Newsletter of the Baton Rouge Astronomical Society

Next Meeting: Monday, December 12th, 7PM at HRPO

(2nd Mondays, Highland Road Park Observatory)

Christmas Dinner and Election of Officers

What's In This Issue?

President's Message

Well, here it is the end of the year. A lot of things have happened this year –

- LIGO and the "Proof" of the existence of gravity waves,
- "Tabby's Star" ("Tabby" has moved to Baton Rouge and is a Professor at LSU),
- New Horizons flyby of Pluto and
- Dr. Alan Stern –Principle Scientist of New Horizons giving two talks at LSU, further exploration of Mars and its possibilities, "reusable" first stages of rockets, and many more happenings,
- not to mention the flooding here in Baton Rouge.

Snoopy Santa says: "You know the drill. The club brings the m*eat. You bring a dish (if you wish). Bring* your family. Bring a friend. Prepare to enjoy!"

Please come to the December meeting and nominate/vote for your officers for 2017. This is also our Christmas Party – a potluck. Besides feasting and voting for officers, we will have our year-end raffle, and you'll have a chance to win free raffle tickets via a holiday game prepared by Michele Fry.
Please allow extra time to arrive, due to holiday traffic jams.

Rockefeller Wildlife retreat and star gaze is in January – if you have not been there yet, make plans. Also, in January, is the annual "Learn to Use Your Telescope" by BREC- Volunteers needed. In March we will hold our star party at Hodges Gardens –come out for great skies and to support BRAS.

There is a new project by a high school student who is asking for assistance – the project is on variable stars. Chris Kersey can give you the details if you are interested.

The 35th Birthday Party was a fascinating trip down memory lane. See Party Pics below. The **Super Moon Photo Contest** results are also shown in these pages, and the winner was Scott Louque.

A sidewalk Astronomy event will be at Perkins Rowe on Dec. 8th. Contact Ben Toban for all the details and to volunteer.

For anyone who wants to go to the Texas Star Party (TSP) – the 39th annual will be held on May 21-28 near Ft. Davis in Texas, you need to send in your request before Jan. 20th – only 500 attendees will be selected from those requested. There will be a mirror-making workshop where you can make your own mirror during TSP. Submit your request to attend the TSP at http://texasstarparty.org/get-started/ .

Clear Skies,

John R. Nagle

John R. Nagle
President of BRAS
Observing Chairperson

Message From Our Treasurer:

2017 BRAS dues are due by the end of January. You can pay Trey Anding in person at the monthly BRAS meeting, or you can send your dues to the following address:

Baton Rouge Astronomical Society
P.O. Box 83162
Baton Rouge, LA 70884

- If you paid for a partial year in 2016, you must pay again for 2017 in order to renew your membership.
- Dues are $20 + $5 for each additional family member that lives at the same address.
- Family members who do not live at the same address must pay the full amount.
- Dues for members under 17 are $10 if they are not covered by the $5 membership mentioned above.

SUPERMOON PHOTO CONTEST

We had a clear winner as we had only two photos, this real one taken with a telescope, and the other one was Photoshopped (a few pages below).

Winner, Scott Louque

Equipment: Camera: Canon IS1100IS Powershot mounted afocally to my 20mm eyepiece Telescope: Celestron 6" Newtonian. Recorded 1:07 sec of video and then stacked and adjusted wavelets in Registax.

2016 Officers:

President: John Nagle
Vice-President: Don Weinell
Secretary: Ben Toman
Treasurer: Trey Anding

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

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

Secretary's Summary of November Meeting

- John Nagle, presiding
- John started off by announcing that this was the 35th anniversary of BRAS and that Craig would show slides and discuss the origins of the organization.
- There are currently no outreach events planned, but the officers are still looking for volunteers to step up and help out whenever the need arises. There is another student that is asking for assistance on a variable star school project; see Chris for more information if you are available to help on this.
- Chris is also looking for volunteers among the club members to help with Evening Sky Viewing Plus Nights as well as Solar Viewing at the Observatory; see him if you can help.
- Dr. Brad Schaefer's Lecture on Friday, November 18th is about an ancient astronomical calculator called the Antikythera Mechanism.
- Don reminded everyone about the Hodges Gardens Star Party coming up in March (3/22 – 3/26) and announced that the Rockefeller Star Party was set up for the last weekend in January (1/27 – 1/29).
- Craig started off his talk by saying that there needed to be a club historian so that the slides he had could be backed up and loaded on the BRAS website. Using the slides he then spoke about what he remembered about how the group got started and how it developed through the years. Others who had been in the group for a while added to his comments. Melanie Templet was present and added her perspective about how HRPO came to be. Merrill Hess also stood up and spoke briefly about his long history with the club.
- At the end of the meeting, the officers were asked to come forward, everyone sang "Happy Birthday", and cake and ice cream were served by Michele Fry.
- There was a reminder about the Christmas Potluck for the next meeting on December 12th. Everyone is encouraged to bring a dish to share at that time. Please keep in mind, too, that this time will be used to elect officers.

