



PAStimes

Phoenix Astronomical Society

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PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

James Lynch to Speak at October 7th Meeting

By James Lynch

Dr. James Lynch obtained his B.S. in Physics from the Stevens Institute of Technology in 1972 and his Ph.D. in Physics from the University of Texas at Austin in 1978. He currently holds the position of Senior Scientist Emeritus at the Woods Hole Oceanographic Institution. Dr. Lynch is a Fellow of the Acoustical Society of America (ASA), a Fellow of the IEEE, former Editor-in-Chief of the IEEE Journal of Oceanic Engineering, and current Editor-in-Chief of the Journal of the Acoustical Society of America. He is recipient of the Walter Munk Award (2009), the Oceanic Engineering Society Emeritus Award (2019), and the ASA Gold Medal (2021). His primary hobby is amateur astronomy, and he is currently president of the Cape Cod Astronomical Society. He also is an amateur musician and a "raider" at WoW.

How did I get into astronomy? It was a toy telescope at age seven, an addiction to science fiction (with Fred Hoyle being my favorite), and access to the Hayden Planetarium were all factors. I actually started grad school in Astronomy, but after a splen-

did row with the graduate advisor, I defected to Physics. (But I still took three astronomy related courses.) My professional career veered from nuclear and particle physics to oceanography (another story), but when I retired, the CCAS gave me a chance to indulge my old hobby (which I never fully left) more vigorously. Covid has screwed that up slightly, but we're all hoping to get past that obstacle, PAS as well as CCAS.

"What are space and time?"

We now know a great deal about space and time - or so we think. We can measure spatial and temporal intervals to a fare-thee-well, and we know how space and time relate to each other, thanks to Einstein. But, at a deeper level, what are they?! Just calling them (x,y,z,t) and then manipulating those symbols without knowing where they come from is not very satisfying!

In this talk I will go from our simplest conceptions of space and time and their measurements to some of the modern hypotheses based on entropy, entanglement, and other recent developments. I will also try to point out some interesting literature,

both book and web-based.

Disclaimer: This goes into deep waters, and some far above my personal pay grade as a theorist. And also, if you're looking for a definitive answer, you'll have to be content with "we're not there yet!"



October 7th Guest Speaker: James Lynch. Photo provided by James.

Oct 7th PAS Meeting

By Terri Finch, Assistant Editor

Everyone is invited to this exciting presentation by Dr. James Lynch on October 7, 2021. This meeting will be conducted virtually as Dr. Lynch is not in the Phoenix

area during this time. Please help PAS in welcoming Dr. Lynch to the meeting! Bring your family and friends!

Here's the Link to the Zoom Meeting:
[https://us02web.zoom.us/j/85959427202?p](https://us02web.zoom.us/j/85959427202?pwd=WERHV2pMRUNSZldNbWFFMW9qUDhrdz09)

[wd=WERHV2pMRUNSZldNbWFFMW9qUDhrdz09](https://us02web.zoom.us/j/85959427202?pwd=WERHV2pMRUNSZldNbWFFMW9qUDhrdz09) The Zoom Doors open at 7pm and the Guest Speaker begins at 7:30pm after a brief introduction by Stu Brackney, PAS President. Please attend and enjoy!

Review of Sept 2nd PAS Meeting

By Terri Finch, Assistant Editor

The Editors of the PAStimes Newsletter would like to apologize. Normally, the review of the previous month's PAS Meeting with Guest Speaker would be one of the articles included in this issue. However,

due to newsletter staff time constraints, this issue was collected, organized and ready for proofing ON Sept 2nd around 11am, and thus, the Sept 2nd PAS Meeting that happened the evening of Sept 2nd did not

get reviewed and was not included in this issue. Please look for the review of Anna Engle's Sept 2nd presentation in the November 2021 issue of PAStimes. And thank you for your understanding.

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Past PAS Recorded Presentations

By Terri Finch, Event Manager

Did you miss a PAS Meeting and wish you could see it? You can get to the link of Past Recorded PAS Meetings with Guest Speakers any time by going to the left hand navigation tool on the PASaz.org website and clicking on "PAS Monthly Meetings." From there a drop down item will appear

and please click on "Videos of Speaker Presentations." You will then find recordings of Past PAS Meetings for your viewing pleasure. The collection is in oldest to newest order. Please work your way to the bottom of the collection to find the most recently recorded PAS Guest Speaker Presentation.

