Next Meeting: Saturday, November 17th, 11 a.m., at LIGO

(This special meeting will NOT be held at the usual time and place.)

PROGRAM: BRAS Potluck and LIGO Tour)

19100 LIGO Lane, Livingston, LA 70754

https://www.ligo.caltech.edu/LA

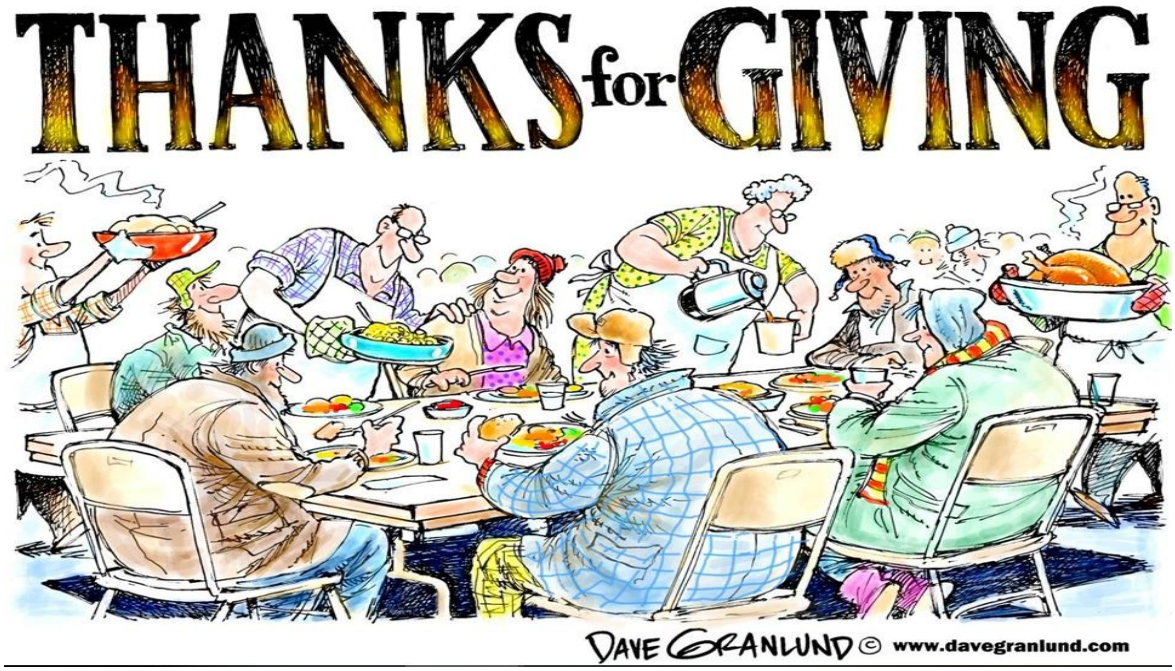
What's In This Issue?

Like this newsletter? See PAST ISSUES online back to 2009

Visit us on Facebook – Baton Rouge Astronomical Society

President's Message

I want to take this opportunity thank all who show up to our meetings, AND who give so generously of their time and resources to HRPO and to our club's Outreach and other events year round. We receive many compliments, help enrich our community, and I think we can be very proud of our club.



"Our picnic at LIGO will be on Science Saturday, November 17, 2018, from 11:00 am to 1:00 PM. BRAS will provide the main dish, jambalaya; members are asked to bring a side dish. The gates will be closed when we arrive for the picnic. BRAS members will need to tell the guard they are there for the picnic. Please to be mindful of the speed limits entering the property.

Elections: In December we elect officers for 2019. 3 current officers plan to stand for re-election, but we need a new VP. Any member is invited to put their name forward for any position by the November meeting."

Our business meeting will be on Wednesday, November 7, at HRPO.

Member Pins: If you have not reserved your member pin yet, please come to a meeting to pick one up.

Outreach: Please check this newsletter for dates, and contact Ben Toman if you are willing to help with our Outreach Requests. Also, be on the lookout for periodic email notices. Remember, Outreach to our community is a lot of what we do.

BRAG: Our astrophotographers (or members wishing to learn) should check with Scott Louque about the November BRAG get together.

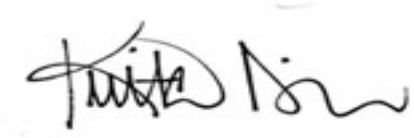
TELESCOPE RAFFLE/FUNDRAISER. Tickets are $5 each: See next page for details.

Clear Skies

Steven M. Tilley, President

Secretary's Summary of September Meeting

- 30 members in attendance.
- 3 new members in attendance.
- BRAS Vice President, Scott Louque, calls the meeting to order at 7:00PM
- Scott introduces BRAS President, Steven Tilley, as the guest speaker.
- Steven gives a talk on comet and asteroid observing. Following the talk, he answered questions.
- The next meeting will take place at LIGO for the annual potluck on Nov 17th, 11 a.m..
- Coy Wagoner informs the club that the SkySafari app is half off.
- Scott Cadwallader will be in charge of the donated AVX.
- Scott L updated the club about the Astrophotography Meeting.
- Chris Kersey gives a HRPO report. He asked for volunteers for upcoming events, and mentioned the donation drive for the Celestron NexStar 8SE.
- Natural Sky Conference will be Friday, November 9th from 5:30PM to 8:30PM.
- Craig Brendan reminded everyone about Deep South Star Gaze.
- Scott C talked about the Meade ETX telescope raffle.
- Chris Rabey showed everyone his lava flow photos.
- Raffle held.
- Meeting adjourned 8:08PM.



Submitted by Krista Reed, BRAS Secretary

NOTICE: Officers shown in red (right) are standing for re-election in our December elections. Feel free to put other names on the ballot at the November meeting. Committee Coordinators are appointed by the President.

2018 Officers:

President: Steven M. Tilley
Vice-President: Scott Louque
Secretary: Krista Reed
Treasurer: Trey Anding

BRAS Liaison for BREC:
Chris Kersey
BRAS Liaison for LSU:
Greg Guzik

Committees/Coordinators:
Light Pollution:
John Nagle
Newsletter:
Michele Fry
Observing Notes:
John Nagle
Outreach:
Ben Toman
Webmaster:
Frederick Barnett

TELESCOPE RAFFLE

" A vintage (c. 2001) Meade ETX 90EC with hard case. 90 Maksutov-Cassegrain reflector, 1250mm focal length (f13.8) on an electronic fork mount with built-in flip-mirror diagonal, additional right angle diagonal, and 8x21 finderscope. It includes two Meade super Plossl eyepieces (26mm &f 9.6mm), Yellow, Blue, Orange, and Neutral Density planetary filters, an ETX Autostar Controller for electronic alignment and goto positioning. It has built-in battery power from 8 AA batteries and a connector for an external power source. It is capable of tracking if it is set into polar alignment mode which requires an additional purchase of a field tripod or tabletop accessory.

At this time, everything has been checked out on the scope EXCEPT the GOTO function. (It's been too cloudy to get outside for a good test run.) We are assuming that it works, but just know that the scope is being raffled AS IS. This is a great opportunity to get your hands on a great little scope with accessories. You'll be able to take a look at it at the meetings."

BRAS Outreach Report

Hi Everyone,

Summer has left us and the shorter days have started. To me, that means more time at the eyepiece without being out until 2am! It also means we get to do more observing with the public at our outreach events.

October was a busy month. Unfortunately, the weather wasn't always very cooperative. The Mini Maker Faire and the Boy Scout Campout both had problems with rain, as well as our Sidewalk Astronomy at Perkins Rowe. Chris R. and his wife, Annette were lucky to have a great night with the Girl Scouts over by Sorrento, though.

We also did some outreach at both Catholic High School and Baton Rouge Magnet High School. At CHS, Scott C. and I gave talks about the upcoming landing of INSIGHT on Mars along with other tidbits of astro knowledge. At BRMHS, Scott C., Chris K. and I were on hand to add a little lagniappe to the high school band concert that featured music with a "outer space" theme. We actually got some observing in of the Moon, Mars and Saturn afterwards and the attendees loved it!

Coming up this month, we will have our planned Sidewalk Astronomy at Perkins Rowe and another night at the Mid City Maker's Market. There are sure to be more requests coming in, so be on the lookout for an email or two!

