE) had the belief of an ordered universe or cosmos. Stable and serene, at the focal point Earth bathed in sunlight then starlight. The human domain of Earth could undergo chaos and corruption, but the heavens were perfect and unchanging -- unless one of the gods was posting a notice. Ptolemy (ca. 150 CE) came along later and gave a mathematical precision to Aristotle's belief, and the case was closed.

Then, 400 years ago, in 1543, Nicolaus Copernicus (1473-1543 CE) published *On the Revolutions of the Heavenly Spheres*. His book explained the heliocentric idea that the earth rotates daily on its own axis and revolves yearly around the sun. In 1609-1612, by means of the newly invented telescope, Galileo saw mountains on the Moon, satellites orbit around Jupiter, the phases of Venus, and sunspots. These discoveries did not conclusively prove the heliocentric universe but provided new evidence in its favor and put aside some old objections. In 1632 Galileo published *Dialogue on the Two Chief World Systems, Ptolemaic and Copernican*. Galileo thought the Copernican arguments were stronger than those for the Ptolemaic geostatic side. Soon thereafter this book was banned. The Catholic Church and Earth returned to the center of the universe.

DIAGRAM SHOWING THE SOLAR SYSTEM ACCORDING TO COPERNICAN THEORY



Source: SCIENCE PHOTO LIBRARY. https://www.sciencephoto.com/media/364082/view

But ideas and technology continued to progress. The tools, the math, and ideas from other disciplines furthered discoveries that reinforced the notion of a heliocentric solar system but cast doubt on the size and composition of the universe as a whole. Was the universe the size of our solar system and the stars that were detected with telescopes merely a backdrop or were they suns like our own? And what of the nebulae that had started to be found just a couple of years after the invention of the telescope? They come in different shapes and sizes, and they were being

found in increasing numbers as more astronomers and better telescopes and eyepieces.

By 300 years ago theories on gravity were helping refine orbits. Stars were considered to be sun-like objects. Edmond Halley suggested that nebulae are clouds of interstellar gas. Calculus, the mathematics of motion and change, congealed along with the creation of a new mathematical language to express its products. Newton built the first practical reflecting telescope and developed a sophisticated theory of color based on the observation that a prism separates white light into the colors of the visible spectrum. His work on light was collected in his book Opticks, published in 1704. He also made the first theoretical calculation of the speed of sound, and did I mention Calculus?

Then, 200 years ago, the sciences exploded. There was widespread knowledge of hundreds of nebulae, variable stars, and comet orbits were understood. The speed of light was being refined. Clocks were becoming more accurate. The wave theory of light was proposed, as well as the atomic theory of matter. Electricity, magnetic fields, batteries, radiation, chemistry, ultra-pure refining, pulling high vacuum, and more fundamentals of what we consider modern science were moving beyond theory and into reality. In astronomy there were still questions as to the distances to the stars, and just what fueled them. Discoveries were coming fast in the field of mathematics and physics. There were many observers, mathematicians and philosophers trying to measure the Milky Way (i.e., the universe), while others were questioning whether the universe was actually much bigger than our galaxy.

Finally, 100 years ago: the first printing of our Star-Book. Amateur astronomers entered the gray space between science and hobby. Modest telescopes were becoming inexpensive enough for the wealthy and even the growing middle class to purchase. Kelvin McKready's, A Beginner's Star-Book, filled with general information, charts and descriptions lit up the imaginations of those would-be astronomers. A book that old has done well not to be completely obsolete. However, it needs an updating on one subject, nebulae. Beginning at the second to last paragraph on page 19 and continuing to page 21, McKready gives a description that was in keeping with many in astronomy at the time. I've copied it below for those who have not downloaded his book.