As long as PAS can record the PAS Meetings, PAS will continue to add more recordings to this page. Here is the direct link to the recorded PAS Meetings collection: <https://www.pasaz.org/pas-monthly-meetings/videos-of-speaker-presentations>. Enjoy!

Fall 2021 PAS GUEST SPEAKERS

By Terri Finch, Event Manager

Events@pasaz.org

Due to the Covid-19 pandemic, PAS Meetings are being held via Zoom over the internet. The Zoom link has been added to the calendar listing for that night's meeting and in the Newsletter in the article about the next PAS Meeting. Please visit the PAS calendar at PASaz.org to find out more about these upcoming Meetings and Guest Speakers. If a Meeting will happen

In-Person, the Calendar Listing will give you that info. For a complete list of Guest Speakers, visit: <https://docs.google.com/document/d/1OO-UpaYNvw3p7JCRXCKSjDcbsK60DnvWOoifbqPrNp8/edit?usp=sharing>

Do you have an idea for a guest speaker? Email Paul Facuna VicePresident@pasaz.org the details and contact info for that possible Guest Speaker.

Here are the next scheduled guest speakers at PAS:

V = Virtual Meeting through Zoom

P = In Person at PVCC Main Campus

Nov 4: Klaus Bransch "The Search for Life in the Universe"

Dec 2: David Williams, "Exploring Strange New Worlds"

Jan 20, 2022: TBA

What's Up For October?

By Don K. Boyd, PAStimes Editor

Name	Date	Rise	Set
Mercury	10-15-21	05:40	17:21
Venus	10-15-212	10:26	20:08
Mars	10-15-21	06:23	17:48
Jupiter	10-15-21	15:08	01:54
Saturn	10-15-21	14:19	12:40
Uranus	10-15-21	18:49	08:21
Neptune	10-15-21	16:28	04:11
Pluto	10-15-21	13:39	23:34

All Times Arizona Time

Bold means the object is "visible" in the evening

PAS is incorporated in the state of Arizona as a non-profit, scientific and educational 501(c)(3) organization. Our newsletter PAStimes is published monthly from September to May and distributed via the Internet. All Issues are available for download on our website www.pasaz.org. Ads for astronomy equipment are provided as a courtesy to sellers and buyers, and do not constitute any endorsement by PAS. All Photos by Don Boyd unless otherwise credited. All articles and photos are copyright their authors or PAStimes.

October 15, 2021

Sunrise: 06:33

Sunset: 17:54

New: October 6



Q1: October 12



Full: October 20



Q3: October 28



EAA at Pinnacle Peak Park Apr 3

By Mark Johnston, PAS Member
I did an EAA public outreach event for the City of Scottsdale at Pinnacle Peak Park

April 3 and had 23 guests. I showed M42, the Rosette, the Horsehead, M45, M1, M101, M51, M81/82, Leo triplert and Rigel

as a double star. Everyone was Covid-safe and it was a great event.

EAA at Pinnacle Peak Park May 7

By Mark Johnston
I did an EAA event for the City of Scottsdale at Pinnacle Peak Park. We had

27 eager guests and I showed M37, Castor, Mizar, M65/66, M81/82, Markarian's Chain of galaxies, M51, M101, the Stargate

Cluster, and Quasar 3C273.

Place your Astronomy Equipment Ad in this Newsletter

Do you have some astronomy related items you'd like to sell? Prepare an ad and send it my way so that Don and I can help you sell it through the club newsletter. PAS Members get this service for free. Items you may wish to sell: Books, Star Charts, Telescopes, Eyepieces, Finder Scopes, and more. As long as it is astronomy related, I will happily add it to the newsletter. Please include all items you wish to sell, and what is included with those items. Price them, and provide the contact info for the way you wish to be notified, such as email or phone number. I await your submissions to

Starstuff@gmail.com. Items for Sale listed in PAStimes Newsletter are written by the seller of the equipment being sold. PAS is not responsible for the ads and asks that anyone making a purchase from these ads, do your research and purchase at your own risk. PAS does not guarantee the quality of the items for sale.