Upcoming Requests:

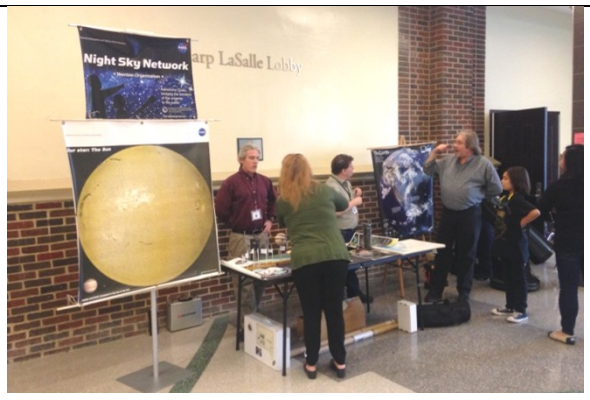
Tuesday, November 13th
6:30-8:30pm
Sidewalk Astronomy at Perkins Rowe
(Telescopes, info)

Friday, November 16th
6pm-10pm
Mid City Maker's Market at Eugene and Government
(One or two scopes, demos/info table)

Outreach at Catholic High School and Baton Rouge Magnet High School
a few pics by Ben Tomen

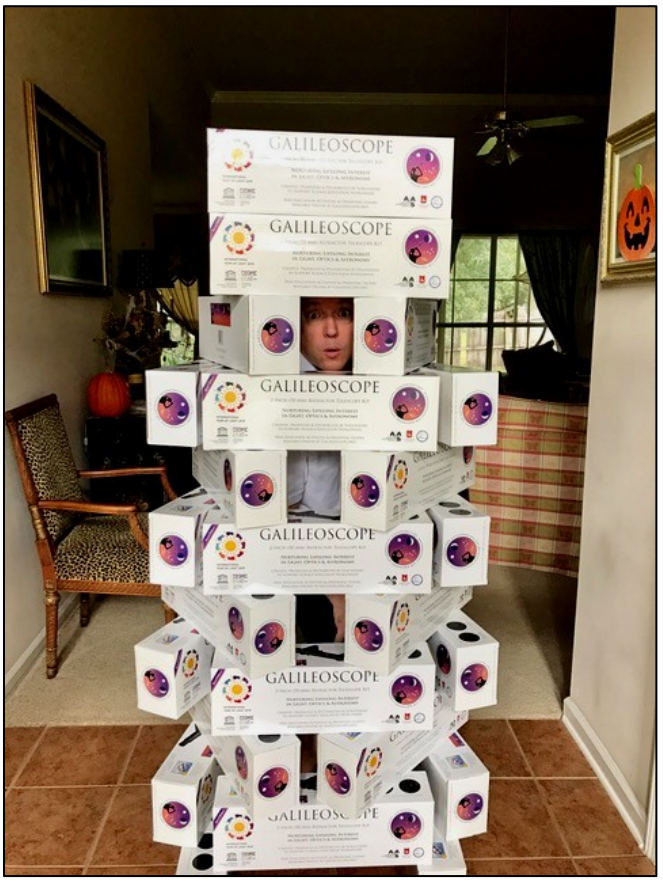
Ben T. and Scott C. at CHS with the meteorite/metoer WRONG display

Giving the presentation to CHS students



Scott C. and Chris K. at BRMHS, talking with people before the start of the band concert.

Galileoscopes ARE IN!!!!!!!!!



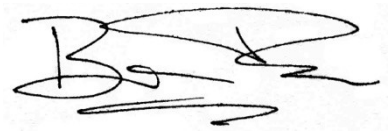
As mentioned in a previous newsletter, our application to participate in a web-based seminar sponsored by the Night Sky Network was accepted. The webinar has been taking place over the course of the last couple of months and our club member, Scott Cadwallader has been our designated participant. Thanks to his efforts, not only will we come away with some great ideas for talking about telescopes, light and optics with our community, but we just received our shipment of 24 Galileoscopes that are a free gift to our club for use in our future outreach events.

We just received our shipment of 24 Galileoscopes from NSN.

For those of you that don't know about the Galileoscope, it was conceived and designed ahead of the 2009 International Year of Astronomy (IYA). The scopes are inexpensive and come as build-it-yourself kits. The magnification and refractor design are similar to what Galileo would have been using when he first turned a telescope to the night sky. According to the Galileoscope website, https://galileoscope.org/, the program was intended to last just through the IYA, but worldwide interest has kept the program alive a further 8 years. They have now ceased production so we are extremely fortunate to have a good stock of them for our use.

Note: No Galileoscopes were harmed in the making of these photos, but our Outreach Chairperson appears to be out for the count!

Clear skies,



Ben Tomen, Outreach Chairperson and occasional Club Clown.

BRAS Light Pollution Committee Report

This committee meets at 6:15, same day as the 7:00 BRAS Business Meeting
(which normally takes place on the Wednesday before the Monthly Meeting)
Everyone is welcome to join in.

Meeting called to order by John Nagle
New member Hannah Brown, with 7 members in attendance
September minutes were published in the October newsletter

Old Business:

1. Approved asking Executive Board to have the Letter to the Legislature, in regards to a proposal to study whether or not to keep Day Light Savings Time.
2. Will draft a letter to BREC in regards to the Environmental Sustainability Program.
3. No new nominations for the BRAS Good Lighting Award.
4. Consultation with Lawyers on the UDC lighting requirements – none contacted yet. Update – Have talked to one Lawyer about the Unified Development Code (UDC)
5. IDA representative reviewing the Unified Development Code, Lighting chapter for the city/parish has not gotten back to us yet.
6 LSU Professor that investigated the "Safety of Nighttime Roadway Lighting" a few years ago has not yet been contacted yet.
7. Two ideas were proposed to more graphically demonstrate Light Pollution for the Natural Sky Conference on November 9th, and are being worked on:
   A. Set up portable lights to create glare and blind spots.
   B. Make up posters of pictures that demonstrate glare and blind spots.

New Business:

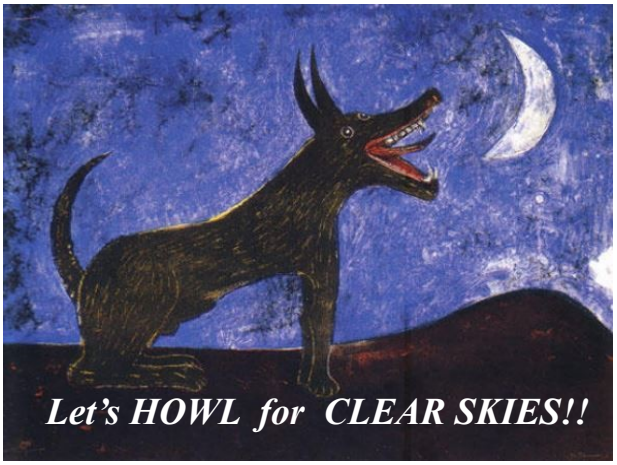
1. Need to check out the new sub-division being built on Burbank near Bluebonnet.
2. We were informed that the Host service for the Dark Sky Advocacy has disappeared and all the pages/information is gone. The committee will work on re-designing the web pages until we get a new host, and the BRAS Webmaster, Frederick Barnett will be asked to insert on the BRAS web pages a notice that the Dark Sky Advocacy pages are being re-designed.
3. Agreed to put links about Light Pollution (IDA, etc.) on the Dark Sky Advocacy web pages as part of the re-design.
4. There is a new way of classifying Lighting Zones – The BUG System (Backlight, Uplight, and Glare).

Minutes of this meeting read and approved
Meeting adjourned.

John R. Nagle

John Nagle, Chairman

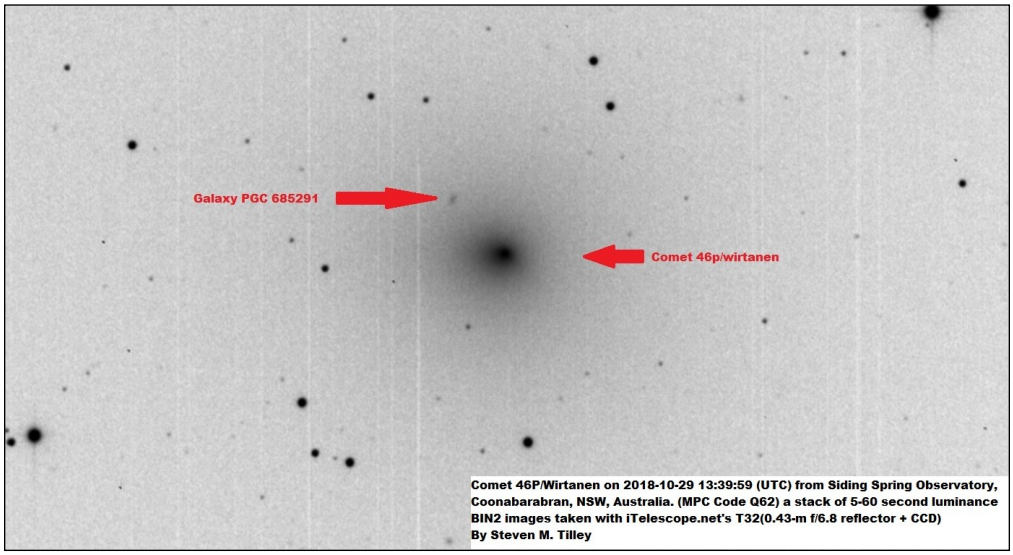
Addendum since the meeting: There is a new, small sub-division being built on Old Hammond Highway between Flannery and Millerville on the south side of the road. Tall, unshielded light posts and lamps have been installed. This will be checked out soon.