Roslyn Readinger
BRAS Substitute Secretary

Here was our party Invitation

Birthday Party Photos

The Cake
1981 - 2016

Presidents In Attendence, L to R:
Don Weinel, Wally Pursell, Melanie Templet, John Nagle, Craig Brenden, Merrill Hess, Bob Sinetere with his wife.

Club History Reviewed by Early Presidents –

#1 Craig gave an impressive Slide Show of the earliest days,
2# - Melanie told about the initial proposal and grant to fund the observatory.
#3 Merrill talked about how the site was chosen, getting the BREC building moved there, and LSU procuring the 20" telescope.

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BRAS Outreach Report

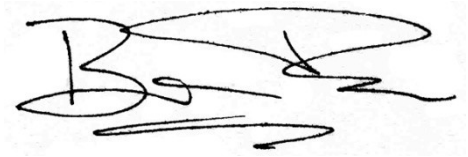
Hi Everyone,

The onset of the holiday season has slowed the call for outreach right down, but we do have a couple of events coming up. First of all, the HRPO will be open for the Geminid Meteor Shower and will also be needing some help for Evening Sky Viewing Plus in December (dates/times below.)

And finally, we can announce the return of Sidewalk Astronomy starting this month! This has already gotten a great response from members so we are currently set for telescopes, but if you'd like to drop by to hang out or add your two cents to the discussion about the night sky, please feel free to join us. (Date/time below.)

Please let me know as soon as possible if you are able to help out with outreach events listed. Also, keep in mind that if you intend to help out at BREC events at the HRPO, you must first fill out the various volunteer forms that BREC requires. Those can be obtained at the HRPO.

Clear Skies,



Ben Toman
Interim Outreach Coordinator

Thursday, December 8th
Sidewalk Astronomy
6:30PM-9:00PM
Perkins Rowe Shopping Center
(Telescopes and Info)

Tuesday, December 13th
Geminid Meteor Shower
9:00PM-1:00AM
Highland Road Park Observatory
(Various tasks)

Saturday, December 17th
Evening Sky Viewing Plus
7:30PM-10:00PM
Highland Road Park Observatory
(Various tasks)

The way we expect a SuperMoon to look.
*Photo by **Michele Fry** on the way to the party, taken with her iPhone 6.(with Scott Louque's Supermoon photo superimposed over the real one half the size.)*

BRAS Light Pollution Committee Report

2nd Mondays, from 6:15 pm to 7:00pm, before the BRAS public meeting.

One does not need to be a BRAS member to attend.

The Light Pollution Committee was made a standing committee, under the guidance of Thomas Halligan. The committee still needs a volunteer for Secretary of the committee. Due to the Christmas Party, there will be no LPC meeting in December.

Thomas J. Halligan

Thomas Halligan
Light Pollution Chairperson

Space is right overhead—double stars, nebulae, the Milky Way Galaxy and other galaxies. We can see it if we let it through.

Question: Why did the reindeer cross the Mobius Strip?

(Answer somewhere herein)

Recent Entries in the BRAS Forum

Below are selected additions to the BRAS Forum from 27 November to. There are also nine active polls. The Forum has reached 4200 posts.

Information about the O'Meara Ghost Hunt
New Science Briefing on the James Webb Space Telescope
Kate Rubins Returns to Earth…
…and Peggy Whitson Returns to the ISS!
CYGNUSS will Increase Accuracy of Hurricane Predictions
Innovation Mission Day on 1 November
Moon-Mars Conjunction on 5 November
November's Supermoon was Closest Since 1948
Three Lunar Halos Spotted in November
Website Devoted to Tabby's Star
Information on the Moth Cluster, Caroline's Rose, the Owl Cluster, the Veil Nebula and the NGC 4298/4302 Pair

BRAS's 20/20 Vision Campaign

GLOBE at Night: 20 Dec to 30 Dec

2016 GOAL: 200 Measurements. CURRENT: 63

OBSERVATIONS NEEDED FOR SCHOOL PROJECT

BRAS is in the process of assisting yet a student at St. Joseph's Academy acquire raw data. This young lady will need data concerning how light pollution effects the view of certain variable stars while they are at their minima. The list of stars, their magnitude ranges and the times of the year to view each will be listed in the January issue.

Observations should only be made when the Moon is below the horizon. Each observation should include the location's GLOBE at Night measurement or SQM measurement. Use all of these parameters to report your results to observatory@brec.org.

Messages from HRPO

The Highland Road Park Observatory will be closed on 24 June.

FRIDAY NIGHT LECTURE SERIES

all start at 7:30pm

2 December: "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. BRAS member Merrill Hess will be the presenter. Merrill is very knowledgeable about this subject, having owned several pieces of equipment over the years and having helped discover five asteroids with LSU's 20OGS telescope at HRPO.