Ads in PAStimes run for 1 month and may be renewed on a month-by-month basis, if the request to run the ad again is submitted by deadline (10th of month), space permitting, and renewed each month by 10th of month. Ads in PAStimes are

FREE for members. All others are asked to make a small donation to PAS. Donations are to be sent to Terri, the Assistant Editor, who will prepare your article for inclusion in the next month's issue. Non-PAS Members: to place an ad and get details on where to send the donation via a check or money order and made out to Phoenix Astronomical Society, please Email Terri, Assistant Editor at Starstuff@gmail.com. The deadline for the November issue will be Oct 10th. These items can also be seen on the PASaz.org website here: <https://www.pasaz.org/items-for-sale>

For Sale: Meade RCX-400 14 inch telescope. Condition is like new. Prices listed are the originally purchase price – Asking price is at end of this Ad:

1. Enhanced diagonal 2 inch Series 5000 (\$180)
2. Meade 24mm wide angle eyepiece (\$225.00)

3. Meade Model 1220 Field De-Rotator (\$600)

4. SBIG ST-7XME CCD Dual Sensor USB Camera with case (\$2000)

5. Meade manual and other pertinent manuals/software.

Equipment can be seen and picked up

from a location in North Scottsdale, Arizona. Prefer not to ship. Local pickup please.

I will be glad to answer any questions. Asking price is \$6,000.00 plus any shipping/packing costs if required / but not preferred. Contact: Richard rjkarizona@cox.net

For Sale: A lot of Astronomy Equipment.

- * Asking \$1800.00 Takahaski scope
- * \$250.00 Takahaski Finder Scope #552
- * \$400.00 Takahaski Extender-Q 1.6x
- * \$120.00 Takahaski Tube holders of which there are two and a small one
- A Starlight 2" Feather Touch Focuser \$344.00
- B Celestron #94175 Reducer \$110.00
- C TeleVue 2" Mirror Diagonal DPC-2002 \$120.00
- D Meade #918A Diagonal Prism \$25.00

E Meade Series 4000 8-24mm Zoom Eyepiece \$66.00

F Meade #918A Diagonal Prism \$24.00

G Meade Ultra-Wide angle 8.8 \$40.00

H Celestron # 93506 1 1/4 Japan \$60.00

I Meade #8x50 Finder scope #544 Blue Japan \$34.00

J Mack 111 Hyperion Zoom 8-24mm \$266.00

K Orion 9x50 Right-Angle Image finder \$54.00

L ScopeTronix MaxView 40mm Eyepiece \$34.00

M Orion Black Right-Angle Correct Image \$30.00

N Vixen LV 15mm Lanthanum Eyepiece 08626 \$36.00

* Celestron Mount with Pelican Case. Also has a Pier made of 1/4" heavy case pipe. The plate is 1/2 inch. Asking \$1800.00 for all three.

Contact Marge at lovins50@aol.com to set up a visit to see the items you are interested in. Pick up location will be near McDonald Drive & Granite Reef Rd in Scottsdale.

See ad with photos at this link: <https://www.dropbox.com/sh/wwyyi1pfbk11jn9/AABMs0xs-cvpcagtEhqNnVSa?dl=0>

Astrophotography of Apr 9

By Mark Johnston, PAS Member

I went out to the Antennas site and had a great night imaging. Will take some time to process the 9 targets but here's my first ever attempt at Centaurus A, a very large elliptical galaxy with a prominent dust lane in Centaurus. This guy (Centaurus A) barely scrapes above the horizon for us in Arizona for about 5 weeks every spring, so I really wanted to bag it.

The weather was perfect, no clouds, low of 61F and SQM readings got down to 21.72 (Bortle 1).

I used my TEC140 refractor with a ZWO 183MC Pro camera. About 40 60-second exposures stacked in DSS and finished in Affinity Photo and Photoshop Elements. If you weren't out there with me, you missed a fabulous night for observing and astrophotography!

Here are 4 photos from my astrophotography session of Apr 9th:

* Comet R4/ATLAS in Aquila. TEC 140ED with ZWO183MC, 10 60 second exposures.

* Markarian's Chain. Same setup plus Apex focal reducer, 29 120 second exposures. Plus an annotated version showing >80 galaxies in the same field.

