

Newsletter of the Baton Rouge Astronomical Society



**October, 2015**

**Next Meeting: Monday, Oct. 12<sup>th</sup> at 7pm at the HRPO**



Lunar Eclipse on Sept 27<sup>th</sup>, 2015. Image by BRAS member David Leadingham, one of the few that got a clear view for a couple of minutes through the clouds in our area! Click on the pic for more info on upcoming eclipses

# What's In This Issue?

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## President's Message

"Astronomy is useful because it raises us above ourselves; it is useful because it is grand. It shows us how small is man's body, how great his mind, since his intelligence can embrace the whole of this dazzling immensity, where his body is only an obscure point, and enjoy its silent harmony." – Henri Poincare, 19<sup>th</sup> Century mathematician and physicist

We all have our reasons for being involved in astronomy. That quote elegantly expresses just one man's thoughts. What attracted you to astronomy? What do you tell people who ask? I think we all have experienced some indefinable draw to the night sky and the wonders of the universe. Maybe that is it. Wonder. At least for me it is. Wonder, beauty, harmony, perspective. Where does it end?

Think about those things and let me know if you have something about that you would like to say at our next meeting. Alternately, you could write up something for this newsletter.

Well the total lunar eclipse certainly was a washout. Wasn't it? Bummer. Two weeks of pristine weather and then the day of the eclipse rain and thunderstorms move in.

OK, enough whining.

The Deep South Regional Stargaze is November 3 – 8, 2015. That is Tuesday through Sunday. Barry said the Feliciana Retreat Center raised their prices a bit (to keep up with ever increasing costs of expenses) but agreed to offer us the same rate as previous years. Although it will not affect us this year, I want you to be aware that it will be a factor in next year's event. There will be no vendors attending this year but several people said they will have scopes for sale, including a classic 8" SCT and CG-5 mount from Barry.

Barry has also fielded a question about renaming the Deep South Regional Stargaze to simply the Deep South Stargaze (DSSG). If you have an opinion about that, log into the DSRSG Yahoo Group and leave a message on the thread.

Brass is raffling an almost new 10" Orion SkyQuest Dobsonian Intelliscope. The hand control for the Intelliscope has some problems but we are checking to see if the firmware can be upgraded. Otherwise, it is a still very fine scope and a real bargain. \$5 per ticket.

Lastly, election season is coming up in December and we need to have nominations for the officer positions. Think about who you believe would be a good leader for the positions of President, Vice President, Treasurer, and Secretary. I am currently President but I will be term-limited out and someone else will have to fill the position. Ben Toman is Vice President. Trey Anding is Treasurer. Rosalyn Readinger is Secretary. We can take nominations anytime, up to the moment of the election. You can nominate yourself, if you like.

As always, if you have a topic you would like to present for a future BRAS meeting activity, let me know.

Clear skies,  
**Merrill Hess**



## Simulating the Universe

Astronomy has historically been an observational rather than a laboratory or experimental science. Except for lunar scientists or meteorite collectors (who can touch rocks from other solar system bodies), most astronomers can only point large telescopes, collect electromagnetic radiation, focus it onto detectors, and analyze what they observe.

But now supercomputers and powerful computational techniques increasingly allow astrophysicists to experiment with the initial conditions and physical laws for astronomical processes, including the formation of the universe. Indeed, large cosmological simulations—computational working models—are the basis for much current astrophysical research.

### Latest and greatest: Bolshoi

The most accurate cosmological simulation yet made of the evolution of the large-scale structure of the early universe is being described in a series of research papers that began to be published in *Astrophysical Journal* and other journals in October 2011.

Named “Bolshoi”—the Russian word for “great” or “grand”—the simulation models the evolution of a representative volume of the universe about 1 billion light-years on a side, a volume that would contain over a million galaxies. The computer code took 6 million CPU hours to run on the Pleiades supercomputer at NASA Ames Research Center. The calculated results—spectacular visualizations of what the universe was like at 180 different times from the Big Bang to the present epoch—were saved for later analysis. Some of the raw data plus detailed summaries and analyses of the outputs are now publicly available to the world’s astrophysicists.

Co-principal investigators Joel R. Primack (University of California, Santa Cruz) and Anatoly Klypin (New Mexico State University) based the Bolshoi simulation on both the most precisely known observational data and the most robust physical theory.