BRAS Astrophotography Group (BRAG) - November Meeting

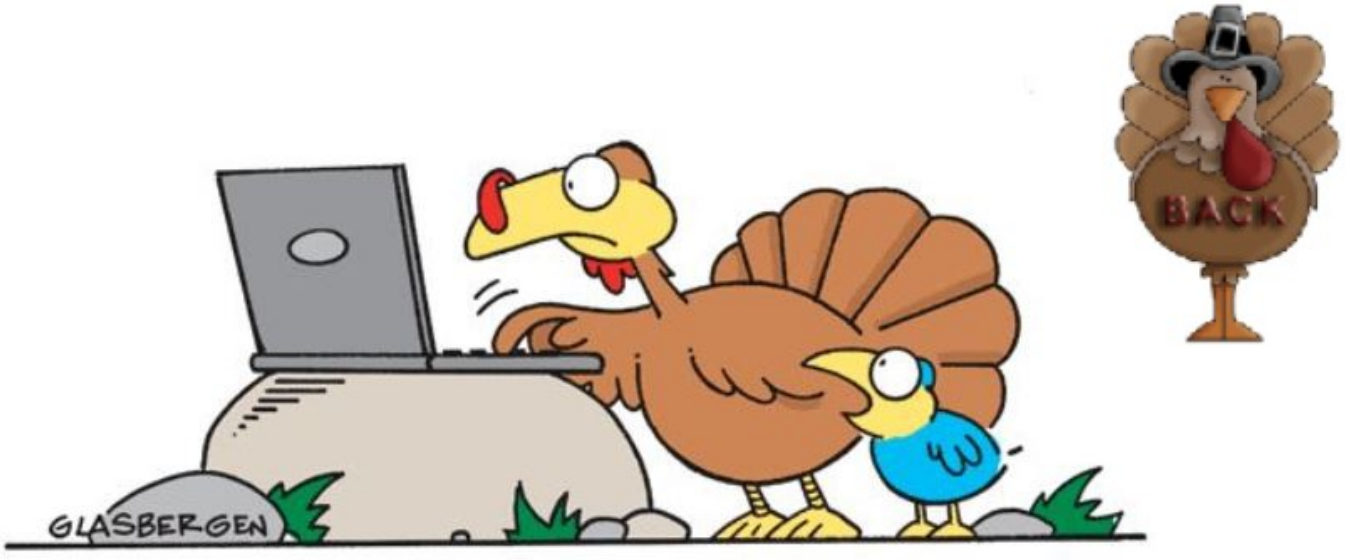
The next astrophotography group meeting will be Nov. 23rd at Chris Deselles house.

For more detailed information, contact Scott Louque, slouque at att dot net.



COMET AND ASTERIOD NEWS (by Steven Tilley)

The latest update on Comet 46P/Wirtanen is that it has brightened to 9th magnitude and is on track to become 4th magnitude making it visible to the unaided eye from dark sky sites in December 2018(Comets and Asteroids, Facebook Page, Manage by Charles Bell, https://www.facebook.com/Comets-and-Asteroids-140234731687/). NASA's OSIRIS-REx spacecraft is now sending back images of the asteroid (101955) Bennu. The Japan Aerospace Exploration Agency (JAXA) space probe Hayabusa2 is continuing its mission to the asteroid (162173) Ryugu. On October 19, 2018, the Newly-discovered asteroid 2018 UA did a flyby of 9.14e-5 AU (0.04 LD) Earth was the size of a basketball this would be 5.42 In(13.78 CM) away. This flyby ranks 4th on a list of close approaches (excluding the impactors 2008 TC3, 2014 AA, and 2018 LA). 2018 UA has an approximate diameter of 8.2 ft - 18.0 ft (2.5 m - 5.5 m).



"Go to Google, then type: How To Uncook A Turkey."

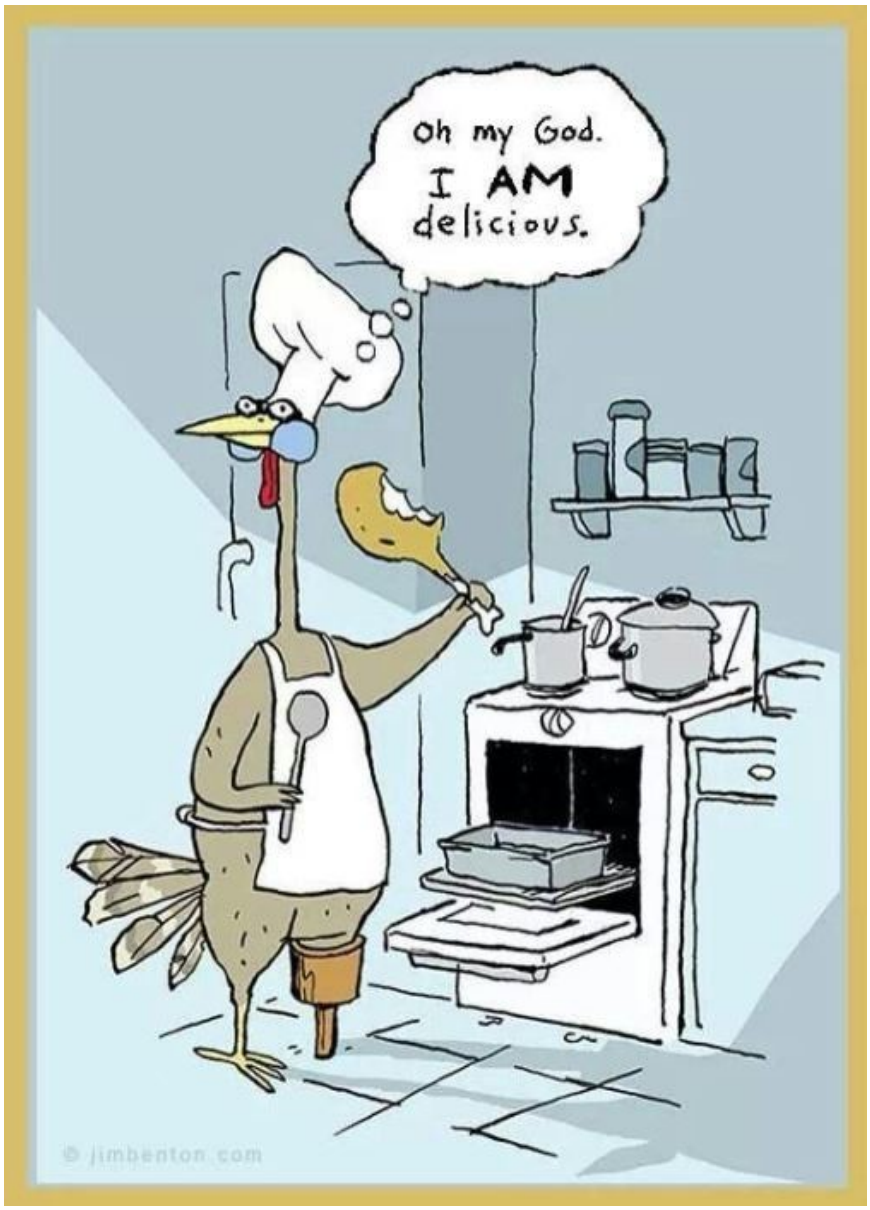
Free The Milky Way Campaign

used to be the 20/20 Vision Campaign, recently renamed by the Light Pollution Committee.

This campaign's goal was to raise the SQM measurement at HRPO's back viewing pad to 20.0 by HRPO's 20th anniversary. That date past, we decided to keep the effort going until the goal is reached, however long that takes.

Recent Entries in the BRAS Forum

Below are selected additions to the BRAS Forum. There are also nine active polls. The Forum has reached 5600 posts.



Mars Remains Brighter Than -0.5 through 8 November
ISS Sessions in Science Academy Come To End
Any Green Flashes from Venus this Month?
Children's Book Acquired for Uranian Opposition
G1 and G2 Geomagnetic Storms in October

Members' Corner - Chichén Itzá Trip

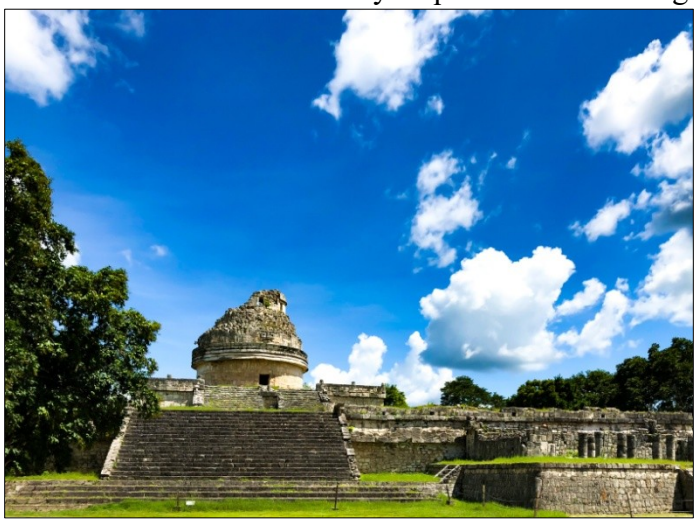
Here's where BRAS members can submit articles and photos about their astronomy-related accomplishments and adventures outside of BRAS activities (as if there were any spare time for such things!)
Send your contributions to Michele at newsletter@brastro.org

This article and photos submitted by **Sam Araujo:**

Kukulkan Pyramid

"I recently had the privilege of visiting the Mayan archeological site of Chichén Itzá. Aside from the obvious anthropological and sociological importance of the site in understanding pre-Columbian Mesoamerican cultures, I was mostly drawn to its astronomical features.