* The Stargate Cluster in Corvus. 10 30 second exposures. This is a popular star party target.

I'm not ready to spend all night on one target yet, so I tried to limit my time to an hour per target, give or take.

Very excited to bag Omega Centauri, this is my first photo of it and it was between 8 and 9 degrees above the horizon, so I had to look through a lot of murk (astron-

omer technical term). But despite that I was able to resolve stars to the core, nicely. Use my TEC140ED with 2600MC Pro and apex-L focal reducer. Did 40 guided 60 second exposures. Darks, no flats. Stacked in DSS, finished in Affinity Photo.

* M1 the Crab nebula. Wanted to get this from a dark site before it disappeared in the west. I used my TEC140ED with 183MC Pro. 34x120 second exposures, guided. Darks and flats applied. Stacked in DSS, finished in Affinity Photo.

* The Whale and Hockey stick galaxies. I screwed up here and inadvertently turned off 'save exposures' so all I had to work with was the Sharp-cap PNG file at the end. Could not stack in DSS. However, my first attempt on this target was not too bad. Used my TEC140ED with apexL, 26 x 120sec guided. Processed in Affinity.

* M20 is tricky with the emission + reflection nebula,

the latter of which demands dark skies, so I was keen to try this before dawn. Again I used my TEC/Apex and 183 camera, 82 x 30 second guided exposures, stacked in DSS, finished in Affinity Photo.

* Last but not least, I wanted to get M83, the southern pinwheel, from a dark



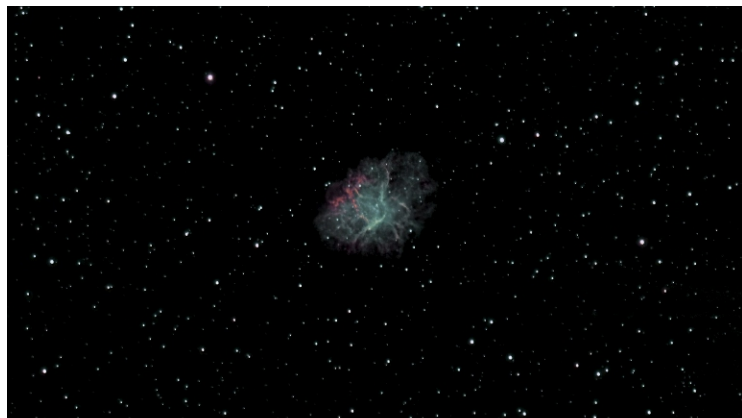
Centaurus A: Centaurus A is a galaxy in the constellation of Centaurus. It was discovered in 1826 by Scottish astronomer James Dunlop from his home in Parramatta, in New South Wales, Australia. Distance to Earth: 13.05 million light years, Size: 60,000 ly. There are 15 stars known to have planets in this galaxy.



Comet Atlas taken early morning of Apr 10th. It's just now making a fine appearance in the predawn sky in Aquila.



NGC 4631 (top left) and NGC 4656 (bottom right) are known as the Whale Galaxy and Hockey Stick Galaxy, respectively. The Whale is distorted due to its interaction with NGC 4627 just to its left. The Whale shows classic galaxy colours, with a yellow core, blue star clusters and pink nebulae. The Whale Galaxy is 25 million light-years away towards the small northern constellation Canes Venatici.



M1 - The Crab Nebula is a supernova remnant and pulsar wind nebula in the constellation of Taurus. The common name comes from William Parsons, 3rd Earl of Rosse, who observed the object in 1840 using a 36-inch telescope and produced a drawing that looked somewhat like a crab.

site. For this image, I used my TEC with Apex and 183MC Pro, 53 x 60 second

guided exposures stacked in DSS, finished in Affinity Photo.

This was my first astrophotography session doing AP where I was guiding.