> *The nebula is sometimes found in connection with the star cluster, as in the Pleiades themselves, but it is often found apart, and it is not strictly star-like in composition. Even when associated with such a cluster as the Pleiades the nebulous matter may be very faint — beyond the reach of average telescopes — and yet the stars which it enfolds may be large and bright. To use an imperfect illustration afforded by other conditions, we may say that a nebula looks as though it might be a tiny, isolated patch of the Milky Way, but in its structure and composition it is gaseous. Sometimes this filmy mass is oval, some- times quite irregular, in form; sometimes it will seem to throw out wisps and streamers of effulgence, or, again, as shown in the illustration on p. 8, it will seem to us like the long and shelving undulations of a thin cataract of light, as it slips from star to star in its shining fall through space.*
>
> *Some of the most remarkable nebulae are spiral in form, and their luminous gases seem charged with star-like condensations, though no telescope — however great — has ever resolved these points of condensation into true stars. Some astronomers regard the nebulas as stars in process of formation, others regard them as stars in process of dis- integration. In certain cases the nebulas seem to be involved in a vast whirlpool motion, throwing off their streams of light and matter as a whirlpool in a flood seems to throw off its frothing waters from its centre. But so great is their distance from the nebulae, however, are not brilliant objects in small instruments. They are disappointing except to those fortunate enough to command facilities far beyond the range of the average purse. And yet it is of interest to get such glimpses of them as we may, even if we may not be able to command an impressive view of them. For even the highest optical aid can do little more than afford a suggestion of the facts. The longer diameter of the great nebula of Andromeda is more than 500,000 times the distance which divides our Sun from the Earth; p. 118; and light, speeding from end to end of this mass at more than 186,000 miles a second, must take eight years in which to complete the journey.*
>
> *--- "The Star-Book," pp 19-21*

But I digress. So, now to the focus of my column this month. The great debate of 1920. As is the case in most of my research, one short article leads well down a rabbit hole, usually. Two recent articles can be found at: https://www.sciencenews.org/article/space-exoplanet-century-astronomy-earth-universe and https://www.sciencenews.org/article/astronomy-great-debate-island-universe-milky-way. These are Science News articles can be viewed in their entirety online. They serve as good if not too brief overviews of the debate, its scientific and cultural context and outcome.

The debate featured two opposing ideas over the dimensions of our universe and the status of the "spiral" nebulae. Two pillars of American astronomy, Harlow Shapley of Mount Wilson and Heber D. Curtis of Lick Observatory, gave opposing views on the size and shape of

the cosmos at the meeting of the National Academy of Sciences in Washington, D.C., on April 26, 1920. For millennia, the standing position was that Earth was surrounded and close to the center of universe. However, there was also a growing collection of clues and evidence that pointed to the universe being much larger, and that the so called spiral and elliptical nebulae were island universes every bit as large as our own.

Could it be? Could the Milky Way be the disk of dust, gas, and stars like those dim nebulae seen in the photographs then being taken by the largest telescopes such as the great 40" refractor at Yerkes Observatory? There is a copy of such a nebulae photograph in the Star-Book on page 20 and reproduced here. We now know it as the Andromeda Galaxy. While no individual stars could be resolved, it could be imagined, looking from the inside out that the nebula could look much like the Milky Way. But was there enough data to support that theory? And if it were true, then how big was space and where was our place within it?

NEBULA OR ISLAND UNIVERSE?

THE GREAT NEBULA IN ANDROMEDA, MESSIER 31
From a photograph taken at the Yerkes Observatory

Source: 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 20.
Note: The most recent measure has the Andromeda galaxy approximately 2.5 million light-years from Earth and with a diameter of about 220,000 ly.

The big observatories were collecting ever more (local and distant) stellar data: star brightness in terms of apparent magnitude (how bright the star appears from Earth) and absolute magnitude (how bright the star appears at a standard distance of 32.6 light-years, or 10 parsecs), color and temperature of the stars, and positions relative to our solar system. Researchers used brand new instruments such as spectrographs to classify the stars, and measuring engines for photographs to determine distance and movement. Researchers and institutions were formulating far reaching theories generalizing local star types (near bright stars) and their attributes, and then extrapolating those traits to the faraway stars of globular clusters and nebulae. The debate was intended to sort the signal from the noise, so to speak. Which data were correct? Were the data collected by the two camps contradictory or could they all be amalgamated? Were the two trains of logic sound? Were the new technologies reliable? And as always, were the laws of physics being obeyed? OK, that last one is the question I always ask, but if you are intrigued at such a premise for a scientific debate, then at least read the *Science News* articles, and then if you want to know the rest of the story, turn to, "The 'Great Debate': What Really Happened" by Michael A. Hoskin, editor, *Journal for the History of Astronomy* for a blow-by-blow accounting. The article can be found at
https://apod.nasa.gov/htmltest/gifcity/cs_real.html

To close, I again go back to Galileo and say, if he had modern equipment… So, do go out when you get a chance and view Jupiter and its four Galilean moons and imagine what may have been. Until next time… you guessed it, get out and stare.