When you enter the site, the very first thing you see is the great pyramid of Kukulkán (or Quetzalcoatl, depending on whom you ask...), the main attraction of the site. At sunset on the equinoxes, the western side of the staircase with the serpent heads at the bottom has the shadow of the terraced pyramid itself cast on it, resembling a snake slithering down from the heavens into the underworld. The first question that comes to mind is how they acquired the knowledge of precisely determining solstices and equinoxes and building accordingly.



The "El Caracol" observatory temple

El Caracol is the name of the ruins of an observatory that helped them calculate celestial events, something of extreme importance to calendrical tabulations in a society such as theirs. Beyond the significance this had within their belief system, it also had practical uses such as knowing when to sow and when to reap. Although learning about the importance of Venus to the Mayan community and the many meanings of the ruins on the site was incredibly enriching, I was sad to learn at the end that El Caracol was not part of the guided tour. Fortunately, time was allotted for "independent" exploration of the grounds!

While it entailed a long walk down several adobe-paved and sometimes rocky footpaths in a very hot late-summer day, and a few wrong turns, I arrived at the plaza in front of the majestic structure. I would be darned if I left without seeing the Observatory! As a bonus, that gave me the chance to practice direction inquiry in Spanish with the local vendors on the grounds…

Chichén Itzá isn't too far from Baton Rouge, as the crow flies!

Another interesting sight was the type of solar observation lens made with obsidian, the naturally-occurring volcanic glass regarded by the Mayans as the coagulated blood of the Earth. There are no volcanoes from which obsidian could have been sourced in the Yucatán, leading archeologists to assume commercial exchange between the population of that area and that of others near volcanoes. This is further corroborated by the similarities in rituals and architectural motifs typical of one being used by another.

The cenotes on the site were also very striking. Their deep, cold, dark nature lended them the reputation among the Mayans of being the gates to the underworld. Many human sacrifices took place in them. How do they relate to astronomy? You may recall a cataclysmic event that happened approximately 65 million years ago and is credited with the mass extinction event that made Michael Crichton's famous novel all the more appealing. The shockwaves from that impact created small fissures and areas of instability in the bedrock around the rim of what we now know as the Chicxulub crater. These, over time, became the sinkholes we call cenotes.

If you ever get to that part of the world, I highly recommend you visit Chichén Itzá!

In a mostly geosynchronous orbit,
-Sam"

Location	Yucatán, Mexico
Region	Yucatán
Coordinates	20°40′59″N 88°34′7″WCoordinates: 20°40′59″N 88°34′7″W
History	
Periods	Late Classic to Early Postclassic
Cultures	Maya civilization

Messages from HRPO

Highland Road Park Observatory

SCIENCE ACADEMY

Saturdays from 10am to 12pm
For ages eight to twelve. $5/$6 per child.
3 November: "Computer Languages"
10 November: "Power in the House I: Water"
17 November: "Power in the House II: Solar"
24 November: "Power in the House III: Wind"

FRIDAY NIGHT LECTURE SERIES

all start at 7:30pm

2 November: "Buying Your First Telescope" Please don't buy a scope (especially as a gift for another) without doing some research first. Whether a scope is a good first telescope for someone depends on that person's age and what he or she will tend to view most (the Moon and planets, or star clusters and nebulae). In almost every situation, a good scope will have to be mail-ordered. HRPO's annual discussion of this issue increases the patron's chance of getting the best deal for the money, and increases the chance of the gift being used on a regular basis.

30 November: "Exoplanets" BREC Center Supervisor Jordan Cobbs will survey the various manners in which we search for planets around other stars, and provide notable examples.

ONE-TIME CALLS FOR VOLUNTEERS

*Saturday 3 November, 7pm to 10pm. *Three or four volunteers.* **Evening Sky Viewing Plus**. Marshmallow roast, demonstration tables; small telescope; setup and takedown. Easy; training provided.
*Tuesday 6 November, 4:30pm to 6pm. *Two or three volunteers.* **Mercurian Elongation.** Devices for Mercurian viewing; information about MESSENGER. Low to moderate difficulty.
*Friday 9 November, 5:30pm to 8:30pm. *Two to four volunteers.* **Natural Sky Conference.** Networking with exhibiting "powers-that-be", explaining the importance of eradicating the area's light pollution. Low difficulty.
*Friday 16 November, 4:45pm to 6:45pm. *One or two volunteers.* **The Edge of Night.** Pointing out different objects or passes as they appear or occur.
*Saturday 17 November, 12pm to 2pm. *Two or three volunteers.* **Solar Viewing.** Telescope operation for Sun viewing; front desk staffing. Moderate difficulty.
*19 and 20 November, 8am to 5pm. *One or two volunteers.* **Space Exploration Camp.** Front desk staffing. Rocket construction. Rocket launch staffing. Moderate difficulty.
*Monday 26 November, 12:30pm to 2:30pm. *One or two volunteers.* **InSight Landing Party.** Front desk greeting. Solar viewing. Information about InSight.

ONGOING CALL FOR VOLUNTEERS

HRPO periodically needs BRAS volunteers for crafting (gluing, cutting, painting, etc.); training is offered for these easy to moderate tasks. We also have plenty of "grunt work". We are asking any members with the time to do so to assist. Thank you.

SPECIAL ALERT: DAYLIGHT TIME DISCUSSION

There is a conversation right now in the Louisiana State Legislature to eradicate the back-and-forth of Daylight to Standard. There are two options if the twice-yearly switch is ended: to remain on Standard time year-round, or to remain on Daylight time year-round.

GLOBE at Night: 1 to 10 October [Pegasus]

Instructions to participate in this project are at…
http://www.brastro.org/phpBB3/viewtopic.php?f=29&t=2760

Mercurian Elongation

Tuesday 6 November from 4:30pm to 6pm
at Burbank Soccer Complex
No admission fee; for all ages.

Periodically Mercury reaches its greatest angular separation in the sky (elongation) from the Sun. This is the safest way to view Mercury by amateurs. The planet will appear as a "half-Mercury". Venus, Jupiter and Saturn will also be seen.

Natural Sky Conference

Friday 9 November from 5:30pm to 8:30pm
No admission fee. For ages fourteen and older.

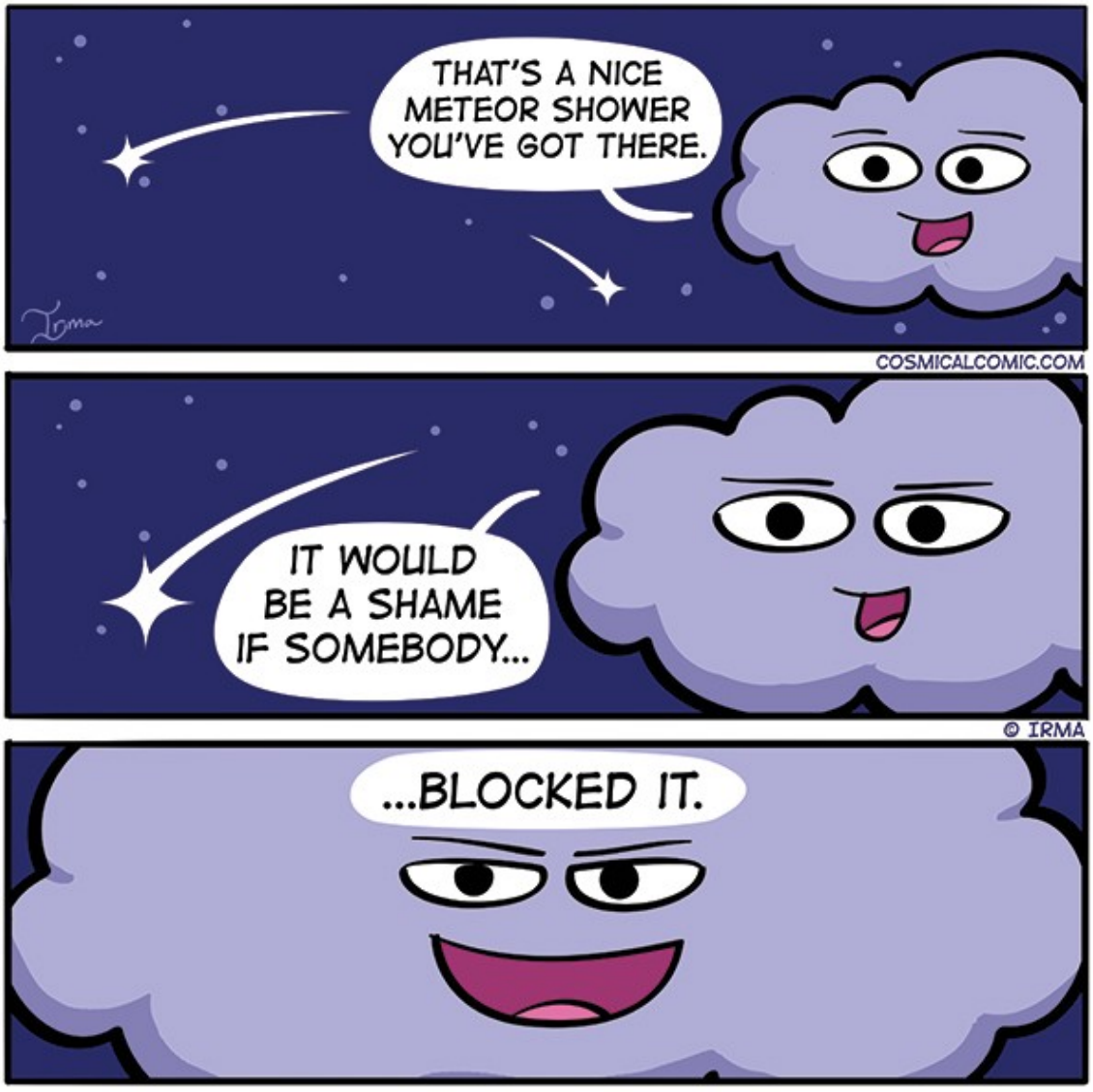
Although open to the general public the Conference will be aimed at those individuals and organizations in town that have a direct ability to quelch the light pollution in the area. HRPO anticipates having the Conference at least through the end of twilight, so participants can see damage currently being caused by the light pollution in the area. The theme of the Conference will the invitees answering questions (seen beforehand) asking them what they will be actively doing within the next twelve months to lessen the light pollution in the area.

