Newsletter of the Baton Rouge Astronomical Society

Next Meeting: Monday, April 11th at 7PM at HRPO

(2nd Mondays, Highland Road Park Observatory)

April 6th through April 10th is our annual Hodges Gardens Star Party.
You can pre-register using the form on the BRAS website.
If you have never attended this star party, make plans to attend this one.

What's In This Issue?

President's Message

There were 478 people who stopped by the BRAS display at the March 19th "Rockin at the Swamp" event at the Bluebonnet Swamp and Nature Center. I give thanks to all our volunteers for our success in this outreach event.

April 6th through April 10th is our annual Hodges Gardens Star Party. You can pre-register on the BRAS website, or register when you arrive (directions are on the BRAS website). If you have never attended a star party, of if you are an old veteran star partier; make plans to attend this one.

Our Guest Speaker for the BRAS meeting on April 11th will be Dr. Joseph Giaime, Observatory Head, LIGO Livingston (Caltech), Professor of Physics and Astronomy (LSU). Yes, he will be talking about gravity waves and the extraordinary discovery LIGO has made.

We need volunteers to help at our display on Earth Day on Sunday, April 17th. In May we need volunteers for two events; the Transit of Mercury on Monday, May 9th, from 6 AM to 2 PM; and on International Astronomy Day (IAD) on Saturday, May 14th. If you can volunteer, let Chris or Ben know what times you are available to help.

I am contacting the International Dark Sky Association (of which I am a member) to avail BRAS of the outreach material (displays) that can be loaned, and then returned to IDA.

I have signed and delivered the letters requesting the adoption of a full-cutoff lighting policy by the Recreation and Park Commission for the Parish of East Baton Rouge. Letters were delivered to the BREC Special Facilities Department and to the Chairperson (Amanda) of the Geaux Green Committee.

I have also signed and sent a letter to the CEO of Buc-ee's requesting that full cut-off lighting be used at the facility they are building in Baton Rouge at Millerville Road and I 12.

Clear Skies,
John R. Nagle
President of BRAS

BRAS Telescope donated to EBRP Library

This is the Orion Dobsonian Telescope that BRAS donated to the EBRP Main Library in 2013. Posing with the telescope is Past President Merrill Hess.

BRAS member Trevor McGuire spearheaded this project and established a Power Point training program for Library personnel to use in training patrons to use the loaner before they can check it out for the weekend. He and his wife have since moved to Fargo, North Dakota where they recently celebrated the birth of their first child, Dexter. BRAS members continue to visit the library to make sure the scope is in good working condition.

The library reports that the scope has been checked out several times.

~ Photo by Michele Fry

Got one or more BRAS event photos? Send them to outreach@brastro.org, att'n Michele, with a caption, preferably by the 25th of the month for inclusion, space permitting, in this newsletter.

Secretary's Summary of March Meeting

March 14th, 2016

-Upcoming Outreach Events were discussed
-Chris discussed the need for volunteers at upcoming HRPO events
-Hodges Gardens Star Party was discussed as it happens before our April meeting
-John Nagle talked about a clever battery pack for scope operation that doubles as a counter weight
-Craig Brenden demonstrated how to properly clean telescope eyepieces
-Wally Pursell demonstrated how to properly clean telescope mirrors
-Merrill Hess talked about flocking the tubes of telescopes and offered some material he had left over for doing so
-Several items that had been cleaned from the BRAS room were put out for club members to take if they were interested
-April's meeting speaker was announced as a guest from LIGO
-Meeting ended

Ben Toman
BRAS Secretary
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Recent Entries in the Forum

Below are selected recent additions to the BRAS Forum.
There are also nine active polls.

BRAS Website Hits 70,000 Visitors
Mapping Tool from Sloan Digital Sky Survey
First Spacewalk Anniversary
Strange Moon Origin Theory
About the Skyquest XT8 Dobsonian Telescope
HRPO Personnel Attends I-10 Corridor Study Meeting
Scott Kelly Concludes One-Year Mission
Anniversary of Uranus Rings Discovery
April Great Red Spot Viewing Times for Baton Rouge Now Posted
Mars-Saturn-Antares Triangle Until 15 April
CRS-6 Brings Supplies to International Space Station
Upcoming Moon-Planet Conjunctions
Total Solar Eclipse Seen in Indonesia
At Least Three Geomagnetic Storm Alerts in March
Chilly Weather Accompanied First Week of Spring
March Solar Viewing Takes Place During NanoDays
Fireball Spotted on 27 February from Louisiana and Mississippi
Potential Meteor Shower from Comet LINEAR
Asteroid 2013 TX68 Passes Earth with No Trouble for Us
"Asteroid" Studied by BRAS Member Now Classified as Comet
Galaxy GN-z11 Now Most Distant Known

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20/20 Vision Campaign

GLOBE at Night: 30 March to 8 April
2016 GOAL: 200 Measurements. CURRENT: 31

BRAS is in the process of assisting a student at St. Joseph's Academy acquire raw data. The student needs descriptions of views of five Messier objects—Pleiades, Orion Nebula, Andromeda Galaxy, Beehive Cluster, Whirlpool Galaxy—together with that location and date's GaN measurement. An alert will be sent out describing this exercise in more details. The student needs very much this information with *at least three sky views (different limiting magnitudes)*.