Our Next Meeting

The September 17 HAC meeting will be held LIVE and In-Person in the Community Room, Student Union Building, Cochise College Sierra Vista Campus.

Our speaker will be our own Ted Forte. Ted, a NASA Solar System Ambassador and co-organizer of the James Webb Space Telescope Community Event, will speak about the telescope and the events planned for October to celebrate Webb's impending launch.

NOTICE: The telescope clinic scheduled for September 11 is being reschedule for later in the year. Watch your email for details.

Mark Your Calendars

October 2: Dine Under the Stars. The 19th annual Dine Under the Stars fundraiser will be held on the UA Sierra Vista campus adjacent to the Patterson Observatory. The observatory will be open for public viewing during the event. This year's event is themed: "Reach for the Stars". Tickets are $50 adult, $15 children. Proceeds go to fund scholarships for students attending classes at UA Sierra Vista and Douglas campuses. Dine Under the Stars is the major fundraiser for the University South Foundation, owner of the Patterson Observatory. Please support the event if you can. **Tickets will be available for purchase at the September HAC meeting.** Purchasing a ticket not only supports scholarships but also supports HAC's representatives on the University South Foundation's board

of directors. They need your help to fulfill their ticket sales requirement.

The event features dinner including appetizers provided by Indochine Family Restaurant, an entree from Texas Roadhouse and dessert from Bobke's For Lunch. Wine and beer bar by La Casita Mexican Restaurant and Cantina. There will be live music by Desert Fever and a dance presentation from Alma Dolores Dance Studio and performances by Miss Sierra Vista and Miss Teen Sierra Vista. . Our Emcees this year are Sheriff Mark Dannels and Grady Butler of Cherry Creek Radio. There will be a live auction, a silent auction, a 50/50 raffle and door prizes.

You are also invited to support the event by the donation of auction items. Contact Ted Forte, Penny Brondum or Matt Lieber.

October 9 Kartchner Star Party. The fall star party at Kartchner Caverns State Park is planned for Saturday, October 9. We will set up for solar observing around noon, enjoy a talk by Ted Forte on the James Webb Space Telescope in the Discovery Center at 5:30 pm followed by an evening of telescope observing (weather permitting).

HAC members participating as telescope operators or presenters for the star party are entitled to free admission to the park – just explain your purpose to the guard at the gate. There will be a volunteer log to record your arrival and departure, (see Ted) please be sure to sign in and out so the park can capture our contribution.

JWST Community Event throughout October

A consortium consisting of the Patterson Observatory and the Henry F. Hauser Museum, along with the Huachuca Astronomy Club, the Sierra Vista Library and several other city facilities have been selected b to host a NASA-supported Community Event in celebration of the launch of the James Webb Space Telescope. More than 14 events are scheduled.

October 15, Sierra Vista's City Star Party. The city-wide Webb celebration kicks off with this public observing event at Veterans Memorial Park. HAC members are encouraged to set up telescopes at the park from 6 to 8 PM. We'll have a waxing gibbous moon and the bright planets Jupiter and Saturn to share with guests. We'll set up at the southeast corner of the park (our usual Earth Day location).

October 16, A Build Your Own Spacecraft activity will be conducted at the Sierra Vista Library, 10AM to 12PM for children ages 6-12. HAC members who would like to volunteer to help with the "Design, Build and Test" and/or the "Stomp Rocket" activities should contact Ted Forte.

October 22, HAC General Meeting in the community room will feature guest speaker Dr. George Rieke, the University of Arizona's team lead on the MIRI instrument for the James Webb Space Telescope. Dr. Rieke's talk is titled "Arizona's Huge Role in JWST – and JWST's Huge Role in Future Astronomy"

October 23, JWST Launch Party will be held at the Patterson Observatory from 9am to 4 pm (times subject to change) and will feature solar observing, activities, and JWST related programs including a virtual presentation by a NASA scientist associated with the Webb Telescope. There will be a display of NASA artifacts by HAC member Scott Schneeweis, Stacy Chitwood will lead a group activity to construct paper models of Webb. We plan to have a live JWST presentation in Spanish by Hector Swidzinski and an infrared camera demonstration by Charles Penny both from the University of Arizona.