For observation, Primack and Klypin based the Bolshoi simulation on a meticulous data set combining ground-based observations with an extended run from the highly successful NASA Explorer mission WMAP (the Wilkinson Microwave Anisotropy Probe). WMAP measured the detailed anisotropy (unevenness of temperature and other characteristics) over the whole sky of the cosmic microwave background radiation left over from the Big Bang that formed the universe 13.7 billion years ago. The anisotropy reveals a wealth of information about the history and composition of the early universe.

For theory, the Bolshoi simulation is based on the Lambda Cold Dark Matter cosmogony ( $\Lambda$ CDM for short), now accepted as the standard modern theoretical framework for understanding the formation of the large-scale structure in the universe. Ordinary atomic matter makes up less than 5 percent of the universe; only about half a percent is visible as stars, nebulae, dust, and planets. Some 23 percent of the universe is made of invisible, transparent “cold dark matter,” felt only through its gravitational influence.  $\Lambda$ CDM predicts that repeated mergers of smaller clumps of dark matter end up creating bigger dark matter “halos,” within which galaxies and clusters of galaxies form and congregate. The Greek letter lambda ( $\Lambda$ ) in  $\Lambda$ CDM represents the fact that 72 percent of the universe is “dark energy,” causing the universe’s expansion to accelerate. Since  $\Lambda$ CDM says the universe is mostly made of invisible dark matter and dark energy, it might better be called the Double Dark theory.

## Revealing the invisible

Thus, the Bolshoi simulation models not just how the minority of the *visible* universe of stars, gas, and dust evolved, but also how the vast majority of the *invisible* universe evolved—rendering the invisible visible for astronomers to study, and to predict structures that astronomers can seek to observe.

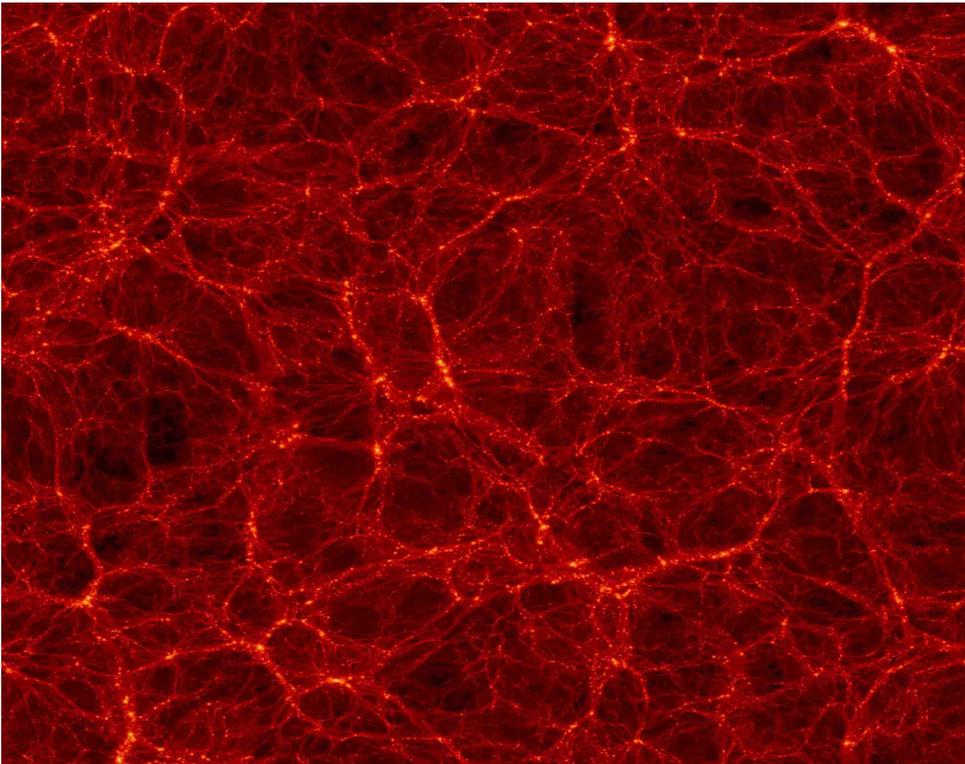
- *Trudy E. Bell, M.A.*

## Further reading

Details about the Bolshoi simulation appear at <http://hipacc.ucsc.edu/Bolshoi/> .

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> .