BRAS has been invited to present at a meeting of BREC's Geaux Green Committee. The Geaux Green Committee "was created to help develop an Environmental Sustainability Policy and help BREC achieve its sustainability goals in the future. BREC's sustainability policy is centered on recycling, reducing waste and reusing resources". The HRPO Manager had a hand in making sure BREC's Environmental Sustainability Policy include a passage on efficient nighttime lighting. The purpose of BRAS attending this upcoming meeting is to illustrate how light pollution harms the use of HRPO by its partners and the public.

HRPO

The Highland Road Park Observatory will be closed from 6 April to 9 April.

FRIDAY NIGHT LECTURE SERIES

all start at 7:30pm

1 April: "Wonders of the Spring Sky" BREC Education Curator Amy Brouillette will take the audience on a fascinating tour of Baton Rouge's winter season. She'll highlight the celestial gems that will sparkle throughout the next three months—gems visitors will be able to see live if they continue to visit HRPO!

15 April: "NASA Spinoff Technology" BREC Center Supervisor Tom Northrop gives the audience an overview of the fascinating objects and technology that developed as a direct result of the American Space Program. Many of these devices and materials may be at the doctor's office, the mall—some might even be in your home!

22 April: "The History of the Baton Rouge Astronomical Society" BRAS is thirty-five years old, and this retrospective hits all the highlights, from Halley's Comet to asteroid discoveries to the last Transit of Venus in our lifetimes.

29 April: "Transits" The beauty of a transit is unlike any other celestial phenomenon. Come discover the history of these events, how to safely view one and what to expect for the upcoming Transit of Mercury.

SCIENCE ACADEMY

Saturdays from 10am to 12pm

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

2 April: "Spring Day"
16 April: "Mercury"
23 April: "Cadet's Choice"
30 April: "Jupiter"

ONE-TIME CALLS FOR VOLUNTEERS

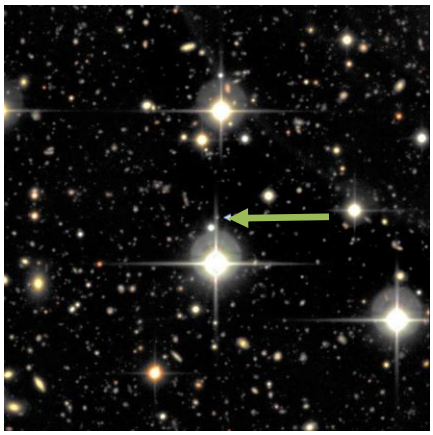
*Saturday, 23 April from 7pm to 10pm. *Three volunteers.* **Evening Sky Viewing Plus.** Various tasks. Easy; training provided.

*Monday, 9 May from 6am to 2pm. *Six volunteers familiar with at least one telescope.* **Transit of Mercury.** Solar viewing. Moderately difficult.

*Saturday, 14 May from 3pm to 11pm. *Fifteen to twenty volunteers.* **International Astronomy Day.** Various tasks. Moderately difficult.

ONGOING CALL FOR VOLUNTEERS

HRPO personnel are currently revamping the look of the main floor. We have already added displays for close asteroid flybys and bright comet apparitions. We periodically need crafting (gluing, cutting, painting, etc.) performed for these tasks. We are asking any BRAS volunteers with time to assist. Thank you.



Arrow points to supernova SNLS 06D4eu and its host galaxy, both about 10 billion light-years away. Big objects with spikes are stars in our own Milky Way; every other bright dot is a distant galaxy. Credit: University of California, Santa Barbara

Astro Short: Discovered: Stellar Dinosaurs!

http://hipacc.ucsc.edu/AstroShorts/March2014.html

"We had no idea what these things were," recounted D. Andrew Howell, staff scientist at Las Cumbres Observatory Global Telescope Network and adjunct assistant professor at UC Santa Barbara.

In 2006 and 2007, two objects caught by the detectors of the Supernova Legacy Survey looked like supernovae—stars exploding in cataclysmic stellar suicide—but did not act like familiar supernovae. Instead of brightening over a period of maybe three weeks (about 20 days), they seemed to take nearly three months (about 80 days). At first, no host galaxy could be found, so Howell and his colleagues didn't know "even whether they were supernovae or whether they were in our galaxy or a distant one." And when their visible light was spread out into a rainbow, their spectra revealed mysterious broad lines never seen before.

Over the next year or so, a handful of similar objects discovered by the Palomar Transient Factory and the Texas Supernova Search revealed that they actually were incredibly distant supernovae—ones dating from beyond a redshift of $z = 1$, that is, more than halfway back to the Big Bang. The mysterious lines in the visible spectra were actually ultraviolet emission redshifted—their short UV wavelengths expanded by the expanding universe—into the longer visible region of the electromagnetic spectrum.

Indeed, the supernovae were so distant that not only was light expanded in wavelength, but also *time* was dilated or expanded (per Einstein's theory of relativity). That time dilation stretched out the duration of the event so that, as seen from telescopes on Earth, the explosions seemed to unfold in slow motion.

But another big mystery remained: how could those supernovae be so phenomenally brilliant?

Power source?

Supernovae are not alike. For decades, astronomers had known that supernovae fell into different types based on their light curves, that is, their pattern of rising and falling brightness. Later, they found these types actually corresponded to different physical circumstances triggering the explosions. Even those types have fine distinctions based on their spectra, giving rise to the categorization of supernovae by roman numerals, with sub-classes given lower-case letters. For example, Type Ia supernovae originate from white dwarfs in binary star systems, whereas Type II supernovae originate in an implosion-explosion event when a massive star's core collapses and the star blows off its outer layers.

