



**SEPTEMBER 2020**

**Volume XX Number 9**

***OBSERVE - LEARN - SHARE***

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Upcoming Events	
Sept 12	NHAC Star Party @ O'Brien Dark Site (No BBQ)
Sept 14	NHAC Executive Board Meeting (Zoom)
Sept 24	Novice Meeting (Zoom)
Sept 25	General Meeting (Zoom)
Oct 17	NHAC Star Party @ O'Brien Dark Site
Oct 22	Novice Meeting (Zoom)
Oct 23	General Meeting (Zoom)

# MONTHLY MEETINGS

The Novice and General Meetings have gone virtual. The Novice Meeting will be via Zoom on Thursday, September 24 at 7 P.M., and the General Meeting will be on Friday, September 25 at 7 P.M.

Speakers and topics will be emailed to Club members and also posted on the [NHAC Website](#) .

# CLUB NEWS

## Pandemic Update

NHAC meetings have gone virtual, using the Zoom application. Check your NHAC emails and the [NHAC Website](#) for information about speakers and topics.

## NHAC Outreach

See the calendar at the [NHAC Website](#) for dates and information about planned outreach events. These are outdoor events and are weather dependent.

Cliff Herseim and Aaron Clevenson will provide NHAC coordination. Any changes or cancellations will be announced by emails and will be posted on the NHAC website event calendar.

The latest issue of "What's Up, Doc" by Aaron Clevenson is at [What's Up, Doc?](#)

## Astronomical League

The North Houston Astronomy Club has been an affiliate of the Astronomical League since the Club's inception in 1999. NHAC members are automatically enrolled in the League and can participate in the League's observing programs according to their time and interests. Currently there are 72 observing programs, with more being added all the time.

Aaron Clevenson serves as the NHAC Astronomical League Coordinator. He may be contacted at [alcor@astronomyclub.org](mailto:alcor@astronomyclub.org).

We welcome news, photos, comments and contributions for the newsletter. Please send them to [newsletter@astronomyclub.org](mailto:newsletter@astronomyclub.org) by the 10th of each month.

# GALLERY

Image by Loyd Overcash

My first image of Jupiter this year. Taken early morning of August 5, 2020 from Spring with the Celestron HD-1100 scope and the ZWO ASI290MC camera. Stacked best 25% of 13,300 frames taken.