Edge of Night

Friday 16 November from 4:45pm to 6:45pm

No admission fee; for all ages.

It's not light, it's not dark. It's that special time called twilight, and HRPO wants to introduce you to it! *Are all sections of the sky the same shade of blue? Which stars are seen first? Are Mercury and Venus or the Moon out? Is that moving object a plane, a satellite or space debris? How much actual darkness should I expect in a light-polluted city when twilight has passed?* There is no other time like twilight. Bring it into your life!



Observing Notes: November

by John Nagle

Vela – The Sails

Position: RA 09 00, Dec. -50°

Named Stars

Al Suhail al Muhlif, Gamma² Vel, "suhayl al-muhlif", "the glorious (star) of the oath", "Regor" – reverse for Roger (astronaut Roger Chaffe), mag. 1.83, 08 09 31.96 -47 20 11.8, is a multiple star system. **Gamma² Vel (a)** is a spectroscopic binary main sequence blue supergiant star with a massive **Wolf-Rayet** star (the nearest to **Earth** Type 1a supernova candidate). The orbital period is 78.5 days with a 1 au separation. The **Wolf-Rayet** star is the heaviest ever discovered. The **Gamma Vel** system is nicknamed the "***Spectral Gem of the Southern Skies***" because it emits bright lines instead of dark absorption lines (also called the **Gamma Vel Cluster**).

Gamma¹Vel (b), mag. 4.27, 08 09 29.30 -47 20 45.0, is a blue-white star separated from "a" by 40.3". **Gamma Vel C**, mag. 7.3, is a blue-white sub-giant star separated from **Gamma² Vel** by 61.5". **Gamma Vel D** (a white star and a binary), mag. 9.4, is separated from **Gamma² Vel** by 93". **Gamma Vel E**, the companion star to **Gamma Vel D**, is a 13th magnitude star.

Alsephina, Delta Vel, transcribed from "Al Safinah", "a Ship", mag. 1.96, 08 44 42.20 -54 42 30.8, is a multiple star system. **Delta Vel A**, mag. 1.99, is an eclipsing binary, composed of two white stars (**Delta A_1** and **Delta A_2**) having an orbital period of 45.2 days and a separation of 0.5 au. **Delta Vel B** is a 5.1 magnitude yellow star separated from the **Delta Vel A** system with a varying range of 26 to 72 au, and an orbital period of 142 years. Further out, at about 1700 au, is **Delta Vel C** – a binary consisting of two red dwarf stars at 11th and 13th magnitudes, with a separation of 6.2". If they are part of this multiple system, they would have an orbital period around **Delta Vel A** of about 28,000 years.

Markab, Kappa Vel, "something to ride (ship)", mag. 2.47, 09 22 06.83 -55 00 38.5, is a spectroscopic binary, appearing as a blue-white sub-giant star. The two stars orbit each other with a period of 116.65 days. **NGC 2910** and **NGC 2925** lie about 2.2˚ to the northeast.

Suhail Alwazn, Lambda Vel, "the glorious star of the cycle", "Al Suhail al Wazn", "The Suhail of the Weight", mag. 2.21, 09 07 59.78 -43 25 57.4, is a variable orange supergiant star with magnitude ranging from 2.14 to 2.3. A faint companion star, said to be magnitude 14.8 and at 18" separation, was detected in 1897. A planetary nebula, NGC 2792, is located 1.1˚ to the northeast.

Al Haram, Mu Vel, mag. 2.69, 10 46 46.12 -49 25 12.5, is a binary star. Primary star A, mag. 2.7, is a yellow giant star, and the companion star B, mag. 6.4, is a yellow main sequence dwarf star. The two are separated by 1.437 arc seconds, and have an orbital period of 116.24 years.

Xestus, Omicron Vel, mag. 3.60, 08 40 17.61 -52 55 19.1, is a blue-white sub-giant star located within **IC 2391**, and gives its name to the ***Omicron Velorum Cluster***.

Tseen Kee, Phi Vel, mag. 3.52, 09 56 51.75 -54 34 04.1, is a blue-white supergiant star.

Marut, HD 82668, N Velorum, mag. 3.16, 09 31 13.35 -57 02 03.8, is an orange giant star.

Deep Sky:

Cr 173, mag. 0.6, 08 02 49 -46 23 00, 370'x370' in size, 70 stars.

IC 2391, C85, Cr 191, vdB-Ha 112, ESO 165-SC4, Lund 469, the Omicron Velorum Cluster, mag.

2.5, 08 40 18 -52 54 59, 60'x60' in size, 30 stars; detached, weak concentration of stars; large range in brightness; very large, bright; magnitude of brightest star is 3.6. Located 50' west of **NGC 2669**, 1.8˚ north-northwest of **Delta Velorum**.

IC 2395, Cr 192, Ced 106m, vdB-Ha 47, Lund 472 and 1060, Raab 79, ESO 210-SC3, mag. 4.6, 08 42 30 -48 08 11, 13'x13' in size, ± 40 stars; detached, weak concentration of stars; large range in brightness; large; magnitude of brightest star is 5.5.

Tr 10, Cr 203, vdB-Ha 53, Lund 487, mag. 4.6, 08 47 54 -42 27 00, 29'x29' in size, 40 stars; detached, weak concentration of stars; moderate brightness range; magnitude of brightest star is 6.4.

NGC 2547, Cr 177, Mel 84, Dunlop 410, Raab 71, mag. 4.7, 08 10 10.5 -49 13 32, 19'x19' in size; detached, weak concentration of stars; moderate range in brightness; magnitude of brightest star is 6.5; bright, large; involved in nebulosity. Located 2˚ south of **Gamma Velorum**.

Cr 203, Tr 10, mag. 5.0, 08 49 34.2 -42 22 32, 1.2˚x1˚.

Pi 4, vdB-ha 36, Lund 461, mag. 5.9, 08 34 36 -44 25 00, 18' in size, 45 stars; not well detached; small brightness range; magnitude of brightest star is 7.3; involved in nebulosity.

vdB-Ha 36, Pismis 4, Lund 461, mag. 6.0, 08 34 36 -44 25 00, 18' in size, ± 45 stars.

NGC 3228, Cr 218, vdB-Ha 93, Lund 539, mag. 6.0, 10 21 22.2 -51 43 57, 5' in size, 22 stars; detached, strong concentration of stars; small range in brightness; magnitude of brightest star is 7.9; large.

NGC 2669, Cr 199, Cr 202, vdB-Ha 52, Lund 48, Lund 1061, mag. 6.1, 08 46 19 -52 56 06, 14'x14' in size, 90 stars; detached, no concentration of stars; large brightness range; magnitude of brightest star is 7.6. Contains **Harvard 3**. **IC 2391** is 55' to the west.

Harvard 3, Cr 202, vdB-Ha 52, Lund 747, mag. 6.1 photo, 08 46 30 -52 54 20, 7' in size, 40 stars, located inside **NGC 2669**. Use **NGC 2669** in place of **Harvard 3**.