October 27, Public Talk on JWST by Ted Forte at the Sierra Vista Library.

A full list of community events organized around the JWST can be found here: https://www.universitysouthfoundation.com/community-events. Contact Ted Forte if you would like to be involved.

The James Webb Space Telescope, a joint NASA/ESA/CSA mission, is scheduled to launch later this year from Europe's Spaceport in French Guiana atop an Arianne 5 rocket. It's a four-week journey to the second Lagrange point where it will be stationed. The second Lagrange point is located 932,056 miles away from Earth. Webb will be the largest, most powerful and complex space telescope ever built and launched into space. It will fundamentally alter our understanding of the universe.

NASA Night Sky Notes September 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!

Catch Andromeda Rising

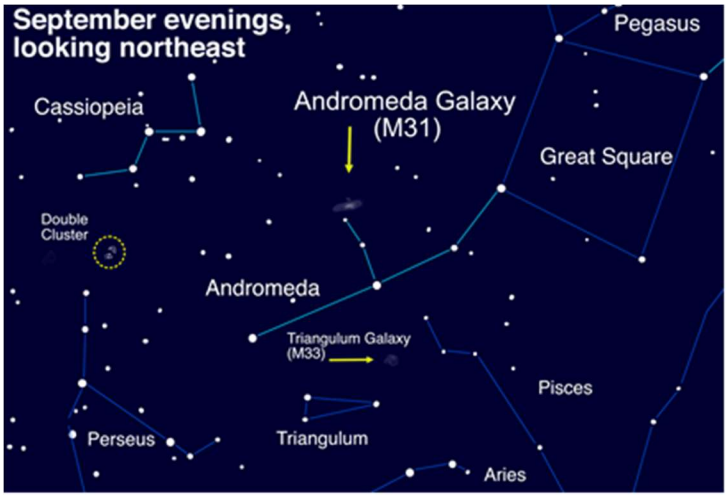
By David Prosper

If you're thinking of a galaxy, the image in your head is probably the Andromeda Galaxy! Studies of this massive neighboring galaxy, also called M31, have played an incredibly important role in shaping modern astronomy. As a bonus for stargazers, the Andromeda Galaxy is also a beautiful sight.

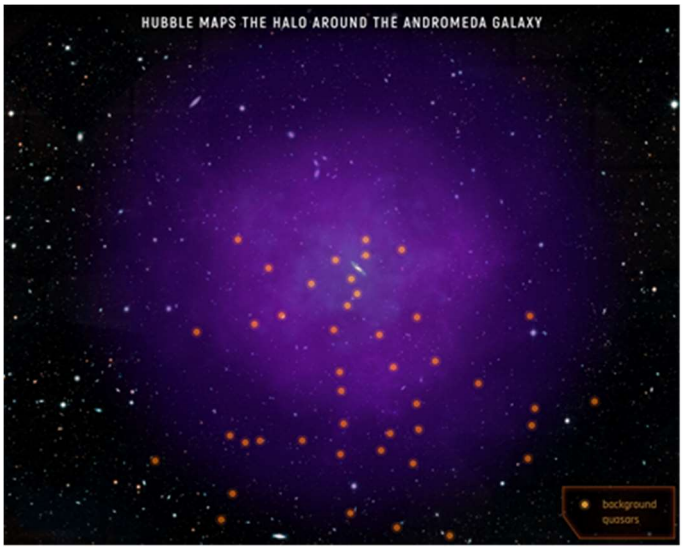
Have you heard that all the stars you see at night are part of our Milky Way galaxy? While that is mostly true, one star-like object located near the border between the constellations of Andromeda and Cassiopeia appears fuzzy to unaided eyes. That's because it's not a star, but the Andromeda Galaxy, its trillion stars appearing to our eyes as a 3.4 magnitude patch of haze. Why so dim? Distance! It's outside our galaxy, around 2.5 million light years distant - so far away that the light you see left M31's stars when our earliest ancestors figured out stone tools. Binoculars show more detail: M31's bright core stands out, along with a bit of its wispy, saucer-shaped disc. Telescopes bring out greater detail but often can't view the entire galaxy at once. Depending on the quality of your skies and your magnification, you may be able to make out individual globular clusters, structure, and at least two of its orbiting dwarf galaxies: M110 and M32. Light pollution and thin clouds, smoke, or haze will severely hamper observing fainter detail, as they will for any "faint fuzzy." Surprisingly, persistent stargazers can still spot M31's core from areas of moderate light pollution as long as skies are otherwise clear.