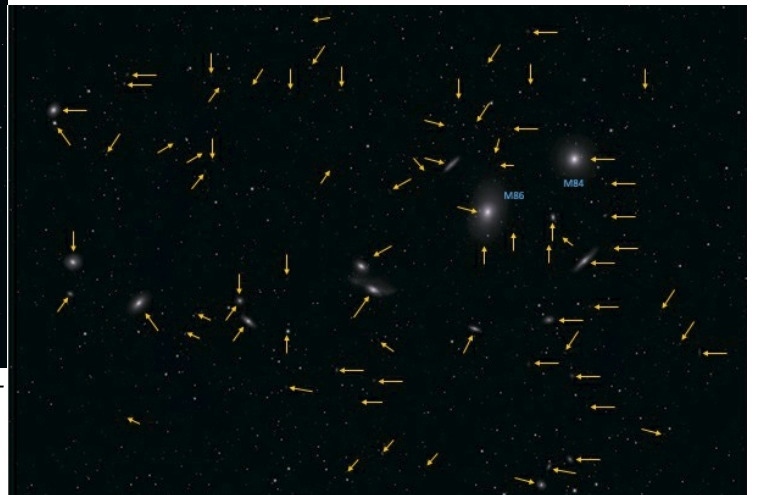
The Trifid Nebula is an H II region in the north-west of Sagittarius in a star-forming region in a nearby spiral arm's Scutum-centered part. It was discovered by Charles Messier on June 5, 1764. Its name means 'three-lobes'. It is 5,200 light years from Earth.



Messier 83 or M83, also known as the Southern Pinwheel Galaxy and NGC 5236, is a barred spiral galaxy approximately 15 million light-years away in the constellation borders of Hydra and Centaurus. Nicolas Louis de Lacaille discovered M83 on February 23, 1752, at the Cape of Good Hope. The Radius of this Galaxy is 27,750 light years.



Markarian's Chain is a stretch of galaxies that forms part of the Virgo Cluster. When viewed from Earth, the galaxies lie along a smoothly curved line. The bright galaxy members of the chain are visible through small telescopes. Larger telescopes can be used to view the fainter galaxies. At least seven galaxies in the chain appear to move coherently, although others appear to be superposed by chance. Six of the points on the chain can be marked by galaxies. The other two points are pairs of galaxies. The Virgo Cluster contains over 2,000 galaxies, and has a noticeable gravitational pull on the galaxies of the Local Group of Galaxies surrounding our Milky Way Galaxy. The center of the Virgo Cluster is located about 70 million light-years away toward the constellation of Virgo.



Markarian's Chain annotated



The Star Gate Cluster is a wonderful object to share with the public. Easy to see, even inside Phoenix. The Stargate Asterism or Stargate Cluster is an asterism in the constellation Corvus consisting of 6 stars, also known as STF 1659. The stars form vertices of two nested triangles, resembling a portal device featured in the Buck Rogers science fiction TV series. Some observers think it looks like a Klingon Battle cruiser.



Omega Centauri is a globular cluster in the constellation of Centaurus that was first identified as a non-stellar object by Edmond Halley in 1677. Located at a distance of 17,090 light-years, it is the largest known globular cluster in the Milky Way at a diameter of roughly 150 light-years.



Corner the Great Square of Pegasus

By David Prosper

The Summer Triangle may be the most famous seasonal star pattern, but during early August evenings another geometrically-themed asterism rises: the Great Square of Pegasus. This asterism's name is a bit misleading: while three of its stars - Scheat, Markab, and Algenib - are indeed found in the constellation of the winged horse Pegasus, its fourth star, Alpheratz, is the brightest star in the constellation Andromeda!

August evenings through to the end of November are an excellent time to look for the Great Square, as it will be rising in the east after sunset. If not obvious at first, wait for this star pattern to rise a bit above the murky air, and remember that depending on your point of view, it may appear more like a diamond than a square. Look for it below the Summer Triangle, or to the southeast of nearby Cassiopeia at this time. As the Great Square rises in prominence during autumn evenings, it becomes a handy guidepost to finding more constellations, including some of the dimmer members of the Zodiac: Aries, Pisces, Aquarius, and Capricornus. Like the Summer Triangle, the Great Square of Pegasus is also huge, but Pegasus itself is even larger; out of the 88 constellations, Pegasus is 7th in size, and feels larger as the stars in its neighboring constellations are much dimmer.