Cr 197, Lund 479, mag. 6.7 photo, 08 44 41.7 -41 21 00, 25'x25' in size, 40 stars; not well detached; moderate range in brightness; involved in nebulosity (Gum 15 is located on the north part of the cluster); magnitude of brightest star is 7.4.

Bo 7, Lund 1131, mag. 6.8, 08 44 48 -45 59 00, 20' in size, 12 stars.

NGC 3201, C 79, Mel 99, Bennett 44, mag. 6.8, 10 17.6 -46 25, 20' in size, is a globular cluster with a low concentration of stars; very large and irregularly round. Located 5.7' northwest of Mu Velorum.

NGC 2910, Cr 209, vdB-Ha 71, Lund 510, mag. 7.2, 09 30 29 -52 54 50, 5'x5' in size, 50 stars; detached, strong concentration of stars; moderate range in brightness; magnitude of brightest star is 9.3; quite large. **Pi 14** is 9' to the northwest, and 11' to the southeast is **vdB-Ha 72**.

Pi 6, (use NGC 2645), mag. 7.2, 08 39.3 -46 13, 1.5' in size, 15 stars; detached, weak concentration of stars; moderate range in brightness; magnitude of brightest star is 8.9.

IC 2488, Cr 208, Mel 97, Raab 83, ESO 186-SC14, vdB-Ha 69, Lund 507, mag. 7.4, 09 27 31 -56 58 54, 18'x18' in size, 70 stars; detached, weak concentration of stars; moderate range in brightness; large; magnitude of brightest star is 10.0 photo.

NGC 3330, Cr 226, Harvard 4, vdB-Ha 100, Lund 533, mag. 7.4, 10 38 47.5 -54 06 56, 7' in size, 39 stars; detached, no concentration of stars; moderate brightness range; magnitude of brightest star is 8.8.

NGC 2645, Pi 6, vdB-Ha 40, Lund 467, mag. 7.6, 08 39 40 -46 17 22, 3' in size, ± 12 stars. **Pi 8** is 26' to the east, and **Waterloo 4** is 15" to the east-northeast.

Mrk 18, Cr 205, vdB-Ha 57, Lund 493, (use Cr 205 for ID), mag. 7.8, 09 00 32 -48 59 06, 5' in size, 30 stars; detached, strong concentration of stars; moderately rich in faint stars; magnitude of brightest star is 9.3.

NGC 2670, Cr 200, Mel 93, Raab 80, vdB-Ha 50, Lund 484, mag. 7.8, 08 45 29.5 -48 47 30, 7' in size, 30 stars; detached, weak concentration of stars; moderate range in brightness; magnitude of brightest star is 9.3; pretty large.

Cr 205, Mrk 18, vdB-Ha 57, Lund 493, mag. 7.9, 09 00 35.9 -48 58 00, 2' in size, 8 stars. Located 25' southwest of **Gum 25** (part of **Gum 16 – the Vela SNR**).

NGC 3132, "Eight Burst Nebula", C 74, Bennett 43, "Southern Ring Nebula, He 2-40, Sa 2-53, PK 272+12.1, ESO 316-27, StWr 4-8, VV 54, mag. 8.0, 10 07 -40 26, 30" in size, is very bright, very large, a slightly oblong ring and smooth disk. The central star is a magnitude 10.0 hot white dwarf

emitting UV radiation.
Pi 6, vdB-Ha 81, Lund 522, mag. 8.0, 09 51 18 -53 10 00, 2' in size, ± 15 stars; detached, weak concentration of stars; moderate brightness range; magnitude of brightest star is 8.9.
Ru 82, Lund 518, mag. 8.1, 09 45 48 -54 00 00, 3.6' in size, ± 20 stars; detached, weak concentration of stars; moderate brightness range; magnitude of brightest star is 10.8.
NGC 2925, Cr 210, Lund 511, mag. 8.3, 09 33 10.9 -53 23 45, 15' in size, 40 stars; detached, no concentration of stars; small range in brightness.
Waterloo 6, Lund 486, mag. 8.4, 08 40 18 -46 07 53, 2.2' in size, 30 stars; detached, weak concentration of stars; large brightness range; magnitude of brightest star is 9.2.
NGC 2659, Cr 194, Mel 91, Pi 9, Raab 78, vdB-Ha 46, Lund 476, mag. 8.6, 08 42 33-45 00 02, 15'x15' in size, 80 stars; detached, no concentration of stars; large range of brightness; magnitude of brightest star is 9.7.
P 1-1, PK 285+1.1, mag. 8.6, 10 38.6 -56 47, is a planetary nebula.
vdB-Ha 46, Cr 194, Mel 91, Raab 78, NGC 2659, Lund 478, mag. 8.6, 08 42 48 -44 58 00, 14' in size, ± 80 stars.
NGC 2660, Cr193, Mel 92, vdB-Ha 45, Lund 475, mag. 8.8, 08 42 38 -47 12 02, 3' in size, 381 stars.
NGC 3033, Cr 212, Lund 519, mag. 8.8, 09 48 39.1 -56 24 42, 12' in size, 50 stars.
Ru 67, Lund 474, mag. 9.1, 08 41 42 -43 22 00, 6' in size, ± 35 stars.
Cr 213, Lund 524, mag. 9.2 photo, 09 54 36 -50 42 00, 17' in size, 21 stars.
Ru 79, vdB-Ha 77, Lund 515, mag. 9.2, 09 41 00 -53 51 00, 5' in size, ± 20 stars.
NGC 3105, Cr 214, vdB-Ha 82, Lund 528, mag. 9.7, 10 00 39.5 -54 47 15, 2' in size, 97 stars. **Ru 85** is 20' to the south-southeast, 26' to the west-northwest is **Hogg 8**, and 27' northwest is **Hogg 4**.
Pi 12, vdB-Ha 62, Lund 500, mag. 9.7, 09 20 00 -50 07 00, 5' in size, ± 20 stars.
Ru 83, vdB-Ha 80, Lund 520, mag. 9.8, 09 49 12 -54 36 00, 3' in size, ± 30 stars.
NGC 2972, Cr 211, Bennett 41a, vdB-Ha 76, Lund 518, mag. 9.9, 09 40 11.5 -50 19 15, 4' in size, 25 stars. Located 5˚ northwest of **Phi Velorum (IRAS 09386-5006). Hogg 1** is 16' to the south, while 25' to the north-northeast is **He 2-35**.
NGC 2866, Pi 13, vdB-Ha 64, Lund 504, mag. 10.0, 09 22 42 -51 10 43, 2' in size.
NGC 2736, "Pencil Nebula", "Peanut Nebula", "Herschel's Ray", 09 00 54.9 -46 01 01.5, 20' in size. Located 2.8˚ south-southeast of **Lambda Velorum**, part of the **Vela SNR**.
NGC 2982, Ru 80, Lund 516, 09 42 43 -44 06 33, 12' in size, 10 stars. Use **Ru 80** for ID.
NGC 3446, 10 52 07 -45 08 21, 6.5' in size, 26 stars.
Gum Nebula, Gum 12a and b, mag. 10+, 107'x720' in size; 12a – 07 55 -43 00, illuminated by **HD 68273**; 12b – 09 45 -38 00, illuminated by **HD 66811**. The **Vela SNR** lies within the **Gum Nebula**.
Vela SNR, 08 42 42 -45 09 16, contains the Vela Pulsar, the first pulsar identified optically (see other stars), and Gum 16, mag. 12+, 08 29 -43 45, 240'x120' in size.
Gamma Velorum Cluster, 08 09 32 -47 20 12, 18' in size, 10 stars, named after Gamma²Velorum.
Octopus Nebula, PK 318-3.1, ESO 215-04, 10 54.7 -48 47.
Vela Molecular Ridge (VMR), Cloud C, Clump6, RCW 36(contains Gum 20), is a vast cloud composed of molecular hydrogen, dust, complex molecules, atomic helium, and other material.
False Cross – asterism, the stars **Delta Vel, Kappa Vel, Epsilon Car,** and **Iota Car** form a cross-shape that has sometimes been mistaken for the **Southern Cross** (in **Crux**), resulting in navigation errors.
Deep Sky Beyond Magnitude 10 contains the following objects: 21 NGC; 1 IC; 13 Teu; 46 ESO; 15 Pi; 10 Sa(dark nebulae); 20 Sa(planetary nebulae); 26 Ru; 1 Cr; 23 vdB-Ha; 16 He; 10 Gum; 8 ASCC; 1 PKS, 9 MCG; 2 PK; 4 Alessi; 2 Pz, 1 SaSt; 1 Slr, 1 SrWr; 2 Klemola; 1 AGC, 1 Al-Teu; 4 SL; 4 Hogg; 7 Loden; 2 VRBC; 1 P; 1 Slo; 1 Sch; 1 Sr; 29 Wray, 1 Alessi(open cluster); 3 Pe; 1 Bas; 1 Muller; 1 Mayall; 8 RCW; 1 Lor; 1 Long; 1 DS; 4 SAI; 1 FeSt; 2 GDC, 1 Waterloo; 2 Kron; 5 R; 1 Raab; 13 Ced; 2 LoTr; 1 Majaess; 1 Ve; 5 VV; 1 Ste; and 27 Vela SNR parts. A total of 381 deep sky objects beyond magnitude 10. See me if you want the list.