Modern astronomy was greatly shaped by studies of the Andromeda Galaxy. A hundred years ago, the idea that there were other galaxies beside our own was not widely accepted, and so M31 was called the "Andromeda Nebula." Increasingly detailed observations of M31 caused astronomers to question its place in our universe – was M31 its own "island universe," and not part of our Milky Way? Harlow Shapley and Heber Curtis engaged in the "Great Debate" of 1920 over its nature. Curtis argued forcefully from his observations of dimmer than expected nova, dust lanes, and other oddities that the "nebula" was in fact an entirely different galaxy from our own. A few years later, Edwin Hubble, building on Henrietta Leavitt's work on Cepheid variable stars as a "standard candle" for distance measurement, concluded that M31 was indeed another galaxy after he observed Cepheids in photos of Andromeda, and estimated M31's distance as far outside our galaxy's boundaries. And so, the Andromeda Nebula became known as the Andromeda Galaxy.

These discoveries inspire astronomers to this day, who continue to observe M31 and many other galaxies for hints about the nature of our universe. One of the Hubble Space Telescope's longest-running observing campaigns was a study of M31: the Panchromatic Hubble Andromeda Treasury (PHAT): bit.ly/m31phat . Dig into NASA's latest discoveries about the Andromeda Galaxy, and the cosmos at large, at nasa.gov.



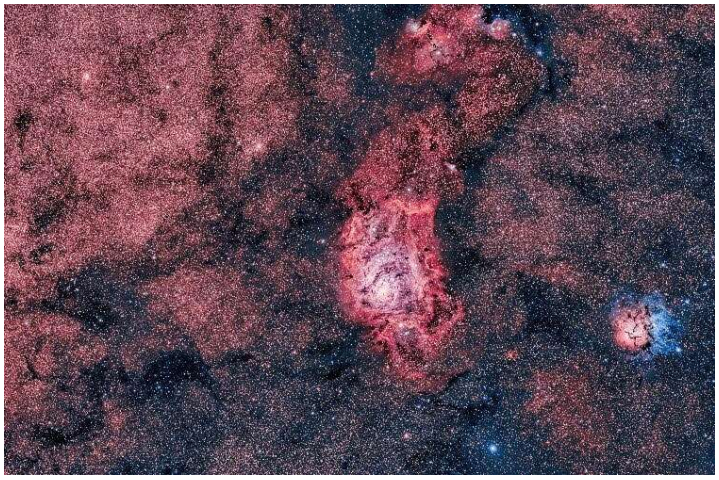
Spot the Andromeda Galaxy! M31's more common name comes from its parent constellation, which becomes prominent as autumn arrives in the Northern Hemisphere. Surprising amounts of detail can be observed with unaided eyes from dark sky sites. Hints of it can even be made out from light polluted areas. Image created with assistance from Stellarium



While M31's disc appears larger than you might expect (about 3 Moon widths wide), its "galactic halo" is much, much larger – as you can see here. In fact, it is suspected that its halo is so huge that it may already mingle with our Milky Way's own halo, which makes sense since our galaxies are expected to merge sometime in the next few billion years! The dots are quasars, objects located behind the halo, which are the very energetic cores of distant galaxies powered by black holes at their center. The Hubble team studied the composition of M31's halo by measuring how the quasars' light was absorbed by the halo's material. Credits: NASA, ESA, and E. Wheatley (STScI) Source: https://bit.ly/m31halo

Pictures by HAC Members

M8 (Lagoon Nebula) and M20 (Trifid Nebula)
by Alex Woronow



Sun September 6. 2021 by Vince Sempronio

NGC 908 by Alex Woronow

Star Party Logic Puzzle

From Vince Sempronio

Five astronomy club members use five different telescopes at a star party, each telescope having a different color and size, and are pointed at a different object. The observers each use a different star atlas. After reading the following clues, can you decide:

Who is viewing M13 in Hercules and who owns the 3” refractor?