## CAPTIONS:



*Snapshot from the Bolshoi simulation at a red shift  $z=0$  (meaning at the present time), showing filaments of dark matter along which galaxies are predicted to form.*

*CREDIT: Anatoly Klypin (New Mexico State University), Joel R. Primack (University of California, Santa Cruz), and Stefan Gottloeber (AIP, Germany).*

## Secretary's Summary of September Meeting

- Since Merrill was not able to attend due to work, Ben got the meeting started by announcing that coffee was available along with homemade butterscotch brownies courtesy of Ashley. He then called for old business.
- Craig still has handouts and information available for ASTROCON 2017 as well as all the forms for the Deep South Regional Star Gaze (Nov. 3 – 8).
- The Observatory is looking for volunteers to help out with the Lunar Eclipse on Sept. 27<sup>th</sup>; they will be open from 6:30 – 12:30. They are also looking for volunteers for Observe the Moon Night on Sept. 19<sup>th</sup>. Linda Gauthier will be here with lunar samples for 7:00 – 9:00 pm. Volunteers are also needed to help out at the BRAS booth for the Mini Maker Faire being held during the day on Sept. 26<sup>th</sup> at the main EBR library on Goodwood.
- New business: There was a reminder that Light Pollution meetings are once a month (6:15 pm just prior to the regular BRAS Meeting at the Observatory the second Monday of the month). We still have the 20/20 Vision Campaign going on where we are trying to reduce the light pollution/increase the darkness from a sky quality meter score of 18 to a score of 20 by the 20<sup>th</sup> anniversary of the Observatory in 2017. Ben showcased the lightbox he put together to demonstrate the advantages of full cutoff lighting. This will be used for education at future outreach events. It will have the BRAS logo on one side and the recipients of the Good Lighting Award listed on the other side.
- As part of the NASA outreach for the New Horizons event, Ben Toman received a certificate for his effort imaging Pluto. Forrest Smith was awarded his certificate and pin for the Deep Sky Binocular Award.
- Craig announced that BRAS was officially part of the NASA Night Sky Network and displayed the banner that we can now post at related outreaches. We just received the first package, Exploring the Solar System, which we will use at the Maker Faire at the library on the 26<sup>th</sup>. NASA Night Sky Network outreaches will need 2 or 3 volunteers to help out. There is the possibility of participating at the Observatory on Plus Night Saturdays once a month to “liven things up”.
- Forrest supplied the replacement knob/cable that was need for the H-alpha solar scope.
- The guest speaker, Nick Cannady, a graduate student at LSU, gave a talk about Cosmic Ray Observations on the ISS. This highlighted the work he has been doing with Calorimetric Electron Telescope (CALET) which was recently deployed (August) to the ISS.
- Ephraim Craddock's award-winning essay as well as an article on Dr. Landolt of LSU were in the most recent issue of the Reflector.
- A raffle was held at the end of the meeting: two or three books, a Caldwell card, and a Moon map were available. We are still working on collecting enough money to award a 10” Dobsonian telescope.

**Roslyn Readinger**  
**BRAS Secretary**

# HRPO

## FRIDAY NIGHT LECTURE SERIES

*all start at 7:30pm*

2 October: “Uranus and Neptune” One has an incredible tilt, the other has the strongest wind gusts in the Solar System! The farthest gas giants are described, with their moons and missions.

9 October: “South Pole Science” Sponsored by the National Science Foundation and the University of Delaware, the Amundsen-Scott South Pole Station housing scientists performing research in seismology, horticulture, air quality, and (yes) physics and astronomy. BREC Center Supervisor Tom Northrop presents the exciting story of the station at which Americans have worked continuously since November 1956.

16 October: “Mysteries in Cosmic Dust” LSU professor Geoff Clayton presents a first for HRPO! The study of interstellar and extragalactic dust reveals much about the Milky Way and its components.

23 October: “Solar Cycle 24” Though not as intense as many, the current solar cycle generated splendid sunspots and flares, CMEs and radio blackouts and lovely aurorae. Is the All Quiet Event heralding the end? When should we expect Cycle 25?

30 October: “Wonders of the Fall Sky” BREC Education Curator Amy Brouillette will take the audience on a fascinating tour of Baton Rouge's autumn 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!