Other Stars:

HD 75289, mag. 6.35, 08 47 40.41-41 44 10.5, has a hot **Jupiter** planet in a 3.51 day orbit at a separation of 0.0482 au.
Vela X-1 (HD 77581), mag. 6.87, 09 02 06.86 -40 33 16.9, is an X-ray pulsar system and an eclipsing binary with a period of 8.96 days. It is an emitter of particularly intense hard X-rays.
HD 93385, mag. 7.49, 10 46 15 -41 27 52, has two "super **Earths**" planets in orbit (masses 8.3 and 10.1 times **Earth**) with 13 and 46 day orbits.
IGR J08408-4503 (HD 74194), mag. 7.55, 08 40 47.79 -45 03 30.2, is a recurrent X-ray transient and a variable star.
HD 85512, mag. 7.67, 09 51 07 -43 30 10, has one planet in orbit.
HD 83443, mag. 8.24, 09 37 11.83 -43 16 19.9, has one planet in orbit.
HD 85390, mag. 8.54, 09 50 02 -49 47 25, is an orange dwarf star with two planets in orbit. One is 42 times **Earth** mass, with an orbital period of 788 days.
HD 73526, mag. 9.0, 08 37 16.48 -41 19 08.8, is a yellow main sequence dwarf star with two planets in orbit. Orbital periods of 187 and 377 days – they are in a 2:1 resonance orbits.
IRAS 08544-4431 (V390), mag. 9.18, 08 56 14.19 -44 43 10.8, is a post-AGB star.
Stars below magnitude 10 of some interest:
LSS 2018 (KV Velorum), mag. 12.12, 10 54 40.57 -48 47 02.9, is the central star of **DS 1(Drilling 1**), and is a re-radiating spectroscopic binary star.
Wasp 19, mag. 12.3, 09 53 40.08 -45 39 33.1, is a yellow main sequence dwarf star with a transiting hot **Jupiter** planet orbiting with a period of 0.78884 days.
GRS 1009-45 (MM Vel), mag. 14.71, 10 13 36.38 -45 04 32.0, is an X-ray nova star.
2S 0918-549, mag. 21.0, 09 20 26.47 -55 12 24.5, is a low-mass X-ray binary star.
PSR B1055-52, 10 57 58.84 -52 26 56.3, is a pulsar star.
PSR J0855-4644, 08 55 36.18 -46 44 13.4, is a pulsar ***possibly*** associated with the **Vela SNR**.
HH 46 IRS, 08 25 43.85 -51 00 32.6, is a young stellar object in **Herbig-Haro 46**.
Vela Pulsar (HU Vel), PSR 0833-45, mag. 23.8, 08 35 20.66 -45 10 35.2, is a pulsar associated with the **Vela SNR**. The pulsar spins at a rate of 89 milliseconds (11,195 revolutions per second), and is only about 11,000 years old. It is one of the youngest pulsars known and has been detected at visible wavelengths. It is the 2nd optical pulsar known, one of the strongest radio pulsars, the strongest gamma-ray source in the sky, and a powerful X-ray source.
Luhman 16 (WISE 1049-5319), 10 49 18.92 -53 19 10.1, is a pair of brown dwarf stars in a binary configuration with masses of 33.5 and 28.6 of **Jupiter**. They are 600 to 800 million years old, and have an orbital period of 27 years, and a separation of 3.5 au.
Stars Beyond Magnitude 10 are as Follows: 9Δ(Dunlop); 27 h(Herschel); 2 Hussey; 4λ; 4 Hld; 1 Rmk; 8 Rst; 2 Donner; 2 Finean; 3 See; 2 Cp; 2B, 5 Cor; 1 Syd, 3 R; 1 Jc; 6 Hu; 1 CorO; and 1 BrsO. A total of 99 stars.

Sky Happenings:November, 2018

(what follows pertains ONLY to the current month. Material above is good year after year.)

Nov. 3rd-6th Evening: **Mars** glides past **Delta Capricorni** these four evenings, brushing past the star a mere ½˚ away on the 4th.
Nov 4th - **Daylight Savings Time** ends at 2:00 AM local time. Set clocks back 1 hour.
Nov 5th - The **Moon** passes 10˚ north of Venus at 8 PM CST.
Nov 6th - **Mercury** is at greatest eastern elongation (23˚) from the **Sun** at 9 AM CST.
Nov 7th - **New Moon** occurs at 10:02 AM CST.
Nov 8th - Evening: An extremely thin crescent **Moon** is 3˚ above **Jupiter**, very low in the evening sky.
Nov 9th - **Mercury** passes 1.8˚ north of **Antares** at 12 AM CST (midnight),
The **Moon** passes 7˚ north of **Mercury** at 6 AM CST,
Evening: the thin crescent **Moon** is 6½˚ above **Mercury**, low in the evening sky.
Nov 11th - The **Moon** passes 1.5˚ north of **Saturn** at 10 AM CST,

Dusk: Look toward the southwest to see **Saturn** and the waxing crescent **Moon** about 3˚ apart.

Nov 12th - The **Moon** passes 0.9˚ north of **Pluto** at 12 PM (noon) CST – northeast **North America** will see an occultation.

Nov 13th - **Venus** is stationary at 9 PM CST.

Nov 14th - Dawn: **Venus** and **Spica**, in the east-southeast before sunrise, will be only 1˚ apart,
The **Moon** is at apogee (251,245 miles or 404,339 km from **Earth**) at 9:56 AM CST.

Nov 15th - **First Quarter Moon** occurs at 8:54 AM CST,
Evening: After sunset, look south to see the just-past-first-quarter **Moon** hanging 3˚ to the lower right of **Mars**,
The **First Quarter Moon** is 1˚ south of **Mars** at 10 PM CST,
Mercury is stationary at 11 PM CST.

Nov 17th - The **Moon** passes 3˚ south of **Neptune** at 12 AM (midnight)CST,
Asteroid **Juno** is at opposition at 4 PM CST.
All night: The weak **Leonid Meteor Shower** peaks in the early evening,

Nov 20th - The **Moon** passes 5˚ south of **Uranus** at 2 PM CST.

Nov 23rd - **Full Moon** occurs at 11:39 AM CST,
Evening: The **Moon**, just past full, and **Aldebaran** rise less than 3˚ apart in the east-northeast.

Nov 24th - The waning gibbous **Moon**, at 97% lit, will occult the 4.4 magnitude star **Xi Orionis** for 45 to 55 minutes for **North America**. It will disappear around 9:21 PM CST, and re-appear around 10:17 PM CST.

Nov 25th - **Neptune** is stationary at 2 AM CST.

Nov 26th - **Jupiter** is in conjunction with the **Sun** at 1 AM CST,
The **Moon** is at perigee (227,807 miles or 366,620 km from **Earth**) at 6:12 AM CST.

Nov. 27th - **Mercury** is in an inferior conjunction at 3 AM CST,
The **Moon** is 0.7˚ south of the **Beehive Cluster** (**M 44**) at 3 PM CST.

Nov 29th - Morning: **Regulus** will be about 2˚ to the lower right of the **Moon** in the hours before sunrise. Closer to dawn, **Venus** is retreating from **Spica**, but is still only 5˚ to the star's left,
Last Quarter Moon occurs at 6:19 PM CST.

Planets:

Mercury – In early November, you will have to observe **Mercury** at dusk, on the southwest horizon. On the 1st, **Jupiter** hangs 4˚ high 30 minutes after sunset, with **Mercury** (at magnitude -0.2) 5˚ to its left. On the 6th, **Mercury** reaches greatest eastern elongation (23˚) from the **Sun**, with **Jupiter 8**˚ to its right. On the 8th and 9th, The planet will shine at magnitude 0.0, only about 2˚ from **Antares** – but both will be hard to see in the **Sun**'s afterglow. During the next 10 days, **Mercury** becomes dimmer and lower, and is then lost to view. The planet will go through inferior conjunction on the 27th. On that day, the planet is less than ½˚ from **Jupiter**, but the two are only about 1˚ from the **Sun.**

Venus – Venus was at inferior conjunction on October 26th, but will become the brilliant "morning star" in the predawn twilight. On November 1st, the planet will rise about a half-hour before the **Sun**, growing to an hour before on the 4th, two hours on the 13th, and three hours on the 25th. The altitude of **Venus** at sunrise jumps from almost 6˚ to about 34˚ during November, and will brighten from magnitude -4.2 to a stunning peak brilliance of -4.9. On the 1st, the planet spans 61' at just 2% lit. On the 10th, less than 56" across and 7% lit, while on the 30th it will be down to 41" wide at 25% lit. **Venus**, early in the morning on November 6th, will be 9˚ to the right of a slender crescent **Moon**, and on the mornings of the 11th to the 19th, the planet approaches to within 1.5˚of **Spica.**

Mars – Mars, 34˚ high in the south as twilight fades, transits the meridian around 7 PM CST on November 1st, and around 5 PM CST on the 30th. During the month, the planet will dim from magnitude -0.6 to -0.1, with its apparent diameter decreasing from 12" to 9". **Mars** will set near midnight local time all month. The planet's eastward motion, in **Capricornus**, carries it 0.6˚ north of magnitude 2.8 **Delta Capricorni** on the 5th. The planet will then cross into neighboring **Aquarius** on the 11th, and on the 13th it passes within a moon's width of magnitude 4.3 **Iota Aquarii**. On the 15th, **Mars** passes 1˚ to the north of the **First Quarter**

Moon. On the 24th, the planet passes 8' southeast of magnitude 4.8 **Sigma Aquarii**. By the end of November, the planet glows at magnitude -0.1 and will lie 2.5˚ southwest of magnitude 3.8 **Lambda Aquarii**. On the 30th, the planet lies due south at an altitude of 41˚ as evening twilight ends. During the first few evenings, **Mars**' most conspicuous features will be near the center of its disk. Look for the dark, wedge shaped ***Syrtis Major*** just north of the equator, with the bright ***Hallas*** basin to its south.