1. Jack’s telescope is blue.
2. Jim owns a 4” refracting telescope.
3. The double star Albereo, in Cygnus is being observed through the black telescope.
4. Ann is observing Epsilon Bootes, a double star.
5. The black telescope is to the right of the green one.
6. The telescope of the observer with the Atlas Coeli is an 8” Celestron.
7. Norton’s Star Atlas is used by the observer with the white telescope.
8. The Ring Nebula is visible in the middle telescope.
9. Bill is the observer on the left, next to the observer with the gray telescope.
10. The observer with the Bonner Durdmisterberg (BD) Atlas is next to the observer with the 10” Dobsonian telescope.
11. While viewing the double star Alpha Hercules, the observer is using the Atlas Eclipicalis for reference.
12. The white telescope is next to the 6” reflector.
13. Suzy is using the Beyer-Graff star atlas.

Categories		Order					Atlas					Object					Scope Size					Scope Color				
Observer Order Scope Color Scope Size Atlas Order		First (left)	Second	Third (middle)	Fourth	Fifth (right)	Coeli	Nortons	Beyer-Graff	BD	Eclipicalis	Albereo	Epsilon Bootes	Ring Nebula	Alpha Hercules	M13	3”	4”	6”	8”	10”	Blue	Black	Green	White	Gray
Observer	Jack																									
	Jim																									
	Ann																									
	Bill																									
	Suzy																									
Scope Color	Blue																									
	Black																									
	Green																									
	White																									
	Gray																									
Scope Size	3”																									
	4”																									
	6”																									
	8”																									
	10”																									
Object	Albereo																									
	Epsilon Bootes																									
	Ring Nebula																									
	Alpha Hercules																									
	M13																									
Atlas	Coeli																									
	Norton’s																									
	Beyer-Graff																									
	BD																									
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For those who are not familiar with how to solve these puzzles visit this youtube channel or search for "How to solve logic puzzles".

https://youtu.be/z2vY7Wu7w8c

FOR SALE

I own a Celestron NexStar 8 SE Schmidt-Cassegrain Computerized Telescope. A Celestron Power Tank. Eye pieces, and various other accessories. They are in excellent shape and am trying to sell the items. If anyone in your astronomy club is interested in purchasing please contact me at the email address below. I will provide photos to anyone interested. Contact Craig Riley Email: criley1974@yahoo.com

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

Celestron 6SE. (Schmidt Cassegrain) Includes two scope buggies for it. Also includes an equatorial tripod for the 2nd buggy. See pictures below
Contact JD Maddy at 602-672-2032 Will deliver

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Farpoint Astronomy http://www.farpointastro.com/
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HAC September/October 2021 Calendar of Events

SU	MO	TU	WE	TH	FR	SA
5 Sep Spica/Venus 2° separation	**6** **5:52 PM** Labor Day	**7**	**8**	**9** **Patterson Public Night 7 PM**	**10**	**11** 
12	**13** **1:41 PM** Mercury eastern elong	**14** **Neptune Opposition**	**15** Kid's World Bella Vista Elementary 1pm	**16**	**17** **HAC Meeting Student Union (In -Person) 7PM**	**18**
19	**20** **4:54 PM** Spica /Merc 1° apart	**21**	**22** Autumnal equinox 12:21 PM	**23**	**24**	**25**
26	**27**	**28** **6:58PM**	**29**	**30**	**1 Oct**	**2** Dine Under the Stars 6-9PM Patterson Obs.
3	**4**	**5**	**6** **4:05AM**	**7** Draconid Meteors	**8** Draconid Meteors	**9** Kartchner Star Party noon-9PM
10	**11** Columbus Day	**12** **8:27PM**	**13**	**14** **Patterson Public Night 6:30PM**	**15** City Star Party Vet Park 6-8PM	**16** Stomp Rocket SV Library 10AM
17	**18**	**19**	**20** **7:57AM** Orionid Meteors	**21** Orionid Meteors	**22** **HAC Meeting Student Union (In -Person) 7PM**	**23** **JWST Launch Party 9AM-4PM**
24 Mercury west elongation 18 degrees	**25**	**26**	**27**	**28** **1:06PM** JWST Talk SV Library 6PM	**29**	Huachuca Astronomy Club of Southeastern Arizona

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