But the new supernovae did not correspond to any known type. Moreover, based on their distances, they had to be extraordinarily energetic. Their luminosity was roughly "10 times brighter than a thermonuclear [Type Ia] and 100 times brighter than a typical core-collapse supernova," state Howell and his 17 co-authors in a paper published in the December 20, 2013 issue of *The Astrophysical Journal*.

For help in understanding the observations, Howell turned to computational astrophysicist Daniel Kasen, UC Berkeley and the Lawrence Berkeley National Laboratory, to see whether computer simulations could shed light on physics that could produce such unimaginable energies.

Hydrogen-free superluminous?

The simulations suggested that one object, designated SNLS 06D4eu, was "unlike a traditional core-collapse, thermonuclear or interaction-powered supernova." Instead, it resembled an emerging class of supernovae classed as superluminous supernovae, a handful of which have been discovered.

The data suggest a star originally 20 to 40 times more massive than the sun first blew off its outer hydrogen-rich layers. Then the dense naked core— still having a mass five times that of the sun and composed of carbon, oxygen, and other heavy elements—precipitously collapsed into a highly magnetized neutron star only tens of miles across, spinning hundreds of times per second, triggering the super-energetic explosion. In short, SNLS 06D4eu is one of a new sub-class of hydrogen-free superluminous supernovae.

"As the most distant superluminous supernova with a spectrum (z = 1.588), SNLS 06D4eu provides a rare glimpse of the chemical composition and lightcurve evolution of an early-universe supernova," write Howell and Kasen, and coauthors. It is also one of the most luminous supernovae known. Thus, they conclude, "it could be a relic of an earlier form of supernovae that is all but extinct today."

"These are the dinosaurs of supernovae!" Howell exclaimed. SNLS 06D4eu exploded before the sun was even born, when the universe was only 4 billion years old. "We were lucky to be pointing telescopes in the right direction when the photons hit Earth after their 10-billion-year journey." *–Trudy E. Bell, M.A.*

***Further reading*:** The paper "Two superluminous supernovae from the early universe discovered by the Supernova Legacy Survey"—which, by the way, reads like a scientific detective story in detailing the discovery and sleuthing—is at http://arxiv.org/abs/1310.0470. A UC Santa Barbara press release is at http://www.news.ucsb.edu/2013/013826/powerful-ancient-explosions-explain-new-class-supernovae . The Palomar Transient Survey is described in the earlier UC-HiPACC AstroShort "Stars That Go *BANG!*" at http://hipacc.ucsc.edu/AstroShorts/February2012AstroShort.html .

The University of California High-Performance AstroComputing Center (UC-HIPACC), based at the University of California, Santa Cruz, is a consortium of nine University of California campuses and three Department of Energy laboratories (Lawrence Berkeley Laboratory, Lawrence Livermore Laboratory, and Los Alamos National Laboratory). UC-HiPACC fosters collaborations among researchers at the various sites by offering travel and other grants, co-sponsoring conferences, and drawing attention to the world-class resources for computational astronomy within the University of California system. More information appears at http://hipacc.ucsc.edu

INTERNATIONAL ASTRONOMY DAY

Saturday, 14 May from 3pm to 11pm
Tenth Consecutive Year!
Volunteers needed!

RAFFLE TICKETS, $5 EACH
First Prize: Orion 40th Anniversary Skyquest XT8 Dobsonian Telescope
Value: $499.99

SOME RETURNING EXHIBITORS…
Baton Rouge Amateur Radio Club
Baton Rouge Metropolitan Airport
Baton Rouge Zoo
Bluebonnet Swamp Nature Center
Civil Air Patrol
LIGO
Saint Joseph's Academy

NEW EXHIBITORS…
Baton Rouge Gallery
Baton Rouge Mosquito Abatement
MARS Van

RIDES…
18" Dry Slide
Spacewalk
Obstacle Course

OTHER…
Adventure Quest
Face Painting
Homemade Comet
Scope-on-a-Rope
Train Like an Astronaut

Early volunteer sign-up is needed. It is extremely difficult to schedule a volunteer if that person reveals his availability with only two or three days to go. Sign-up now, please!

Observing Notes:

by John Nagle

Leo – the Lion

Position: RA 11, Dec. +15

Named Stars:

Regulus (Alpha Leo), "Prince", "Qalb al-Asad", "Little King" or "Prince", also "Cor Leonis", "The Heart of the Lion", mag. 1.36, 10 08 22.46 +11 58 01.9, is a four star system composed of two pairs of stars, and is the 21st brightest star in the night sky. **Regulus A** is a spectroscopic binary star composed of a blue-white main sequence star and a companion star which can't be resolved, but is believed to be a white dwarf star. The two stars complete an orbit around their common center of mass every 40 days or so. **Regulus B** and **Regulus C** are dimmer main sequence stars with an apparent visual magnitude of 8.14 and 13.5, located at an angular distance of 177 arc seconds from **Regulus A**. **Regulus B** and **Regulus C** are separated by about 100 AU, and have an orbital period of 2000 years. **Regulus A**'s primary star is an extremely fast rotator, with a rotational period of only 15.9 hours, and, as a result, it has an oblate shape.
Denebola (Beta Leo), "denab al-asad", "the lion's tail", mag. 2.14, 11 49 03.88 +14 34 20.4, is a main sequence blue-white star. **Denebola** is a rapid rotator, resulting in an oblate shape; with a bulge at the equator (rotational velocity is 128 km/sec. **Denebola** also exhibits a strong infra-red excess, suggesting that it may have a circum-stellar debris disk of dust in its orbit. **Denebola** belongs to the **IC 2391** super cluster, a stellar association also known as the **Omicron Velorum Cluster**, located in the constellation **Vela**. **Denebola** has several optical companions, but no real companions.
Algieba (Gamma Leo), "Al Gieba", "Al Jabbah", "the forehead", "Juba", "the Lion's Mane", is a double star. **Gamma Leo 1**, mag. 2.01, 10 19 58.16 +19 50 30.7, is a gold-yellow giant star, and **Gamma Leo2** is a dimmer yellow star at mag. 3.80. There is a third optical component (**40 Leonis**), which is a yellow tinged star at mag. 4.8. The primary and secondary stars have a period of 500 years. The primary star has one confirmed and one unconfirmed planet in orbit around it. Some 2° to the northwest of **Gamma Leonis** is the radiant point of the famous **Leonid Meteor Shower** (a product of the **Temple-Tuttle Comet [1866 I]** with a period of 33.176 years). The close pair of galaxies, **NGC 3226** and **NGC 3227** lies 50' to the east of **Gamma Leonis.**
Zosma (Delta Leo), "girdle", "Duhr", "Al thahr al Asad", "the lion's back", mag. 2.56, 11 14 06.41 +20 31 26.5, is a white, main sequence star located on the Lion's hip. **Delta Leonis** is another rapid rotator, with a projected rotational velocity of 180 km/s, having an equatorial bulge and an oblate shape. In about 600 million years, **Delta Leonis** will become a red giant star. The close double star **Struve 1517** lies about 23' to the south, and the faint spiral galaxy **NGC 3646** is about 2° to the east and slightly south.
Ras Elased Australis (Epsilon Leo), "Al Ashfar", "the eyebrows", Algenubi", "ras al-asad al-ganubi", "the southern star of the Lion's head", mag. 2.97, 09 45 51.10 +23 46 27.4, is a yellow giant star.
Adhafera (Zeta Leo), "al-dafirah", "the curl", "the braid", mag. 3.43, 10 16 41.40 +23 25 02.4, is an optical triple star. **Zeta Leonis** is a white giant star; the first optical companion is **39 Leonis** at mag. 5.8 and is 5.5' to the south; and the second optical companion is **35 Leonis** at mag. 6.0 and is located 325 arc seconds away from **Zeta Leonis.**
Al Jabhah (Eta Leo), "the front", "the forehead", 30 Leonis, mag. 3.48, 10 07 19.95 +16 45 45.6, is a white supergiant star and a suspected binary star.

Chertan (Theta Leo), "Chort", "Kharat or al-khurt", "small rib", "Coxa", "hip", "Chertan", "al-kharatan", "two small ribs", 9 Leonis, mag. 3.33, 11 14 14.44 +15 25 47.1, is a white main sequence dwarf star. **Theta Leonis** exhibits an excess emission of infra-red, which indicates a circumstellar disk of dust (estimated age of the star is 550 million years, a young star), and a relatively high projected rotational velocity of 23 km/sec.
Al Minliar (Kappa Leo), Minkhir al-Asad", "the muzzle of the lion", mag. 4.47, 09 24 39.28 +26 10 56.8, is a binary star.
Al Terf (Lambda Leo), "Al-tarf", "the view of the lion", mag. 4.32, 09 31 43.24 +22 58 05.0.
Ras Elased Borealis (Mu Leo), "ra's al-asad as-samali", "the northern star of the lion's head", mag. 3.88, 09 52 45.96 +26 00 25.5.
Subra (Omicron Leo), is a double star. **Omicron Leo A**, mag. 3.52, 09 41 09.12 +09 53 32.6; **Omicron Leo B**, mag. 3.70, 09 41 13.40 +09 54 35.0; both components are giant, main sequence stars.
Shir (Rho Leo), mag. 3.84, 10 32 48.68 +09 18 23.7, is a binary star. **Rho Leonis** is a runaway star and has a peculiar velocity of 30 km/sec at the minimum relative to the nearby stars. The primary component, a blue supergiant star, has a companion at mag. 4.8, and a separation of 0.11 arc seconds.

Deep Sky:

M 65 (NGC 3623), mag. 9.3, 11 18.9 +13 05, 10.0' x 3.3' in size, is a bright, very large, and very elongated galaxy; small, diffuse, very bright nucleus. **M 65** is a member of **Leo's Triplet** (along with galaxies **M 66** and **NGC 3628). M 66** is 21' apart from **M 65,** located about 2 ½° to the south-southeast of **Theta Leonis. M 65** is the western of the pair of galaxies. About 1° to the north, hovering between **M 65** and **M 66**, is **NGC 3628.**
M 66 (NGC 3627), mag. 9.0, 11 20.2 +12 59, 8.7' x 4.4' in size, is a bright, very large, and very elongated galaxy; small, very bright nucleus. **M 66** is a member of **Leo' Triplet** (along with **M 65** and **NGC 3628**). **M 66** has heavy dust lanes and thick spiral arms studded with coarse masses of star clouds. The largest arm, on the southeast side, resembles a huge crab's claw; fainter arms can be traced out for vast distances. Just 35' to the north of **M 66** is the edge on galaxy **NGC 3628.** A little over 1° to the west and slightly south is **NGC 3593.**
M 95 (NGC 3351), mag. 9.7, 10 44.0 +11 42, 7.4' x 5.1' in size, is a large, bright, and round galaxy; extremely bright nucleus; internal ring with a bar. **M 95** is a member of the **Leo Galaxy Group,** mag. 6.49. **M 96** is 42' away from **M 95**, with **M 95** being the western member of the pair. **M 95** has a faint outer ring, 6' in diameter, encircling the whole system, contacting the inner pattern on the northwest side. **M 95** is located 2½° north and 3° east of **Rho Leonis.**
M 96 (NGC 3368), mag. 9.2, 10 47.8 +11 49, 7.1' x 5.1' in size; is a very bright, very large, and slightly elongated galaxy; small, bright nucleus; has visible dark lanes. **M 96** is the brightest in the **Leo Galaxy Group**. At about 48' to the north-northeast from **M 96** is the galaxy **NGC 3379** (sometimes called **M 105**), and its two companions **NGC 3384** and **NGC 3389**. Ultraviolet emissions from **M 96**'s central region suggest that it has a super massive black hole at its core.
M 105 (NGC 3379), mag. 9.5, 10 47.8 +12 35, 4.5' x 4.0' in size, is a very bright, large, and round galaxy; very bright nucleus. **M 105** is a member of the **Leo Galaxy Group;** paired with galaxy **NGC 3384. M 105** has a super massive black hole at its center.
NGC 2903, mag. 9.0, 09 32.2 +21 30, 12.6' x 6.6' in size, is a quite bright, very large, and elongated galaxy; has a very bright nucleus; an excellent example of a multi-armed spiral galaxy. **NGC 2903** is located 1½° directly south of **Lambda Leonis.**
NGC 3521, mag. 9.0, 11 05.8 -00 02, 9.5' x 5.0' in size, is a quite bright, quite large, and elongated galaxy; many arms; very small, very bright nucleus.
NGC 3628, mag. 9.5, 11 20.3 +13 35, 14.8' x 3.6' in size, is a very large, pretty bright, and very elongated galaxy; edge on. **NGC 3628** is a member of **Leo's Triplet.**
Leo I (NGC 5470), mag. 9.8, 10 08.5 +12 18, 10' x 7' in size, is a galaxy with low surface brightness; somewhat lost in the glare of nearby **Regulus.**
NGC 3607, mag. 9.9, 11 16.9 +18 03, 4.6' x 4.1' in size, is a very bright, large, and round galaxy; small, very bright nucleus. **NGC 3607** is the brightest in a group of galaxies that include **NGC 3599** (mag. 11.9)

and **NGC 3608** (mag. 10.8).
NGC 3384, mag. 9.9, 10 48.3 +12 38, 5.9' x 2.6' in size, is a very bright, large, and round galaxy; extremely bright nucleus. **NGC 3384** is paired with galaxy **M 105,** a member of the **Leo Galaxy Group.** The stars located in the galaxy's central region are very old, with more than 80% of them being **Population II** stars (more than a billion years old).
Leo's Triplet, mag. 9.0, 11 20.0 +13 20, 0.5° in size, is three galaxies (**M 65, M 66, NGC 3628**) located within 0.5° of each other.

The Leo Ring – the Leo Ring is an enormous primordial cloud of hydrogen and helium (left over from the **Big Bang**) found in orbit around two galaxies in the Leo constellation. The cloud was discovered by radio astronomers in 1983.

Leo is also home to some of the largest structures in the observable universe. Some of the structures found in the constellation are the **Clowes-Campusano LQG, U1.11, U 1.54,** and the **Huge-LQG,** which are all large quasar groups; the latter being the second largest structure known.

There are 66 more deep space items at or more than magnitude 10 to magnitude 13.0. See me for a list of the items.

Other Stars:

Iota Leo, mag. 4.0, 11 23 55.37 +10 31 46.9, is a spectroscopic binary star that appears to be a yellow-tinged star at mag. 4.0, whose components are at mag. 4.1 and 6.7, and an orbital period of 183 years.
Sigma Leo, mag. 4.05, 11 21 08.25 +06 01 45.7, is a blue-white star.
HD 94402, mag. 5.45, 10 53 43.76 -02 07 45.3, is a double star.
R Leo, mag. 6.02, 09 47 33.50 +11 25 44.0, is a red giant Mira variable star with a period of about 313 days, and is located in the Lion's foreleg.
HD 97658, mag. 6.27, 11 14 33 +25 42 37, has one planet in orbit.
HD 100655, mag. 6.45, 11 35 03.79 +20 26 29.6, has one planet in orbit.
83 Leo A, mag. 6.49, 11 26 45.75 +03 00 45.6, is a binary star.
HD 89307, mag. 7.06, 10 18 21.28 +12 37 16.0, has one planet in orbit.
83 Leo B, mag. 7.57, 11 26 46.28 +03 00 22.8, is a binary star and has two planets in orbit.
HD 81040, mag. 7.74, 09 23 47.09 +20 21 52.0, has one planet in orbit.
HD 95089, mag. 7.95, 10 58 47.74 +01 43 45.2, has one planet in orbit.
HD 88133, mag. 8.06, 10 10 07.68 +18 11 12.7, has one planet in orbit.
HD 96063, mag. 8.37, 11 04 44 -02 30 48, has one planet in orbit.
HD 100777, mag. 8.42, 11 35 51.53 -04 45 20.5, has one planet in orbit.
HD 1022721, mag. 8.71, 11 46 23.54 +14 07 26.3, has two planets in orbit.
BD+20° 2437, mag. 9.73, 10 16 44.86 +19 53 29.0, has one planet and a brown dwarf star in orbit around it.