Jupiter – As November starts, on the 1st, **Jupiter** hangs 4˚ above the horizon (at magnitude -1.7) 30 minutes past sunset, only to set within an hour after sunset. By the end of the first week of November, the planet is just a few degrees high 30 minutes after sunset, and then vanishes in the twilight during the second week of the month, on its way to a conjunction with the **Sun** on the 26th.

Saturn – Saturn stands 20˚ high above the southwest horizon in **Sagittarius** an hour after sunset in early November, only to set by little more than 3 hours after the **Sun**. By the end of the month, the planet will set 2 hours after the **Sun**. In early November, the planet shines at magnitude 0.5, with the **Lagoon** and **Trifid Nebulae** (**M 8** and **M 20**) lying just 4˚ to the east of the planet. By the end of the month, the planet's eastward motion carries it 3˚ farther (to 7˚) from the **Lagoon** and **Trifid Nebulae**. On the 30th, Saturn will lie 3.6˚ south of the 5th magnitude open cluster **M 25** and 1.5˚ northwest of the globular cluster **M 22**. The best views of the planet come in the early evenings during the first couple of weeks of November. On the 1st, **Saturn'**s globe measures 16" across the equator, and the ring system spans 36". A telescope will reveal the planet's brightest satellites. You can see 8th magnitude moon **Titan**, and a four-inch (or larger) instrument will also pull in a trio of 10th magnitude moons: **Tethys; Dione;** and **Rhea**.

Uranus – Uranus rises about 3 hours after **Neptune**. **Uranus** is in the southwest corner of **Aries**, about 10˚ due south of 3rd magnitude **Beta Arietis**. The planet will shine at magnitude 5.7. Your best bet for finding the planet is to start at the 4th magnitude star **Omicron Piscium** in neighboring **Pisces**. **Uranus** stands 2.4˚ northeast of this star on the 1st, and 1.6˚ north-northeast on the 30th. Do not confuse the planet with the magnitude 5.9 star **SAO 92659**. **Uranus** passes 14' due south of this star on the 9th. Only **Uranus** shows a disk, which spans 3.7" and sports a distinctive blue-green color.

Neptune – The planet rises among the background stars of **Aquarius** some 40˚ above the southeast horizon as darkness falls. It stands just 2˚ from the 4th magnitude star **Lambda Aquarii**. You will need binoculars or a telescope to see the 7.9 magnitude planet. On the 1st of November, you can find it 2.1˚ east of **Lambda Aqr** and 0.3˚ south-southwest of 6th magnitude star **81 Aqr**. The planet will creep westward until the 25th, reaching a stationary point 0.1˚ closer to **Lambda Aqr**. The planet will show a 2.3" disk with a subtle blue-gray color. Best views will come during mid-evening when the planet lies high in the south.

Pluto – Pluto is in **Sagittarius**, west of the **Teapot**, and will be located at RA 19 22.3, Dec. -22 07 on the 15th of November, with a magnitude of 14.3 and a 100% lit disk of 0.1" diameter.

Moon – On November 10th, at dusk, the **Moon** is a thin waxing crescent in the west-southwest, some 8˚ to the lower right of **Saturn**. On the 11th, it is a little more than 3˚ to the upper left of **Saturn**. A waxing gibbous **Moon** is about 3˚ to the lower right of **Mars** at nightfall on the 15th. The just-past-full **Moon** is 2½˚ to the left of **Aldebaran** after dark on the 23rd, and the waning gibbous **Moon** is less than 2˚ to the upper left of **Regulus** on the night of the 28th/29th. ***Favorable Librations***: Nov. 10th – **Oken Crater**; 11th – **Marinus Crater;** 23rd – **Galvani Crater**; and the 24th –**Xenophanes Crater**.

Asteroids **–** Asteroid **3 Juno** makes its closest approach to Earth at 2 AM CST on Thursday, November 16th. Reaching opposition at 4 PM CST on the 17th, reaching a peak magnitude of 7.4 – the brightest it has been since October of 1983. **Juno** rises during twilight and by mid-evening appears in the southeast sky to the lower right of **Aldebaran**. The asteroid resides in northern **Eridanus** in a region lacking prominent stars. On the 4th, **Juno** will lie about 0.1˚ southeast of the 5.3 magnitude star **35 Eridani**. On the 16th, **Juno** will be about 1˚ from the 4.5 magnitude star **32 Eridani**.

Comets **–** Comet **21P/Gacobini-Zinner** has started to fade away. The best of the lot in November should be **64P/Swift-Gehrels**, which passes nearly overhead during the evening hours. Plan to look for **Swift-Gehrels** during the first half of the month when the **Moon** won't affect the viewing. The comet moves eastward during this period slightly north of the 2nd magnitude star **Beta Andromedae** (**Mirach**). Astronomers think that **64P** could peak near 10th magnitude, the same as the nearby elliptical galaxy **NGC 404** (the **"Ghost of Mirach**"),

lying a mere 7' northwest of **Beta And**. My estimates of the location of **64P** are as follows: on the 6th – about 1.7˚ south of **Mu And**; on the 14th – about 1˚ north of **NGC 404** and **Beta And**; and on the 15th – about 1.7˚ south and slightly west of the star **45 And**.

The comet **46P/Wirteanen** will come into visual range in the middle of November, climbing northward in **Fornax** before crossing into **Cetus**. This will be the big "comet" for December. My estimates of its location are as follows: On the 19th – about 1˚ to the west of **Nu For**; on the 22nd – about 10.3˚ west of **Alpha For** or 1½˚ to the west of **Nu For**; on the 28th – crosses into **Cetus** at about 5½˚ west-southwest of **Upsilon Cet**.

Meteors – The **Leonid Meteor Shower** peaks on the night of November 17th/18th. The waxing gibbous **Moon** sets before 2 AM local time and the morning twilight starts after 5 AM, leaving more than 3 hours of undisturbed viewing. The meteors radiate from **Leo**, which climbs more than 60˚ high in the southeast before dawn. This meteor shower derives from the debris ejected over many millennia by the comet **55P/Tempel-Tuttle** – the last time this comet returned to the inner solar system was in 1998. Under dark skies, an average of between 15 and 20 meteors per hour may be seen.

There are at least three weak meteor showers associated with **Vela,** which includes the **Gamma Velids**, which run from January 1st to the 17th, peaking on the night of the 6th/7th, when around 2 to 3 meteors per hour can be seen; the **Delta Velids**, which peaks on February 15th with one meteor per hour; and the **Puppid-Velids** which run from December 2nd to the 16th, and peaks on the 12th with 4 meteors per hour.

When to View the Planets:

Evening Sky		Midnight		Morning Sky	
Mercury	**(southwest)**	**Uranus**	**(southwest)**	**Venus**	**(southeast)**
Mars	**(south)**	**Neptune**	**(west)**		
Jupiter	**(southwest)**				
Saturn	**(southwest)**				
Uranus	**(east)**				
Neptune	**(southeast)**				

DARK SKY VIEWING - PRIMARY ON NOVEMBER 10TH, SECONDARY ON NOVEMBER 17TH (JUST AFTER FIRST QUARTER MOON)

Mythology:

Vela – the Sails

One of the three sections, into which the French astronomer Nicolas Louis de Lacaille, divided the Greek constellation of *Argo Navis*, the Argonaut's ship, in 1763. *Vela* represents the ship's sails. The other sections are *Carina* – the Keel, and *Puppis* – the Stern (see the March 2018 newsletter for *Puppis*). As a result of the dismantling of *Argo Navis*, *Vela* has no stars labeled Alpha or Beta, since these stars were retained in *Carina*. *Vela's* brightest star is Gamma Velorum, a second magnitude star.

Argo Navis represented the fifty-oared galley in which Jason and the Argonauts sailed to fetch the *Golden Fleece* from Colchis in the Black Sea.

The End