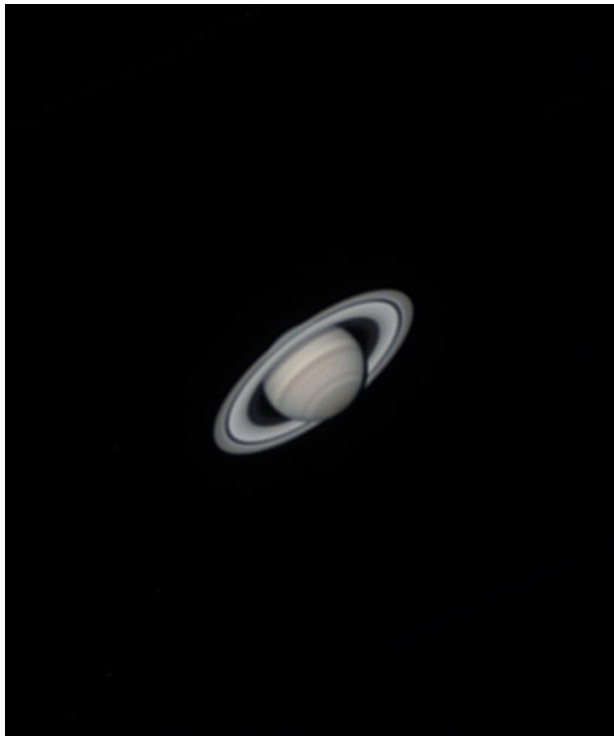


Image by Kurt Johnston

Date: Aug. 14, 2020

Location: Backyard, Magnolia, Texas

Frames: 500

Focal length: 5600

Imaging telescope: TMB APO 175/1400

Imaging camera: ZWO ASI224MC

Seeing: 3

Transparency: 4

# COSMOLOGY - 3

**By William W. Leach, Lone Star College Professor of Physics, NHAC Founder**

The study of cosmology reminds me of a book I once read by Herman Hesse entitled “Steppenwolf” where the main character, Harry Haller, encounters a sign in a dark alley on a wall that states “for madmen only.” In the study of the Big Bang theory, there is an idea that you will encounter called the “cosmological principle”. It’s usually stated and then forgotten. But, lucky you, today we are going to delve into its deep dark recesses.

The cosmological principle, one of the foundation pillars of the big bang theory, states that the universe is isotropic and homogeneous. These two simple ideas hold the key to our scientific understanding of how the universe evolves. By definition, a point in space is isotropic if an observer at that point sees the same thing no matter what direction they are looking. There are no preferred directions from that point in the universe. By definition, a region of space is homogeneous if an observer located in one part of that space sees the same thing as another observer in any other part of that space. There are no preferred locations in space. The distinction is that isotropy is defined for a point and homogeneity is defined for a region.

Is the space around you that you see with your eyes isotropic or anisotropic? Is the house that you live in homogeneous or inhomogeneous? Hopefully not. Let’s take a look at some examples of spaces that are and that are not isotropic and/or homogeneous. It’s an interesting mind game of logic based on the two definitions above.

**Example 1: A flat finite square**

You are a flat observer. Is the center of the square isotropic? No! An observer in the center of the square would see the sides of the square in one direction and the corners of the square in another. Are there any points on the square that are isotropic? No! Other observers would be closer to one side than the other. Is the square homogeneous? No! Some observers in the square could see different sides at different distances.

**Example 2: A sphere**

Is the center of the sphere isotropic? Yes. Any direction you look from the center of the sphere you see the edge of the sphere at the same distance. Are there any other points that are isotropic? No. All other points would be closer to one side of the sphere than the other so an observer would not see

the same thing in any direction. Is the sphere homogeneous? No. Observers at the center see something different than observers off-set from the center.

Example 3: A thick cloud of gas and dust

Are there any points inside the cloud that are isotropic? An observer deep inside the cloud would see the same thing no matter what direction they were facing. They would see dense cloud. That point is isotropic. Any point deep inside the cloud would be isotropic. Points inside the cloud near the edge of the cloud would see different things in different directions. One direction you could see the edge of the cloud and in another direction the dense center of the cloud. So, those points would not be isotropic. Is the cloud homogeneous? No, observers in the center of the cloud would see something different than observers on the cloud's edge. Would the inner regions of the cloud be homogeneous? Yes! All observers located in the inner regions of the cloud would see the same thing. If all points in a region are isotropic then the region is homogeneous.

Example 4: An infinite 3D space filled with an even distribution of stars

Are there points in this space that are isotropic? Yes! An observer at one point will see the same thing no matter where they look, stars. By the Copernican principle, all points are isotropic. Is the region homogeneous? Observers at any location would see the same thing, so the region is homogeneous. You also have learned that if all points in a region are isotropic then the region is homogeneous. So, yes, the region is homogeneous.

Example 5: A region of black and white vertical stripes

Are there any points in the region that are isotropic? No! All points are anisotropic. An observer could see parallel to the stripes in one direction and perpendicular to the stripes in the other. Is the region homogeneous? On the scale of individual stripes an observer might be on a black stripe or a white stripe, so, on this scale the region is not homogeneous. But, on the large scale, all observers see the same thing, an alternating pattern of black and white stripes. On the large scale the region is homogeneous. Knowing the difference between isotropy and homogeneity allow us to do a little cosmology.

Observational evidence indicates that the universe is inhomogeneous at distances less than 100 Mpc (326 million light years), it shows a structure of voids and superclusters of galaxies. At distances greater than 100 Mpc, there is no evidence of superclusters. At distances greater than 100 Mpc the universe appears isotropic from Earth. Are all points in this large-scale structure isotropic?