9 December: "The Star of Bethlehem" This season reminds us of the famous story from Christian Scripture about the Magi being spurred by the sight of the Star of Bethlehem to take a trip and visit a newborn. However, what was the Star? Scripture gives little description, only scant clues. What exactly occurred in the Middle East 2000 years ago? Can modern scientific calculations shed light on the puzzle? LSU physics professor Brad Schaefer will use current theory to take the audience step-by-step toward the solution to the mystery. If you've never experienced this lecture before, don't miss out. This is Professor Schaefer's thirteenth consecutive year bringing this incredible presentation to HRPO patrons. During his career he has published in Sky & Telescope magazine, discovered a long-lost ancient atlas, appeared on a National Geographic program and earned an invitation to the Nobel Physics Prize ceremony!

16 December: "Skygazing Binoculars" Unlike a telescope, a good binocular for nighttime sky viewing can be gotten at a variety of retailers in town. Whether gift-hunting or searching for oneself, acquiring the right binocular will yield a plethora of celestial beauty. The Earth's Moon alone has at least two dozen features easily accessible with a good binocular. Come learn the ins-and-outs of acquiring a handheld device that will work every time!

SCIENCE ACADEMY

Saturdays from 10am to 12pm

For ages eight to twelve. $5/$6 per child.

3 December: "Uranus and Neptune"
10 December: "Venus"
17 December: "Surveying the Earth"

ONE-TIME CALLS FOR VOLUNTEERS

***Saturday 30 December, 6pm to 10pm**. **2017 Preview Party.** *Two or three volunteers.* Telescope operation, physical science demonstrations, front desk duty. Easy to moderate difficulty.

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". Also, we would more than welcome any who can help for at least one or two hours anytime during Winter Rocket Camp. We are asking any BRAS volunteers with time to assist. Thank you.

UPCOMING HRPO EVENTS

(click links for more detailed info)

Geminid Meteor Shower

Tuesday, 13 December from 9pm to 1am

No admission fee. For all ages.

The Geminid meteors, in addition to being part of one of the most reliable showers of the year, are quite intriguing. The first Geminids were noticed in the 1860s. Astronomers searched for the comet which left behind the debris field responsible for the Geminids. In the 1980s, after over a century of searching, scientists pinpointed an asteroid now known as Phaethon as the originator of the debris. Any meteors that are part of this shower seem to radiate from a point in the sky near the star Castor, in the constellation Gemini. For this *one* night HRPO will be open for four hours, during which time members of the public are welcome. Due to the light pollution problem here in East Baton Rouge Parish, it is feasible to attempt viewing of this major shower only during its peak time, which according to the American Meteor Society will be the evening of the 13th through to the morning of the 14th. Earth's Moon will be in its waxing gibbous phase in the constellation Taurus and will be above the horizon for the entire viewing time. Patrons *must* follow the rules and regulations below if they expect to stay on park property.

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Winter Rocket Camp

Wednesday 28 December and Thursday 29 December

8am to 5pm daily. For ages nine to thirteen.

$55 per in-parish child. $66 per out-of-parish child.

For centuries humanity wondered what it would be like to fly, and then fly into space. Of course, it's no longer fantasy due to the hard work of the Wright brothers

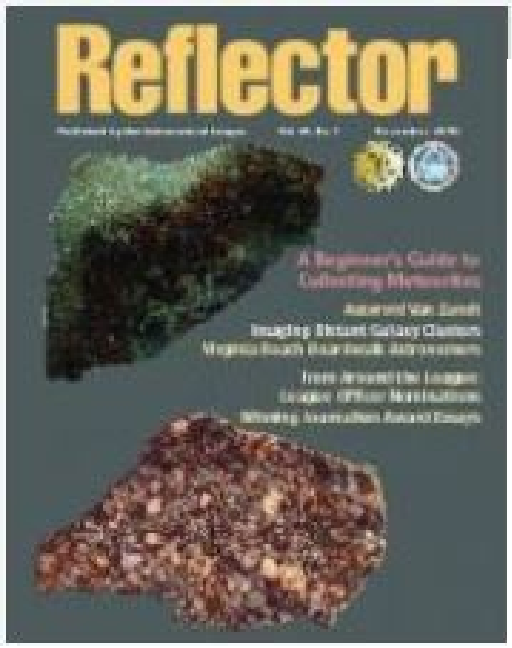
Robert Goddard and others. The thrill of watching (or being inside) a hot-air balloon, helicopter, jet, rocket or spacecraft never seems to leave us.
At Fall Rocket Camp, kids will learn a brief history of flight as well as the basics of rocket science. They will also learn the safety procedures required for a safe launch and recovery. Then—the kids will build and a rocket! After the flights, the children take their rocket home. The rocket this go-round will be the ever-thrilling two-stage Mongoose; it flies so high HRPO personnel reserve the ball fields next door for launch!

2016 Horkheimer/O'Meara Journalism Award

This year's 2nd place award goes to our own ***Ephraim Craddock*** of Baton Rouge Astronomical Society, a fifth grade student at Galvez Primary School in Prairieville, Louisiana, who wrote on

"Examining the Mystery of Tabby's Star."

Read the article in the Astronomical League's December 2016 issue of Reflector, Page 25



DID YOU KNOW?