There are many notable deep-sky objects found within the stars of Pegasus - ranging from easily spotted to expert level targets - making it a great constellation to revisit as your observing skills improve. Notable objects include the densely-packed stars of globular cluster M15, a great first target. The potential "Milky Way look-

alike" galaxy NGC 7331 is a fun target for more advanced observers, and expert observers can hop nearby to try to tease out the much dimmer interacting galaxies of Stephan's Quintet. A fascinating (but extremely difficult to observe) object is a gravitationally-lensed quasar famously known as the Einstein Cross. Pegasus has quite a storied history in the field of exoplanet research: 51 Pegasi was the first Sun-like star discovered to be host to a planet outside our solar system, now officially named Dimidium.

While observing Pegasus and its surroundings, keep your eyes relaxed and ready to catch some Perseids, too! August

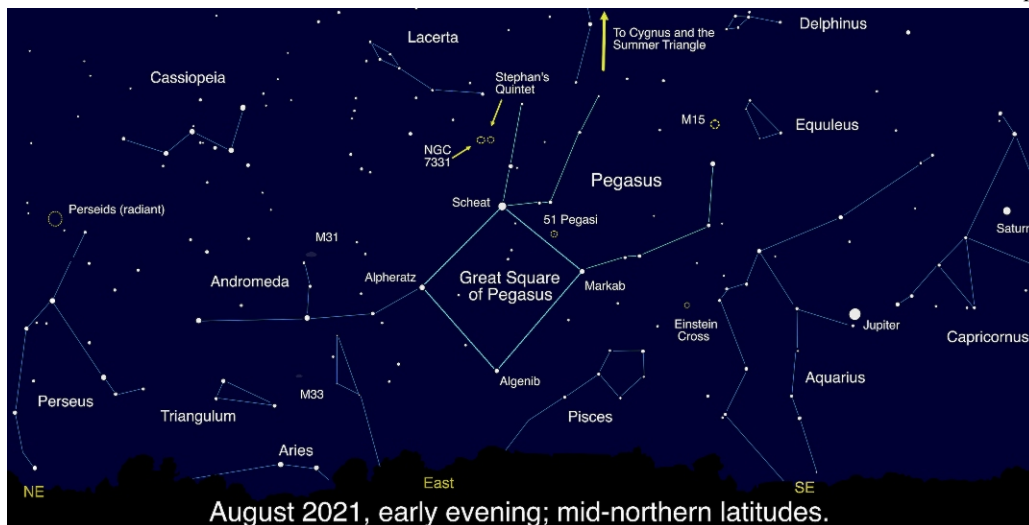
2021 promises an excellent showing of this annual meteor shower. The crescent Moon sets early on the evening of the shower's peak on August 11-12, but you can spot stray Perseids most of the month. If you trace the path of these meteors, you'll find they originate from one point in Perseus - their radiant. Giant planets Jupiter and Saturn will be up all evening as well. Look south - they easily stand out as the brightest objects in the faint constellations Aquarius and Capricornus.

Pegasus truly holds some fantastic astronomical treasures! Continue your exploration of the stars of Pegasus and beyond with NASA at nasa.gov.



Stephan's Quintet is one of the most famous deep-sky objects in Pegasus. First discovered in 1877, it contains the first galaxy group discovered (which includes 4 of the 5 galaxies making up the Quintet) - and has been studied extensively ever since. One day this group will merge into one supergalaxy! While famous, these galaxies are hard to spot in all but the largest backyard telescopes - but are a favorite target of astrophotographers. Take a virtual flyby of these galaxies with a tour created from Hubble data at: bit.ly/quintetflyby

Credit: NASA, ESA, and G. Bacon, J. DePasquale, F. Summers, and Z. Levay (STScI)



August 2021, early evening; mid-northern latitudes.

While the stars of the Great Square of Pegasus are not as bright as those of the Summer Triangle, they still stand out compared to their neighbors, and make a great foundation for exploring this area of the night sky. Note that the brightness of the stars near the horizon is exaggerated in this picture.



Observe the Milky Way and Great Rift

By David Prosper

Summer skies bring glorious views of our own Milky Way galaxy to observers blessed with dark skies. The Milky Way can also be seen in the first half of Fall from Phoenix. For many city dwellers, their first sight of the Milky Way comes during trips to rural areas - so if you are traveling away from city lights, do yourself a favor and look up!