Are the laws of science universal? Are the laws of physics discovered by mankind on this planet universal? Are these same laws operational on a planet around a star on the other side of the universe? If the answer is no, it seems a little anthropocentric. The problem with saying there are two sets of laws

would be where does one set end and the other begin and why there? But the evidence indicates that the laws discovered on Earth are operational throughout the universe. We would not have been able to send our robots out exploring in space if they were not. Also, the light we collect from stars on the other side of the universe seems to obey the same laws of quantum mechanics that earthly photons do. This property is referred to as universality.

Astronomers combine the ideas of universality, isotropy and homogeneity into what is called the “Cosmological Principle”. The principle assumes that the laws of physics are universal and that all points in space are isotropic and that space is homogeneous, an idea supported by the “Big Bang” theory. The cosmological principle states that if the laws of physics are universal, then an observer anywhere in space will see the same thing no matter what direction they are looking in. There is also an idea called the “Perfect Cosmological Principle” where the universe also has a uniform density, an idea supported by the “Steady State” theory. The Copernican principle states that there is nothing special about our location in the universe which is true on large scales. Isotropy about any point in the universe combined with the Copernican principle implies isotropy around every point in the universe and that implies that the universe is homogeneous. Remember the assumption of isotropy and homogeneity is the cosmological principle. The Copernican principle prevents us from saying “we’re number 1” but the cosmological principle states that we’re “second to none”.

A more important reason that these considerations are important is the following. Einstein’s field equations that come out of the general theory of relativity are very difficult to solve. One of the early solutions of these field equations is called the Friedmann equation which itself is impossible to solve. Using clever assumptions, parts of the Friedmann equation can be solved for special cases. These special cases, combined together, are referred to as the “benchmark” model. They are not an exact solution, but the best approximation we have of a real solution. Two of these assumptions are isotropy and homogeneity. They allow the equations to be solved.

There may be some initial evidence (2020) coming out that indicates that the universe, on the largest scales, is not isotropic, but anisotropic. That would have drastic effects on our understanding of a big bang.

*Note - The Cosmology 1 article in the June newsletter had an error in it. In the 3rd paragraph it should read that  $\hbar = h/2\pi$  not  $h/2p$ ,  $h/(2\pi)$  works.*

# THE DEAL OF THE WEEK?

*Colliding asteroids! Flaming meteors! Streaking comets! Unfortunately, this offer expired many moons ago...*

## AEROSPACE & NAUTICAL DEPOT SALE

# NOTICE!!!

## Super-Powerful 100-BILLION MILES DEEP SPACE TELESCOPES

not ~~\$199.95~~  
but only **\$29.95**



(with 3 lens systems — telephoto, wide-angle & deep space)

**This once-a-year 'Depot-Overstock' release to the public!  
Brings The Moon, Distant Stars, Planets, Comets, Meteors, Even  
The Milky Way Into Full Close-Up View**

Starting midnight tonight the Aerospace & Nautical Depot will open its warehouse doors to the public and accept orders for DEEP SPACE 100-BILLION MILES TELESCOPES. Each of these precision-engineered EXTRA LONG-RANGE TELESCOPES is equipped with 3 individual lens systems — telephoto, wide-angle and deep space probe — for clear, close-up view-range of up to 100 billion miles. Now bring the surface of the Moon, Mars, Venus, etc. right into your living room. Track comets streaking across the heavens. Be absolutely spellbound in your ringside seat as asteroids collide in fiery explosions ... see meteors flame through the skies ... in the most spectacular nighttime "fireworks show" in the world!

Machine tooled with high-impact housing and reflective lenses ... they are designed to penetrate some of the remotest sights in the universe, thousands of light years away — as giant stars and distant galaxies, such as the Milky Way are drawn into full, close-up view. It's the greatest show on earth, now being made available to the public on this once-a-year Depot Overstock Release, at the most affordable price ever!