Every BRAS member is automatically a member of the Astronomical League. That's right. Our club purchases a group membership every year. Benefits include:
1. Your own print subscription to Reflector Magazine.
2. League Observing Programs and Awards
3. League Store – Observing Guides, Books, apparel, etc.

Answer: To get to the same side.

Observing Notes:

by John Nagle

Sculptor Apparatus Sculptoris

Position: RA 23 06.4 to 01 45.5, Dec. -24.80 to -39.37°

Named Stars

There are no named stars in Sculptor

Deep Sky:

Blanco 1, mag. 4.5, 00 04.3 -29 56, 90' in size, is an open cluster, also called the **Zeta Sculptoris Cluster,** of 30 stars; detached, no concentration of stars; moderate brightness range.
NGC 253, Caldwell 65, "Sculptor Galaxy", "Silver Coin Galaxy", "Silver Dollar Galaxy, mag. 7.6, 00 47.6 -25 17, 26'x6' in size, is an extremely bright, extremely large, and very elongated galaxy; has complex dust lanes; extremely small, bright nucleus. **NGC 253** can easily be seen with binoculars, and is located 7½° south of the bright star **Beta Ceti. NGC 253** is a strong radio source, and a supernova, SN1949E, was observed in this galaxy. **NGC 253** is the largest member of the Sculptor Group of Galaxies. **NGC 253** is located 4.8° north-northwest of **Alpha Sculptoris** (mag. 4.30, 00 58 36.35 -29 21 26.9), and 1.8° northwest of **NGC 288.**
NGC 55, Caldwell 72, "The Southern Cigar Galaxy", mag. 8.1, 00 15.1 -39 13, 31'x6' in size, is a very bright, very large, and very elongated galaxy. **NGC 55** is the brightest member of the Sculptor Galaxy Group. **NGC 55** is a barred spiral galaxy seen almost edge on, and is located 3.7°north-northwest of **Ankaa (Alpha Phoenics).**
NGC 288, mag. 8.1, 00 52.8 -26 35, 12' in size, is a globular cluster with a low concentration of stars; large, bright, slightly elongated. **NGC 288** is located 1.8° southeast of **NGC 253** and 3.1° north-northwest of **Alpha Sculptoris.** The **South Galactic Pole** is 37' to the south-southwest.
NGC 300, Caldwell 70, mag. 8.1, 00 54.9 -37 41, 19'x13' in size, is a very bright, very large, and elongated S-shaped galaxy; contains dark lanes; bright, extremely small nucleus; a member of the Sculptor Galaxy Group. **NGC 300** has an X-ray source at its core, designated **NGC 300 X-1**, with the source believed to be a Wolf-Rayet/black hole binary system. **NGC 300** is located 7.2° northeast of **Ankaa (Alpha Phoenics).**
Sculptor Dwarf Galaxy, PGC 3589, mag. 8.8, 01 00 09.3 -33 42 33, is a dwarf spheroidal galaxy that is a satellite of the **Milky Way**, and contains only 4% of the carbon and other heavy elements that the **Milky Way** has, making it similar to primitive galaxies seen at the edge of the universe.
The Sculptor Group of Galaxies brightest members are **NGC 253, NGC 247, NGC 7793, PGC 6430, and NGC 625** in the Phoenix constellation.
Abell 2667, 23 51 42 -26 00 00, is a galaxy cluster at a red shift of 0.2, and a known gravitational lens.
Abell 2744, "Pandora's Cluster", 00 14 19.51 -30 23 19.18, is a giant galaxy cluster in which the gas is so hot that it shines in X-rays. Dark matter makes up around 75% of the clusters mass. **Abell 2744** has a red shift of 0.3, and shows a radio halo.

Other Stars:

Alpha Scl, mag. 4.30, 00 58 36.35 -29 21 26.9, is a blue-white giant star and a helium weak star that rotates ever-so-slowly. **Alpha Scl** can generate a huge stellar magnetic field, and can even flip its magnetic poles.
Beta Scl, mag. 4.38, 23 32 58.19 -37 49 06.1, is a blue-white sub-giant star, and a mercury-manganese star with a strong magnetic field.
Delta Scl, mag. 4.59, 23 48 55.48 -28 07 48.1, is a triple star with the primary being a white main sequence dwarf star, the first companion is at 11th magnitude separated by 4 arc seconds, and the second companion is a yellow star at mag. 9.4, orbiting the pair at a separation of 74 arc seconds.
Epsilon Scl, mag. 5.29, 01 45 38.65 -25 03 08.8, is a multi-star system. The primary is a yellow-white sub-giant star with the first companion being a yellow dwarf star at mag. 8.6 – both stars complete an orbit around their common center of mass every 1200 years. There are two more companions in the system – one at 15th magnitude separated by 15 arc seconds from the main pair of stars, and the other companion is at 11th magnitude and separated by 142 arc seconds from the main pair. Around the year 2920, the **Epsilon Sculptoris** system will have moved into the **Fornax** constellation.
Zeta Scl, mag. 5.04, 00 02 19.91 -29 43 13.6, is a binary star the primary component is a blue-white main sequence dwarf star, its companion is a 13th magnitude star with a separation of 3 arc seconds.
Kappa Scl is two systems separated by 0.53° in the sky. **Kappa ¹ Scl**, mag. 5.42, 00 09 21.02 -27 59 16.5, is itself a triple star system composed of a binary pair of yellow giant stars at mag. 6.2 and 6.3, and an 18th magnitude companion separated by 70 arc seconds from the main pair. **Kappa² Scl**, mag. 5.41, 00 11 34.42 -27 47 59.2, is a binary star consisting of an orange giant star and a 21st magnitude companion 46 arc seconds away.
Lambda Scl is another Bayer designation shared by two separate star systems in **Sculptor. Lambda¹ Scl**, mag. 6.05, 00 42 42.89 -38 27 48.5, is a binary system with the primary being a blue-white main sequence dwarf star at mag. 6.7, and the companion is a white star at mag. 7.0. **Lambda² Scl,** mag. 5.90, 00 44 11.92 -38 25 19.1, is an orange giant star.
R Scl, mag. 5.72, 01 26 58.10 -32 32 35.2, is a red giant star in the final stage of its existence. **R Scl** is notable for the unusual spiral structure in the material surrounding it. It is suspected to have an unseen binary companion toward which it is throwing off gas.
HD 9770, mag. 7.10, 01 35 01.04 -29 54 37.0, is an eclipsing binary star.
HD 4208, mag. 7.79, 00 44 26.65 -26 30 56.4, is a yellow main sequence dwarf star with a planet in orbit, having a mass of 0.6 times that of **Jupiter**, and an orbital period of 828 days.
HD 4113, mag. 7.91, 00 49 12.60 -37 58 57.5, is a yellow dwarf star with a planet in orbit, having a mass at least 1.56 times that of **Jupiter**, and an orbital period of 526.62 days.
HD 9578, mag. 8.20, 01 33 17.14 -38 14 42.1, is a yellow main sequence dwarf star with a planet in orbit having at least 0.62 times the mass of **Jupiter** and an orbital period of 494 days.
WASP 8, mag.9.89, 23 59 36.07 -35 01 52.9, is a yellow main sequence dwarf star with a planet, **WASP 8-b**, discovered using the astronomical transit method, having a mass 2.23 times that of **Jupiter**, and an orbital period of 8.16 days.
Beyond mag. 10, there are 52 NGC, 12 IC, 2 PGC, and 2 ESO objects.

Sky Happenings: Deember,2016

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

Dec. 2nd - **Asteroid Vesta** is stationary at 10 PM CST.
Dec. 3rd - The **Moon** passes 6° north of **Venus** at 7 AM CST.
Dec. 5th - The **Moon** passes 3° north of **Mars** at 5 AM CST.
Dec. 6th - The **Moon** passes 0.7° north of **Neptune** at 4 PM CST.
Dec. 7th - **First Quarter Moon** occurs at 3:03 AM CST.

Dec. 9th - The **Moon** passes 3° south of **Uranus** at 2 PM CST.
Dec. 10th - **Saturn** is in conjunction with the **Sun** at 6 AM CST,
Mercury is at greatest eastern elongation (21°) at 11 PM CST.
Dec. 12th - The **Moon** is at perigee (222,737 miles from **Earth**) at 5:29 PM CST,
The Moon passes 0.5° north of **Aldebaran** at 11 PM CST.
Dec. 13th - **Full Moon** occurs at 6:06 PM CST.
Dec. 13th/14th Night: The strong and reliable **Geminid Meteor Shower** peaks on the evening of Dec. 13th, and should be fairly active on the nights before and after, too. However, the full **Moon** will hide all but the brightest meteors.
Dec. 15th - Dwarf planet **Ceres** is stationary at 1 AM CST.
Dec. 18th - Morning: **Regulus**, the brightest star in **Leo**, sparkles 5-6° to the lower left of the waning gibbous **Moon** after midnight on Dec. 17/18,
The **Moon** passes 1.0° south of **Regulus** at 1 PM CST.
Dec. 19th - **Mercury** is stationary at 1AM CST.
Dec. 20th - **Last Quarter Moon** occurs at 7:56 PM CST.
Dec. 21st - **Winter Solstice** occurs at 4:44 AM CST – Winter officially starts in the northern hemisphere.
Dec. 22nd - Morning: Rising in the east by about 2 AM Standard Time, the waning crescent **Moon**, bright **Jupiter,** and white **Spica** form a line about 9° long,
Ursid Meteor Shower peaks,
The **Moon** passes 2° north of **Jupiter** at 11 AM CST.
Dec. 24th - The **Moon** is at apogee (252,196 miles from **Earth**) at 11:55 PM CST.
Dec. 27th - The **Moon** passes 4° north of **Saturn** at 3 PM CST.
Dec. 28th - **Mercury** is in inferior conjunction at 1 PM CST.
Dec. 29th - **New Moon** occurs at 12:53 AM CST,
Uranus is stationary at 10 AM CST.
Dec. 31st - **Mars** appears within 0.1° (4 to 11 arc minutes) of **Neptune** during the evening hours.