## SCIENCE ACADEMY

*Saturdays from 10am to 12pm*

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

3 October: “Surveying the Moon”

10 October: “How to Darken a Sky”

17 October: “Expedition 1”

31 October: “Fall Day”

## SOLAR VIEWING

*For all ages. Free admission.*

31 October, 12pm to 2pm

## CALL FOR VOLUNTEERS

**\*Saturday, 24 October from 6pm to 10pm. *Four volunteers in additional to regular Plus Night complement. The Spooky Spectrum. Marshmallow roast, demo tables, desk duty, game prize redemption table. Easy; training provided. This is an extremely popular event for families with young children. Any help is appreciated.***

# 6<sup>TH</sup> ANNUAL DONATION DRIVE

through 24 October

Goal: \$720

Last year, HRPO held its fifth annual donation drive—and the public came through, bringing to the facility the Space Shuttle Blueprints, the Galileo Combo Station and the Resonance Bowl among other delights. We've ranked this year's items from least- to most-expensive. Until the night of 24 October, all monies deposited into our BREC Foundation account will first go toward items on the list below. We will acquire the items in that order as the success of the drive allows. The goal is all five items—so please give generously to HRPO during this time period and all these goodies will be at HRPO in no time! *Any items acquired quickly enough will be on display during the Spooky Spectrum on 24 October.*

## THE ITEMS:

- \*Large Fossil Collection: **Total monies needed: \$49.**
- \*Deep Sea Geological Flow: **Total monies needed: \$128.**
- \*Jupiter Rotating Globe: **Total monies needed: \$272.**
- \***Atlantis** Signed Print (with Liner Fragment): **Total monies needed: \$451.**
- \*Van De Graff Generator: **Total monies needed: \$720.**

## THREE WAYS TO DONATE:

- \*Give at HRPO! We can write you a receipt.
- \*Mail a check to the [BREC Foundation](#), stipulating "HRPO" in the memo line of your check.
- \*Donate online via PayPal. Contact the BREC Foundation at (225) 226-7381 for instructions for stipulating online donations for HRPO.

For more information on the drive please contact HRPO at (225) 768-9948 or [observatory@brec.org](mailto:observatory@brec.org).

Once again, any items acquired early enough will be displayed or used during The Spooky Spectrum on 24 October.

*All monies received are deposited into the BREC Foundation's HRPO account. Any monies received by HRPO in excess of the amount needed to purchase the items described above will be used for HRPO's other public programs—especially International Astronomy Day next May.*



## Recent Entries in the Forum

*Below are selected recent additions to the BRAS Forum. There are also [nine active polls](#).*

[Deep South Regional StarGaze XXXIII](#) from 3 Nov. to 8 Nov. This Year

Time of Year to Hunt [Zodiacal Light](#)

[Curiosity](#) Celebrates Third Earth Year on Mars

[Mercury Viewings](#) at HRPO Mostly Successful

[Expedition 45](#) Takes Reins of ISS

[Neptune Spotted](#) with 14x at HRPO

2800+ Louisianians Register Names with [InSight](#)

[One-Year Mission](#) Reaches Halfway Point

Cassini Investigates [Titan's Ionosphere](#)

[Expedition 46](#) Personnel Hold Press Conference

[Lunar Samples](#) Showcased at Observe the Moon Night

Moon Conjuncts with [Mercury, Then Saturn](#)

Baton Rougeans Fume at [Poor Weather for Lunar Eclipse](#)

Moderate Geomagnetic Storms Results in [Nice Sun Sketch Opportunities](#)

[Bad Asteroid Strike Rumor](#) Refuted by JPL

Binocular View of [Perseus Double Cluster](#) from HRPO Very Difficult

LSU P&A Colloquim on [Habitable Zones in Milky Way](#)

September BRAS Deep Sky Observations Include [Great Square of Pegasus](#), the [Polaris Engagement Ring](#) and [Albireo](#)

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## [20/20 Vision Campaign](#)

[Light Pollution Committee: 12 October, 6:15pm](#)

*On 26 September, BRAS took part in the second annual Mini Maker Faire at the East Baton Rouge Parish Library on Goodwood Boulevard. Officers and members educated more of the public on the dangers and pitfalls of uncontrolled night lighting. Many already were aware of the issue and eagerly asked what steps BRAS had taken to convince local officials and businesspeople to switch to FCO lighting. One lady stated that her husband called Entergy and with little difficulty had the streetlamp near their home capped.*

# Lacerta – The Lizard

**Position:** RA 22.5, Dec. +45

**Named Stars:** There are no named stars in **Lacerta**.

## Deep Sky:

**NGC 7243, Caldwell 16, Best 59**, mag. 6.4, 22 15.3 +49 53, 20', is an open cluster of 40 stars; not well detached from surrounding star field; modest range in brightness; mag. of brightest star is 8.5. A neat double star forms the vertex of a telescopic triangle near the middle of the group. The brightest star in the cluster is **Struve 2890**, a double star. The cluster is located 2 at .6° west-southwest of **Alpha Lacertae**.