And if you act within the next 30 days the Aerospace & Nautical Depot will also include FREE a professional astronomical tripod. But this is a one-time-only special Depot release ... once last remaining telescopes are gone ... this announcement to the public may not be repeated, so order today!

### TECHNICAL SPECIFICATIONS

- Tripod mounted
- 3 interchangeable eye pieces — 20X, 30X, 40X for wide-angle, telephoto and deep probe viewing
- Full rotary focusing controls for both primary and secondary body cylinders
- 45° astronomical fold mirror
- Lens hoods
- Multi element optical system for sharp image quality
- Both exit pupil lenses and objective high-impact lenses engineered for maximum transmissions
- Total spectrum clarity for both night and day viewing

### priority order form



**Aerospace & Nautical Depot**  
Lens & Scope Division, Dept. TL496  
405 West Fairmont Drive, Tempe, AZ 85282

Please send me \_\_\_\_\_ (limit 3) "TELESCOPE"  
at \$29.95 each ..... \$ \_\_\_\_\_

Shipping & handling: \$3.00 per "TELESCOPE" ..... \$ \_\_\_\_\_

FL residents add 6% sales tax ..... \$ \_\_\_\_\_

**Total** ..... \$ \_\_\_\_\_

Enclosed is my check or money order for ..... \$ \_\_\_\_\_

Please charge to my:  Visa  M/C  Discover

Credit Card # \_\_\_\_\_

Exp date: \_\_\_\_\_ Signature \_\_\_\_\_

Telephone ( \_\_\_\_\_ ) \_\_\_\_\_

Print Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

To avoid disappointment or future regret you must place your order immediately. 30-DAY SATISFACTION GUARANTEE or you get a full refund of product price. Not affiliated with any government agency. The deadline expires October 30, 1999. Results vary depending upon weather and eyesight. FREE Technical support for Depot customers 1-941-592-0758. P29/1993



# SEPTEMBER STAR PARTY

By Rusty Hill

From today, Tuesday September 8, the forecast is for a few clouds, so it could be good. It is just too far in advance to know for sure.

Sunset will be at 7:30 P.M., and the moon will rise at 1:46 A.M. on Sunday Morning.

Observers with all levels of equipment, from a basic binocular, through an elaborate motorized mount with go-to/ tracking capability and a guiding camera and software, can find something of interest.

I am writing this with the simple and basic level of equipment in mind, specifically either (1) a binocular and a lawn lounger (my choice for getting started) or (2) (my choice for a first telescope) a manual equatorial mount, non-motorized, and about a 4" Newtonian (reflector, same thing) telescope with a 6X30mm right angle finder-scope or a "unitary" finder. Other experienced observers will often disagree with me.

Whatever you choose, please do not get a \$179.95 "Department Store Special" with 1200X magnification. You will only be disappointed. If you are buying new, possibly from Orion Telescopes, I suggest the 7X50mm binocular for \$99.99 and an accessory tripod mounting adapter for \$19.99 as a decent quality binocular to get started. I do use such an adapter and an ordinary camera tripod with my binocular. For minimal starting expense, it works great! Oh, yes. The lawn lounger: your choice!

If you want to spend more to acquire a telescope, Orion has useable inexpensive package, using an equatorial manual mount, a useable scope, a useable finder, and 2 eyepieces. Item # 09250. I sometimes use just such a setup with a used 4" refractor from my backyard or for traveling, and find it quite useful. In this case, a folding chair is better than the lounger.

In any case there will be a learning curve. There is less to learn about the equipment with the binocular, and you can learn just as much about the sky with its constellations and major objects to see.

At the Star Party, an hour after Sunset, Pegasus and Andromeda will be nicely up to the Northeast. If the sky is good, the Andromeda Galaxy will be visible in binoculars and perhaps with naked eye. It will be traversing the Northern Sky throughout the evening. It is an easily found target. If you are using a manual mount with a scope, you can visually find it in your finder scope and keep it centered manually.