Planets:

Mercury –Thirty minutes after sunset on Dec. 1st, a two-day-old **Moon** stands 15° high in the southwest, and if you drop ⅔ the way to the horizon from there, you will see **Mercury. Mercury** shines at mag. -0.5, bright enough to see against the twilight with the naked eye, though you may need binoculars to locate it initially. Through a telescope, **Mercury** shows a 5.6" diameter disk that is 82% lit. At greatest eastern elongation on Dec. 10th, **Mercury** lies 21° east of the **Sun** and appears 7° high a half-hour after sunset. Through a telescope, **Mercury** reveals a disk that spans 6.6" with sunlight illuminating 63% of the disk. On Dec. 17th, **Mercury,** at mag. 0.0, shows a disk that measures 8.0" across and is just ⅓ lit. **Mercury** becomes lost to view around Dec. 19th, and passes through inferior conjunction with the **Sun** on Dec. 28th.

Venus – The waxing crescent **Moon** lies 8° above **Venus** on Dec. 3rd. The sunset altitude of **Venus** increases from about 24° to 34° in the southwest as twilight fades in Dec. During Dec., **Venus'**s magnitude swells from -4.2 to -4.4, as **Venus** races from eastern **Sagittarius** all the way through dim **Capricornus. Venus**'s diameter enlarges from 17" to 22" in the telescope, while its gibbous phase thins from about 68% to 56% lit. On Dec. 6th, **Venus** passes 0.8° south of the 9th magnitude globular cluster **M 75** in **Sagittarius**. The following day **Venus** crosses into **Capricornus,** and then makes a beeline through the heart of the **Sea Goat. Venus** slides 1° north of the mag. 2.8 **Delta Capricorni** on Dec. 28th. **Venus** slips across the boundary to **Aquarius** in the final days of 2016.

Mars – **Mars** begins the month in central **Capricornus.** Its eastward journey carries it to 1.5° north of **Delta Capricorni** on Dec. 11th, and **Mars** crosses into **Aquarius** on Dec. 15th. **Mars** dims from mag. +0.6 to +0.9 during Dec. **Mars** reaches the middle of **Aquarius** by New Years Eve, when it will have a spectacular reunion with **Neptune** during the closest conjunction between these two planets in more than 700 years.

Jupiter – **Jupiter,** moving slowly against the backdrop of central **Virgo** during Dec., will stand 8° northwest of 1st magnitude **Spica** on Dec. 1st, with the planet's eastward journey carrying it to a point 4° north-northwest of **Spica** by Dec. 31st. As Dec. begins, **Jupiter** rises around 1:30 AM, and midnight as Dec.

ends. **Jupiter**'s magnitude improves from -1.8 to -1.9, and its width, in the telescope, improves from 31" to 35" during Dec. For best views of **Jupiter** through a telescope, wait until it climbs some 30° above the southeastern horizon an hour or so before twilight begins. **Jupiter**'s outermost moon **Callisto** can be found due north of the planet's disk around 2 AM CST on Dec. 11th. **Ganymede**, the solar system's largest moon, begins to transit **Jupiter**'s north polar region at 1:40 AM CST on Dec. 14th. Although only observers in eastern **North America** can witness the transit's start, nearly everyone can see the conclusion at 4:08 AM CST. Io' at 5:21 AM CST. Dec. 17th finds **Europa** beginning to transit **Jupiter** at 2:56 AM CST, just 17 minutes before **Europa**'s shadow leaves the planet's disk on the opposite limb. On Dec. 3rd, a nice set of events involving **Ganymede** takes place for western **North America**. **Jupiter** will occult **Ganymede**, with **Ganymede** vanishing into **Jupiter**'s shadow, emerging briefly into sunlight, and then disappearing behind **Jupiter**'s disk. **Ganymede** comes out of **Jupiter**'s shadow at 4:02 ***PST*** on Dec. 3rd, and then slips behind **Jupiter**'s disk at 5:24 AM PST (***note PST***).

Saturn – **Saturn** passes through conjunction with the **Sun** on Dec. 10th, and is not visible for most of the month. By Christmas morning, however, **Saturn** rises an hour before the **Sun,** glowing faintly through the brightening dawn at mag. +0.5. Look for it to the lower left of mag. +1.0 **Antares**. On Dec. 31st, **Saturn** rises nearly 90 minutes before the **Sun** and climbs 6° above the southeast horizon some 45 minutes before sunup, shining at mag. 0.5.