There are two more stars with planets, a carbon star, and a flare star beyond magnitude 10.
Note: Star **SDSS J102915+172927 (Caffau's Star)** is a Population II star in the galactic halo seen in Leo. It is about 13 billion years old, making it one of the oldest stars in the galaxy. It has the lowest metallicity of any known star.

Asterism – Algieba (Gamma Leonis), Adhafera (Zeta Leonis), and Al Jabbah (Eta Leonis) are sometimes collectively known as **"The Sickle".**

Sky Happenings:

April 4th – The **Moon** passes 1.9° north of **Neptune** at 8:00 PM CDT.
April 6th – The **Moon** passes 0.7° north of **Venus** at 3:00 AM CDT.

April 7th – New Moon occurs at 6:24 AM CDT,
Moon is at perigee (221,931 miles from **Earth**) at 12:36 PM CDT.
April 8th – The **Moon** passes 5° south of **Mercury** at 6:00 AM CDT,
The **Moon** passes 0.02° north of asteroid **Vesta** at 11:00 PM CDT.
April 9th – Uranus is in conjunction with the **Sun** at 4:00 PM CDT,
Extreme 18.6 year tides,
Look west-northwest after sunset for the next two weeks to enjoy **Mercury**'s best evening apparition of 2016.
April 10th – Afternoon, Dusk – the waxing crescent **Moon** occults **Alderbaran** this afternoon for telescope users across most of **North America,** and for those who do not see the occultation, the **Moon** passes 0.3° north of **Alderbaran** at 5:00 PM CDT. The
Moon, by evening, is above **Alderbaran** and the **Hyades.**
April 13th – First Quarter Moon occurs at 10:59 PM CDT.
April 16th – Evening – the waxing gibbous **Moon** shines 3°-4° below **Regulus, i**n the fore-foot of **Leo, The Lion,**
Mars is stationary at 9:00 PM CDT, **when it shines at mag. -1.4**
April 18th – The **Moon** will pass 2° south of **Jupiter** at 12:00 midnight CDT,
Mars begins a westward retrograde motion.
April 17th – A blazing **Jupiter** is just 2°-3° above the waxing gibbous **Moon,** near the hind foot of **Leo.,**
Pluto is stationary at 8:00 AM CDT,
Mercury is at greatest elongation (20°) at 9:00 AM CDT.
April 20th – Night – the **Moon** hangs about 6° above **Spica,** low in the southeast in the twilight. Watch the nearly full **Moon** move closer to the blue-white star during the night. By dawn on the 21st, they are about 4° apart for observers in **North America.**
April 21st - The **Moon** is at apogee (252,492 miles from **Earth**) at 11:05 AM CDT,
Lyrid Meteor Shower peaks in bright moonlight tonight.
April 22nd – Full Moon occurs at 12:24 AM CDT, and will be the smallest **Full Moon** of 2016,
The predicted peak of the **Lyrid Meteor Shower** falls at 11:00 AM CDT, with the **Full Moon** hampering observation of the meteors.
April 23rd – The **Moon** passes 5° north of **Mars** at 11:00 PM CDT.
April 24th – The waning gibbous **Moon, Mars, Saturn, and Antares** are in a wide grouping (rising about 11:00 PM CDT).
April 25th – The waning gibbous **Moon** lies within 10° of **Mars, Saturn, and Antares** in the pre-dawn sky,
The **Moon** passes 3° north of **Saturn** at 2:00 PM CDT.
April 26th – Asteroid **Juno** is at opposition at 10:00 PM CDT.
April 28th – Mercury is stationary at 11:00 PM CDT.
April 29th – Last Quarter Moon occurs at 10:29 PM CDT.

Planets:

Mercury – Mercury has its best evening appearance of 2016 during April. At the beginning of April, **Mercury** remains low to the horizon, but burns brightly at mag. -1.5. On April 8th, the waxing crescent **Moon** passes by **Mercury** (now at mag. -1.0) at 8° to the upper left. On April 18th, **Mercury** (now at mag. 0) reaches greatest elongation at 20° east of the Sun and achieves its highest sunset altitude of 19°. In mid-April, 45 minutes after sunset, you will still see **Mercury**'s light at least 10° high in the west-northwest. On April 18th, **Mercury**'s globe appears 7½" wide and about 38% lit, but fades rapidly, dimming to mag. +1.3 by the evening of April25th. By April 28th, **Mercury** is lost to our view, on its way to a transit of the **Sun** on May 9th.
Venus – Venus rises less than ½ hour before the **Sun** this month and is not observable past the morning of April 9th or so depending on your latitude, air clarity, and eyesight. On April 1st, **Venus** lies a degree or so above the eastern horizon ½ hour before sunrise, and shines at mag. -3.8.
Mars – Mars rises in the southeast just before midnight on April 1st and about two hours earlier by month's end. As April opens, **Mars** shines at mag. -0.5 among the background stars of northern **Scorpius**. **Mars**

then heads eastward, crossing into **Ophiuchus** on April 3rd. **Mars** motion slows to a crawl around mid-month, when it lies 5° north of 1st magnitude **Antares. Mars** then travels south for a few days before reversing course and starting its retrograde (western) loop. It crosses back into **Scorpius** on April's final day, when it shines at mag. -1.4, more than twice as bright as it started the month. On April 1st, **Mars** disk is 12" across, and on April 30th, **Mars** span will be 16'. For good looks at **Mars**, wait until Mars climbs at least 20° high – roughly two hours after it rises. Best views come when **Mars** lies highest in the south shortly before twilight starts.