Overhead, the Summer Triangle is easily found, consisting of Deneb in the Constellation Cygnus, Vega in Lyra, and Altair in Aquila. Also, in Cygnus at the end of the head and neck, is the very pretty 2-color double star Albireo. In Lyra there is the pair of stars near Vega called the "Double-double" because it

consists of a pair of double stars at right angles to each other. If you can “split” them with your equipment, it is a fun catch.

With the Planets, both Jupiter and Saturn are easily visible, and will stay in good visible sky until well after midnight. Pluto lies about half way between them, easily found, but bring a big telescope!

Mars, however, will be the big treat this fall. On our Star Party night, it will rise about 10:30 P.M., and by 11:59 P.M. it should be high enough to be easily visible. I had an early morning visual look at it yesterday morning, and it is BRIGHT! It easily surpassed Sirius for brightness. There is a very good write-up in the October issue of Sky and Telescope, with an excellent chart on page 49 showing magnitude and angular size from back in June through the end of 2020. Peak magnitude at -2.0 or better will be from now through about November 2. It will gradually rise a bit earlier each evening. By our Star Party on October 17 it will still be even bigger and brighter than it is now. The next time it will have this visibility and size will be in 2035. You should make every effort to see it this fall.

If you are able to stay until 3:00 A.M., Orion will be well up in the East Northeast. You can find M42, the Orion Nebula, as the second “star” in Orion’s “sword” and it is a great view in a binocular. It is also a very good object for imaging, requiring little in the way of elaborate equipment. Orion will continue to rise earlier through the Fall and early Winter months. A binocular or a simple equatorial mount, again go-to and tracking are not needed, will be sufficient for visible observations.

If it is a decent evening, there will be more experienced observers there, and you can always ask for help. These Star Parties are an excellent opportunity to learn.

Keep a log of when you were where, what you saw or did not see, and what worked or did not work. That will help you become more successful sooner.

Do as I say, not as I do: I have a box full of loose notes. Someday I will figure out what all the notes mean and get them in order.

As always, Safety is the primary consideration. Stay safe:

1. Practice social distancing.
2. Bring plenty of fluid.
3. Dress for 10° cooler than the forecast.
4. Do not stay until you are the only person there unless you are quite familiar with the area and the route home, and have a reliable way to communicate. I always have both a cell phone and an iPad with texting capability.
5. Pack up and leave before you get tired. You want to be alert and driving safely while you are headed home. Do not stay until the last minute!

Clear skies and have fun,  
Rusty

# DARK SITE INFORMATION

If you are new to the club, Star Parties are especially for you. We, the members, are the reason we have observing Star Parties, and they are great occasions to get familiar with observing. We have 10" Dobsonian telescopes available at the Dark Site for your use. There will also be several other scopes available for all to try. And do bring a Binocular-- you can do lots of successful observing with nothing more.

NHAC Club Policy is that the focus of the Star Parties will be to give as much assistance as possible to new observers. For those who may not have been to the O'Brien Dark Site, it is just north of Dobbin, which is on Highway 105 west of Montgomery. It has reasonably dark skies and a great low horizon in all directions. The Owners, Tim and Wanda O'Brien, are very generous hosts, and they do turn off any outside lights which might bother us, if we remember to ask.

**The specific Dark Site location is password protected. Any club officer can give you the password, but it is NOT FOR THE GENERAL PUBLIC!**

Access to the Dark Site must be requested from the O'Brien's in advance via the NHAC email. It is only necessary for any 1 member to request access... Access approved for any of us is access approved for all of us.

On our NHAC web site, click on "Observing" then select "O'Brien Dark Site". Scroll down to the O'Brien Dark Site information and look for the "detailed directions" link. You will need to enter the password. There are maps as well as directions. It is well worth the drive, which is about 6- or 7-minutes driving time north of Dobbin off of State Highway 105 west of Montgomery.

Star Parties are routinely scheduled for the Saturday on, just before, or just after the New Moon throughout the year. This is to provide the best opportunity for dark skies.