Uranus – **Uranus** is in **Pisces**, standing high in the southeast after nightfall, and climbs nearly ⅔ of the way to the zenith in the southern sky an hour or two later. **Uranus** shines at mag. 5.8, bright enough to see with the naked eye from a dark-sky site, using binoculars makes it easier to see. To find **Uranus**, first locate 5th magnitude **Zeta Piscium**. This nice double star lies 17° east-southeast of mag. 2.8 **Algenib** (**Gamma Pegasi**), the star at the southeast corner of the **Great Square of Pegasus**. **Uranus** lies less than 1° east of **Zeta Piscium** throughout Dec. The gap between them closes from 52' on Dec. 1st to 35' during the final days of Dec. Don't confuse **Uranus** with the 6th magnitude star **88 Piscium**, which lies 38' south-southeast of **Zeta Piscium**. A telescope will confirm a planet sighting by revealing its 3.6" diameter and a blue-green disk.

Neptune – **Neptune** stands fairly high in **Aquarius** at nightfall all month. On Dec. 6th, 8th magnitude **Neptune** is occulted by the dark side of the first quarter **Moon** after dark in the northeastern **United States**. On Dec. 31st, New Years Eve, **Neptune** and **Mars** will have their closest conjunction in more than 700 years. For **North American** observers, the two planets stand 9.8' apart on the **East Coast**, and just 4.4' apart on the **West Coast** an hour before they set. In **Hawaii, Mars** skims 1.3' north of **Neptune**. Through a telescope, **Neptune** looks like an 8th magnitude satellite of **Mars. Mars'** disk will span 5.7" on Dec. 31st, with **Neptune**'s disk spanning 2.2".

Pluto – **Pluto** is lost in the solar glare during Dec.

Sun – The **Sun** reaches the Dec. solstice at 4:44 AM CST on Dec. 21st, marking the beginning of **Winter** in the **Northern Hemisphere**, and **Summer** in the **Southern Hemisphere**.

Moon – the **Moon** is a slender crescent some 10° above a very low **Mercury** in the bright twilight on Dec. 1st. The waxing lunar crescent cuts about 8° to the right of **Venus** on Dec. 2nd, and about 7° above **Venus** on the 3rd. On Dec. 4th, the thickening crescent hangs about 6° to the right or lower right of **Mars,** and on the 5th it is 7° to **Mars**'s upper left. On the night of Dec. 12th/13th, the night before the **Full Moon**, the **Moon** occults **Aldebaran** for westernmost **Europe** and all of the **United States** except **Alaska**. The waning gibbous **Moon** is 4° to the lower right of **Regulus** at dawn on Dec. 18th. The waning lunar crescent stands just a few degrees to the upper right of **Jupiter** on Dec. 22nd, with 4th magnitude **Theta Virginis** peeking between the two (for **North American** observers). The next morning, Dec. 23rd, the **Moon** forms a fairly compact triangle with **Jupiter** and **Spica**, low in the southeast, as dawn brightens. On Dec. 28th, the razor sharp waning crescent **Moon** will be almost indiscernible in an even brighter sky, well to **Saturn**'s lower left.

Asteroids – The largest object in the asteroid belt is the dwarf planet **Ceres**, which spans 600 miles and holds approximately ⅓ of the asteroid belts mass. Fortunately, **Ceres** now climbs more than halfway to the zenith in the southern sky in the earls from mag. 8.1 to 8.6 during Dec.; it lies in a fairly

sparse region of **Cetus the Whale**. To find **Ceres**, first locate 3.6 mag. **Theta Ceti**, located on the **Whale**'s back. Then head 8° north to mag. 5.6 star **42 Ceti. Ceres** lies about 3° east of **42 Ceti** during the first half of Dec. before it starts moving northward.

Late on Monday night, Dec. 12th/13th, telescope users from the **Texas Gulf Coast** north to **Winnipeg**, **Canada**, can watch for an 8.8 mag. star in central **Cetus** to vanish for up to 9 seconds, occulted by the 14th magnitude asteroid **772 Tanete**. The occultation will take place around 1:30 AM CST in **Texas**, and 1:32 AM CST in **Winnipeg.** The star will be fairly low in the southwest. This occultation is of special interest. Observations of another occultation by **Tanete**, on April 18, 2004, suggest that it has a small satellite a few hundred miles from the main object.

Comets – Comet **45P/Honda-Mikso-Pajdusakova** can be seen on Dec. 15th when the **Moon** moves out of the evening sky. You will need an open view to the southwest and have eye to eyepiece an hour after sunset. The comet, at mag. 10.0, lies about 15° above the horizon on Dec. 15th. A bonus on the 15th is the presence of the 9th magnitude globular star cluster **M 75** just 1.5° to the west-northwest. The comet should brighten to 8th magnitude by month's end. On Dec. 21st, comet watchers will get an edge-on view of its fan shaped dust outflow. Based on previous visits, this comet is expected to show a round, blue-green head at the front of a gray-white spike. On New Year's Eve, a pretty crescent **Moon** will pose just 3° from the comet.

Meteor Showers – The prolific **Geminids** will be mostly washed out by a bright **Moon**, as the shower peaks on Dec. 13th/14th – the same night as the **Full Moon**. Rates for this shower can reach 120 meteors per hour in good years, but the **Moon** likely will reduce this by 90%.