At the beginning of April, *Sinus Meridiani and Acidalia Planitia* are prominate shortly after **Mars** rises. *Syrtis Major* rotates into view at the end of April's first week. It will linger into the latter half of the month if you observe shortly before dawn. It is currently summer in **Mars** northern hemisphere. Keep an eye on *Syrtis Major* and other dark markings, looking for changes in size or shading.

Jupiter – Jupiter reached opposition and peak visibility in March, but its appearance hardly suffers. By the time darkness falls, Jupiter has already climbed 40° high in the southwest, giving it improved visibility from its opposition viewing. Jupiter spends the month in southern **Leo**, some 15° east-southeast of 1st magnitude **Regulus**. At mag. -2.4, **Jupiter** outshines **Regulus**. A telescope will reveal **Jupiter**'s equator spanning 42" at mid-month, an almost imperceptible 2" smaller than at opposition. The diameter through the poles is nearly 3" less than across the equator.

On the night of April 6th/7th, **Jupiter** is action packed with events. The innermost moon **Io** begins to transit Jupiter at 8:52 PM CDT, and its shadow follow 40 minutes later. **Europa**, west of **Jupiter**, will be occulted by **Jupiter** at 9:48 PM CDT. **Ganymede**, the solar system's largest satellite, lies east of **Jupiter** but is closing rapidly. **Ganymede** starts to transit **Jupiter** at 12:01 AM CDT. At 1:54 AM CDT, **Europa** will emerge from **Jupiter**'s shadow at about one planet radius east of the limb. **Ganymede** then appears more than halfway across the Jovian disk. Its large shadow first touches Jupiter's cloud tops at 2:45 AM CDT. **Ganymede**'s transit ends a half an hour later by which time **Jupiter** is low in the west for observers in **North America**.

Saturn – Saturn rises about a half hour after **Mars**. Although the mag. +0.3 planet pales in comparison with **Mars**, its yellow glow contrasts nicely with **Mars'** hue. **Saturn** lies in southern **Ophiuchus** all month. On April 25th, a waning gibbous **Moon** slides past **Saturn**. The **Moon** stands north of Mars and **Saturn**, while **Antares** lies to their south. All four objects lie within a 10° wide circle. In mid-April, **Saturn** shows a mostly featureless disk measuring 18" across, surrounded by the spectacular ring system that spans 40" and tilts 26° to our line of sight. A telescope will reveal a number of moons around **Saturn. Titan**, at 8th magnitude and the biggest and brightest moon of **Saturn**, can be seen through any instrument. **Titan** passes due north of **Saturn** on April 3rd and 19th, and due south on April 11th and 27th. A trio of 10th magnitude moons (**Tethys, Dione, and Rhea**), lurk closer to **Saturn** and will show up through a 4-incc or larger telescope. Two faced **Iapetus** can be seen in early April. **Iapetus** is at 10th magnitude when it's bright half points earthward at greatest westward elongation on April 5th. **Iapetus** will then stand 9' from **Saturn. Iapetus** dims by a magnitude by the time it passes 2° north of **Saturn** on April 25th.

Uranus – Uranus is in conjunction with the Sun on April 9th, putting it out of sight this spring.

Neptune – Neptune emerges from its late February solar conjunction, but it is very low in the morning twilight. You might glimpse **Neptune** at the end of April. **Neptune** appears 5° high in the east as twilight begins, but its 8th magnitude glow will be a challenge to see.

Moon – The **Moon** is a waxing crescent, well to the upper left of **Mercury**, in the twilight of April 8th, and occults **Alderbaran** during the afternoon on April 10th for all of the contiguous **United States** and southern **Canada.** The waxing gibbous **Moon** hangs below **Regulus** high in the south on the evening of April 16th and much closer to **Jupiter** the next evening. The waning gibbous **Moon** forms a compact triangle with **Mars** and **Saturn** at dawn on April 25th, and a straight line with them the next morning.

Asteroids – Evidence suggests that the asteroid **6 Hebe** could be the parent body of 40% of the meteorites that fall to Earth. **Hebe** reached opposition in March and is now well placed for viewing through a small telescope. You can find the 10th magnitude asteroid in eastern **Leo** through a small telescope. **Hebe** sits a couple of degrees from 2nd magnitude **Denebola**, the lion's tail star. On April 1st, **Hebe** will be under 1

east-northeast of **95 Leonis**. On April 11th, **Hebe** will be about 2° to 2½° due north of **Denebola.**

Comets **– Comet Ikeya-Murakami (P/2010 V1)** should glow around 10th magnitude this month, lying among the background stars of **Leo. Ikeya-Murakami** should look dagger shaped with a bulbous end. Imagers might capture short greenish or bluish gas tail sticking out the southeastern end. Meanwhile, the fan shaped dust trail turns almost edge-on to our line of sight and appears as a colorless streak to the west of the nucleus**. Ikeya-Murakami's** trajectory in April carries it to the southeast across western **Leo** and its conspicuous Sickle asterism. It slides a mere 0.5° from 1st magnitude **Regulus**, the Lion's Heart, on April 24th and 25th. On April 16th**, Ikeya Murakami** will be due east about 2°to 3° of **Psi Leonis**, and on April 21st, it will be about 1° due east of **Nu Leonis.**

Meteor Showers **–** The April 22nd **Full Moon** nearly ruins this year's peak of the annual **Lyrid** meteor shower (max. rate is 18/hr). The best views likely will come just before twilight begins. The meteors appear to radiate from the constellation **Lyra**, which then lies nearly overhead, and the **Moon** then hangs low in the southwest. On the morning of April 12th, the minor **Virginid** shower peaks. With the **Moon** setting just after midnight, observers at dark sites could see up to 5 meteors per hour coming from near **Spica.**