# INSPERITY OBSERVATORY



## Public Night at the Insperity Observatory – October 2, 2020

**Watch for emails with reservation announcements. Due to pandemic precautions, attendance is limited, by reservation only, and viewing will be video observations through the telescopes.**

The Observatory has a 6" Takahashi refractor, a 16" Meade Schmidt-Cassegrain, and a 20" Plane Wave telescope. Each is computer controlled, and provides an awesome view of the sky. This can be an great opportunity to see a new or favorite object in a large telescope.

The Observatory is about 3/4 of a mile south of Will Clayton Parkway on S. Houston Ave, just north of Rankin Road in Humble, in the back part of the Jack Fields Elementary School on the East side of S. Houston Ave. The address is:

Jack Fields Elementary School  
2505 S. Houston Ave.  
Humble, TX 77396

For more information, the Observatory phone number is 281-641-STAR and the web site is <https://www.humbleisd.net/observatory>. Dates and times are subject to change.

## ABOUT NHAC

The North Houston Astronomy Club (NHAC) is a not-for-profit organization established in 1999 for educational and scientific purposes, for people of all races, creeds, ethnic backgrounds and sex. Our primary purpose is to develop and implement programs to increase the awareness and knowledge of astronomy, especially for those living near the north side of Houston, Texas.

NHAC is dedicated to providing an opportunity for people to pursue the science of astronomy, to observe in a dark-sky site, to learn the latest technology, and to share their knowledge and experience, thus our “Observe-Learn-Share” motto.

Public meetings are normally held each month on the fourth Friday. In the months of October, November and December they are usually rescheduled for the third Friday of each month, so as to not conflict with the Annual All Clubs meeting, Thanksgiving, or Christmas.

The benefits for membership include:

- Loaner telescopes after being a member for 6 months.
- Opportunity to observe from dark sky observing sites.
- Learn from experienced observers.
- Astronomy Magazine subscriptions at a discount.
- Astronomical League membership, with its many observing programs.
- Subscription to the Astronomical League magazine "Reflector".
- Access to the NHAC library
- Discounts on purchases at Land, Sea and Sky. Be sure to identify yourself as an NHAC member.

More information at the [NHAC Website](#)

Check out our [Facebook page](#).

Our mailing address is:

North Houston Astronomy Club  
Post Office Box 5043  
Kingwood, TX 77335-5043

NHAC is sponsored by:



# CALENDAR. MEMBERSHIP. OFFICERS

NHAC General Calendar			
	Executive Board Meeting	Star Party	General Meeting
September 2020	Sep 14	Sep 12 (No BBQ)	Sep 25
October 2020		Oct 17	Oct 23
November 2020	Nov 9	Nov 14 (and BBQ)	Nov 20
December 2020		Dec 12	Dec 18

Dates and times are subject to change. Star parties are weather permitting.

### Membership

Memberships run from January 1 through December 31.

Full year dues are:  
 Students \$10  
 Individuals \$30  
 Family Groups \$40

Membership applications and dues payments can be made at the NHAC website at:  
[NHAC Website](#)

### 2020 NHAC Executive Board

President	Carlos Gramajo - <a href="#">email</a>
Vice-President	Bruce Pollard - <a href="#">email</a>
Secretary	Rusty Hill - <a href="#">email</a>
Treasurer	Joana Tan - <a href="#">email</a>
Newsletter Editor	Jesse Roberts - <a href="#">email</a>
Astronomical League Coordinator	Aaron Clevenson - <a href="#">email</a>
Webmaster	Bruce Pollard (interim) - <a href="#">email</a>
Observation Chair	James Billings - <a href="#">email</a>
Membership Chair	Hagen Miller - <a href="#">email</a>
Program Chair	Trevor Arnold - <a href="#">email</a>

# AFFILIATIONS

NHAC is a member of:



The Astronomical League

<https://www.astroleague.org/>



Night Sky Network

<https://nightsky.jpl.nasa.gov/>



INTERNATIONAL DARK-SKY ASSOCIATION

International Dark Sky Association

<https://www.darksky.org/>