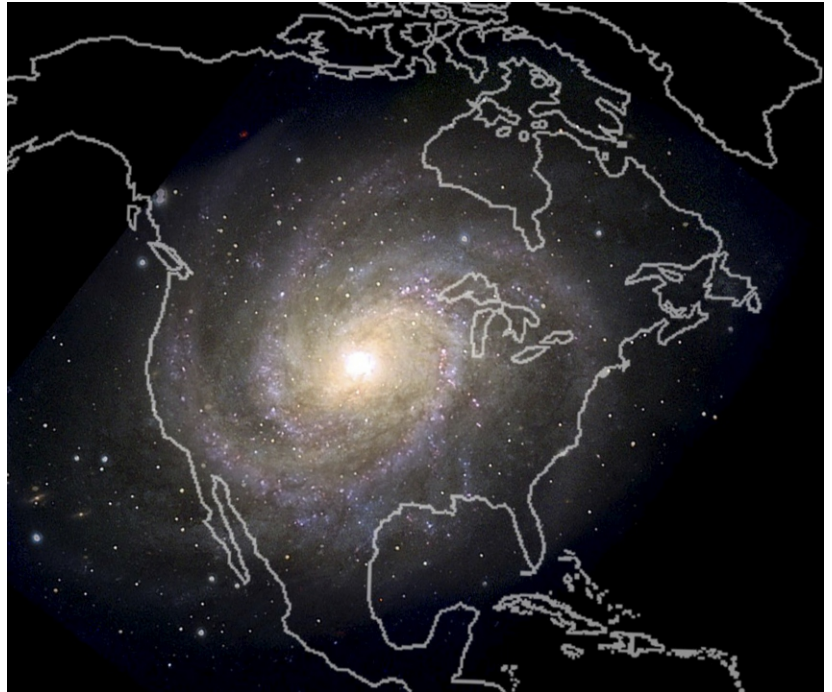
To observe the Milky Way, you need clear, dark skies, and enough time to adapt your eyes to the dark. Photos of the Milky Way are breathtaking, but they usually show far more detail and color than the human eye can see – that’s the beauty and quietly deceptive nature of long exposure photography. For Northern Hemisphere observers, the most prominent portion of the Milky Way rises in the southeast as marked by the constellations Scorpius and Sagittarius. Take note that, even in dark skies, the Milky Way isn’t easily visible until it rises a bit above the horizon and the thick, turbulent air which obscures the view. The Milky Way is huge, but is also rather faint, and our eyes need time to truly adjust to the dark and see it in any detail. Try not to check your phone while you wait, as its light will reset your night vision. It’s best to attempt to view the Milky Way when the Moon is at a new or crescent phase; you don’t want the Moon’s brilliant light washing out any potential views, especially since a full Moon is up all night.

Keeping your eyes dark adapted is especially important if you want to not only see the haze of the Milky Way, but also the dark lane cutting into that haze, stretching from the Summer Triangle to Sagittarius. This dark detail is known as the Great Rift, and is seen more readily in very dark skies, especially dark, dry skies found in high desert regions. What exactly is the Great Rift? You are looking at massive clouds of galactic dust lying between Earth and the interior of the Milky Way. Other “dark nebulae” of cosmic clouds pepper the

Milky Way, including the famed Coalsack, found in the Southern Hemisphere constellation of Crux. Many cultures celebrate these dark clouds in their traditional stories along with the constellations and Milky Way.

Where exactly is our solar system within the Milky Way? Is there a way to get a sense of scale? The “Our Place in Our Galaxy” activity can help you do just that, with only birdseed, a coin, and your imagination: bit.ly/galaxyplace. You

can also discover the amazing science NASA is doing to understand our galaxy – and our place in it - at nasa.gov.



If the Milky Way was shrunk down to the size of North America, our entire Solar System would be about the size of a quarter. At that scale, the North Star, Polaris - which is about 433 light years distant from us - would be 11 miles away! Find more ways to visualize these immense sizes with the Our Place in Our Galaxy activity: bit.ly/galaxyplace



The Great Rift is shown in more detail in this photo of a portion of the Milky Way along with the bright stars of the Summer Triangle. You can see why it is also called the “Dark Rift.” Credit: NASA / A.Fujii