The **Ursid Meteor Shower** peaks on the night of Dec. 21st/22nd, under a waning crescent **Moon,** which rises just after 1 Am local time. The best views should come within an hour of midnight. The shower's radiant lies near **Kochab** in the **Little Dipper**'s bowl. Expect to see 10 meteors/hour under a dark sky.

When to View the Planets:

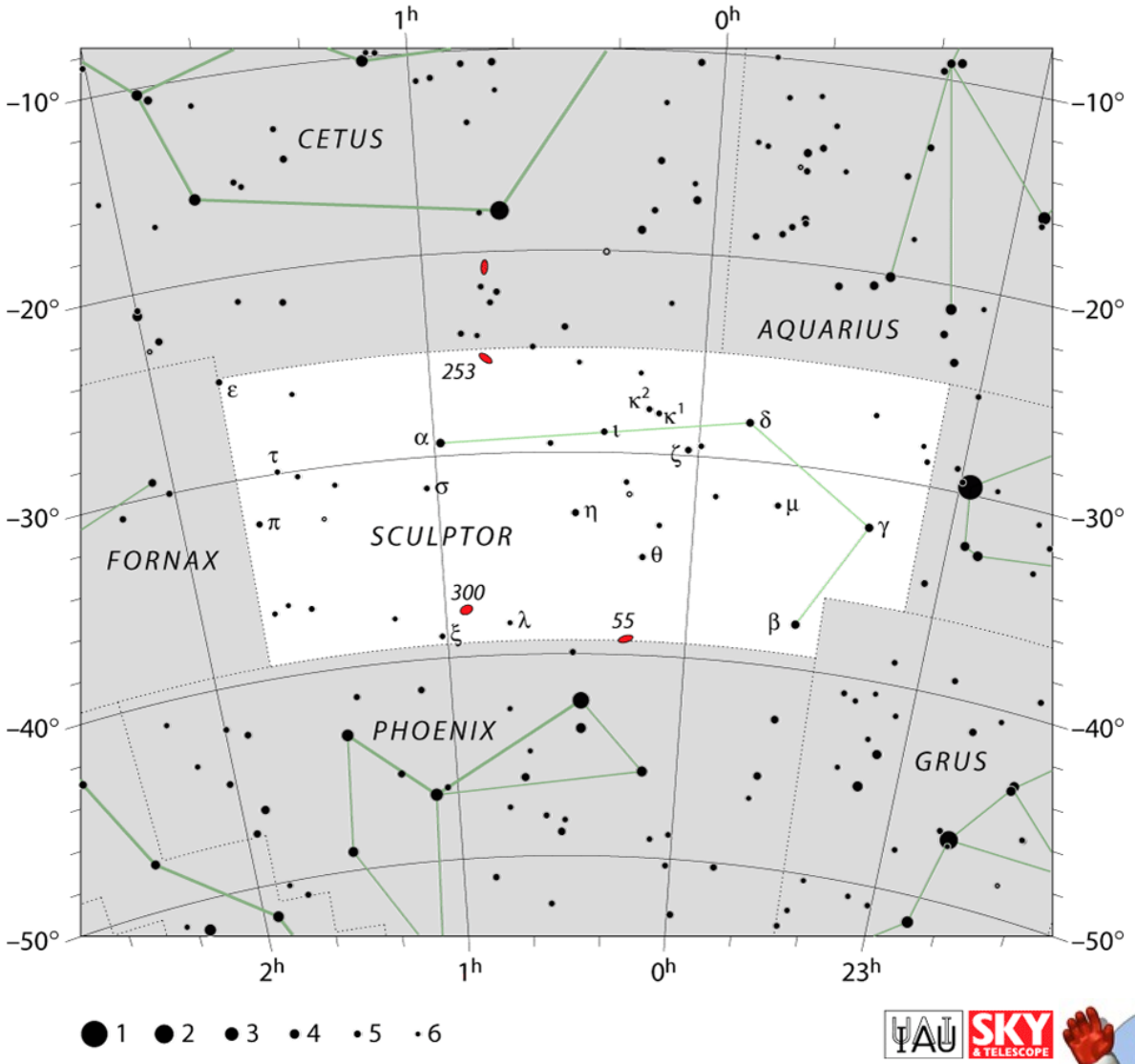
Evening Sky		**Midnight**		**Morning Sky**	
Mercury	(southwest)	**Uranus**	(west)	**Jupiter**	(southeast)
Venus	(southwest)			**Saturn**	(southeast)
Mars	(south)				
Uranus	(southeast)				
Neptune	(south)				

DARK SKY VIEWING - PRIMARY ON DEC. 3RD, SECONDARY ON DEC. 31ST

Mythology:

Sculptor – the Sculptor

A faint constellation south of Cetus and Aquarius was invented by the French astronomer Nicolas Louis de Lacille during his mapping of the southern skies in 1751-52. Its original name was Apparatus Sculptoris, since shortened. Sculptor represents a sculptor's studio, complete with a fine marble head on a platform and a mallet and chisel. The stars of Sculptor are 4th magnitude and fainter, and none are named.



The End

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