When to View the Planets:

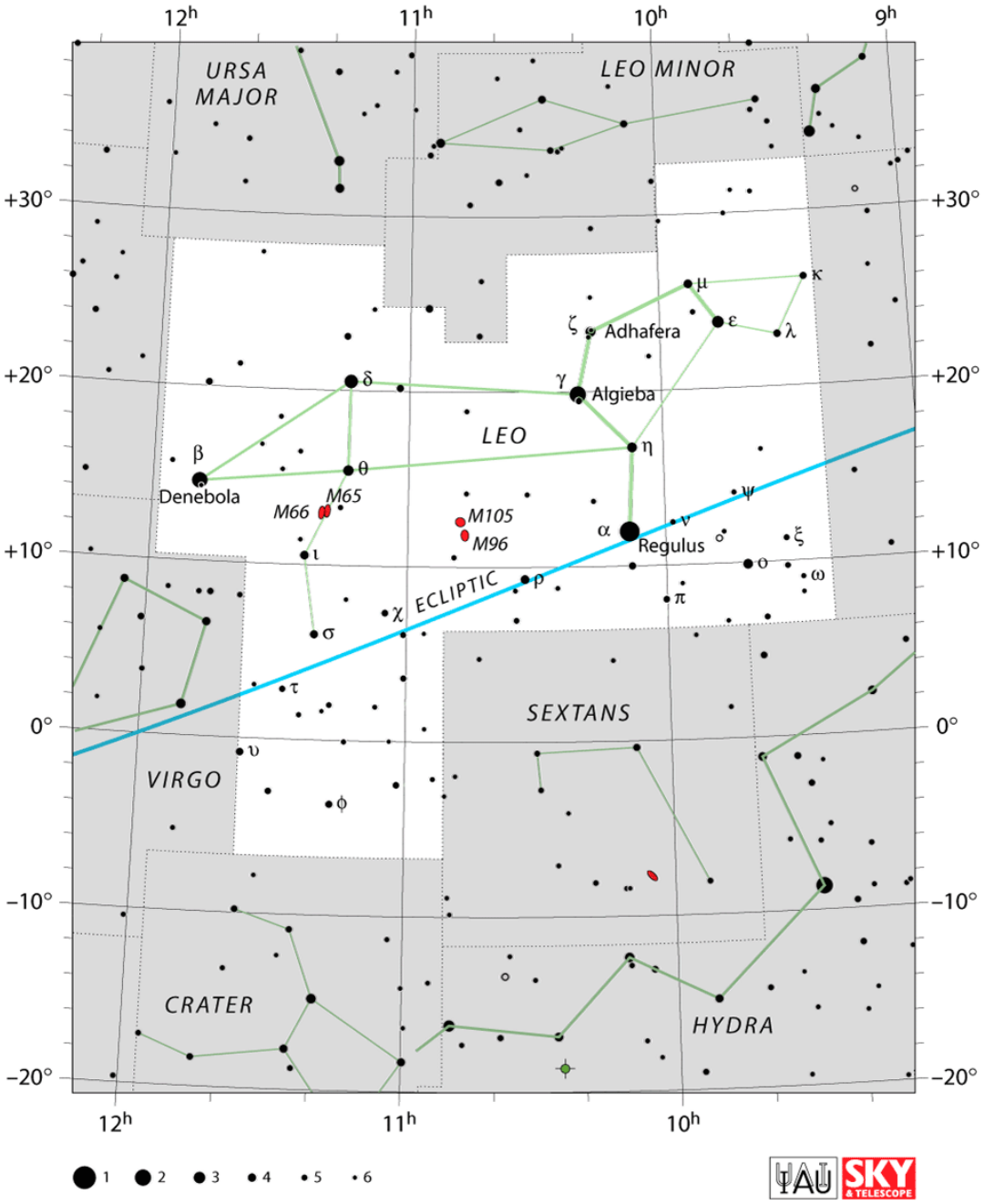
Evening Sky	Midnight	Morning Sky
Mercury (west)	**Mars** (southeast)	**Venus** (east)
Jupiter (southeast)	**Jupiter** (southwest)	**Mars** (southwest)
	Saturn (southeast)	**Saturn** (south)
		Neptune (east)

Dark Sky Viewing – Primary on April 9th, Secondary on April 16th

Mythology:
Leo – The Lion

Eratosthenes and Hyginus affirm that the lion was placed in the sky because it is the King of Beasts. Mythological speaking, it is reputed to be the lion of Nemea, slain by Heracles as the first of his twelve labors. Nemea is a town some way southwest of Corinth. There the lion lived in a cave with two mouths, emerging to carry off the local inhabitants, who were becoming scarce. The lion was an invulnerable beast of uncertain parentage; it was variously said to have been sired by the dog Orthrus, the monster Typhon, or even to be the offspring of Selene, the Moon goddess. Its skin was proof against all weapons, as Heracles found when he shot an arrow at the lion and saw that it simply bounced off.

Heracles heaved up his club and made after the animal, which retreated into its cave. Heracles blocked up one of the entrances and went in through the other. He grappled with the lion, locking his huge arm around its throat and choking the beast to death. Heracles carried the lion away in triumph on his shoulders. Later, he used the creature's own razor sharp claws to cut off its pelt, which he wore as a cloak. The lion's gaping mouth bobbing above his own head made Heracles look more fearsome than ever.



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