**NGC 7209, Collinder 444, Melotte 238**, mag. 6.7, 22 05.2 +46 30, 25', is an open cluster of 25 stars; detached, no concentration of stars; small range in brightness; mag. of brightest star is 9.0; a large cluster. The cluster is located 2.5° west of **2 Lac**.

**NGC 7296**, mag. 9.7, 22 28.2 +52 17, is an open cluster.

**IC 1434**, mag. 9.9, 22 10.5 +52 50, 8', is an open cluster of 40 stars containing 6 "branches". The cluster is located about 2° west-northwest of **Beta Lac**.

**BL Lacertae**, mag. 14 to 17, 22 02 43.3 +42 16 40, Red-shift 0.07, was originally thought to be a variable star and was given a star designation. It is in fact the proto-typical blazer (blazing quasi-stellar object), a highly compact quasar associated with a supermassive black hole presumed to be lying at the core of an active giant elliptical galaxy (AGN). The light that comes from **BL Lacertae** does not have the "thermal" spectrum of a hot body which normal stars and galaxies have. Instead, it has a "synchrotron" spectrum, with radiation right across the spectrum, in the radio, visible light, ultra-violet, and X-ray regions, with no noticeable emission or absorption lines. Such radiation is associated with electrons being accelerated to near the speed of light in a magnetic field. There are two more deep sky objects beyond mag. 10 (IC 5217 at mag. 11.3, and UGC 11920 at mag. 12.9 photo).

## Other Stars:

**Alpha Lac**, mag. 3.76, 22 31 17.38 +50 16 56.8, is an optical double star, and a main sequence blue-white star.

**Beta Lac**, mag. 4.42, 22 23 33.64 +52 13 46.2, is a yellow giant star.

**Struve 2890**, is a double star and is the brightest star in **NGC 7243**.

**Struve 2902**, is a binary star with magnitudes of 7.6 and 8.2 with a separation of 6.4". The binary is located 1.5° southeast of **2 Lac**, along a line between **2 Lac** and **6 Lac**.

**8 Lac**, mag. 5.73, 22 35 52.28 +39 38 03.6, is a binary star and three other stars. Primary star is at mag. 5.7, and the secondary star is at mag. 6.5. The stars are separated by about 22'. B star is at mag. 6.3, 22 35 52.10 +39 37 41.4. At a separation of 82", a "C" component (star), mag. 7.2, can be found. This multiple star system is on the Astronomical League (AL) 100 list. AB 5.7, 6.3, 22.4" separation; AC 5.7, 7.2, separation 82"; AD 5.7, 9.1, separation 81.4"; AE 5.7, 7.2, separation 337.8".

**EV Lac**, mag. 8.2, 22 46 49.73 +44 20 02.4, is a red dwarf star classified as a flare star that emits x-rays. **EV Lac** is a fast spinner and, as a result, has a very strong magnetic field.

**Roe 47**, 22 30 +39 31, is a multiple star system containing five elements at magnitudes 5.8, 9.8, 10.1, 9.4, and 9.8.

**SAO 51891**, mag. 8.57, 22 20 07.03 +49 30 11.8, is both a flare star and a variable star.

**HD 215441**, mag. 8.81, 22 44 07.51 +55 35 21.2, is a variable star that is also called "Babcock's Star".

**IRAS 22272+5435**, mag. 9.0, 22 29 10.37 +54 51 06.4, is a proto-planetary nebula.

**IRAS 22223+4327**, mag. 9.69, 22 24 31.43 +43 43 10.9, is a proto-planetary nebula.

**ADS 16402B**, mag. 9.87, 22 57 46.83 +38 40 29.8, is a binary star. The secondary star is at mag. 10.2 and has a planet, HAT P-1b, orbiting it.

**PSR B2217+47**, 22 19 48.14 +47 54 53.9, is a pulsar.

There are two nova stars and one transiting planet beyond mag. 10.

## Sky Happenings:

**Oct. 2<sup>nd</sup>** – The Moon passes 0.5° north of Aldebaran at 8 AM CDT, with a possible occultation between 8:53 and 9:18 PM CDT and re-appearing between 9:43 and 9:55 PM CDT.

**Oct. 3<sup>rd</sup>** – Asteroid Eunomia is at opposition at 6 AM CDT.

**Oct. 4<sup>th</sup>** – Last Quarter Moon occurs at 4:06 PM CDT.

**Oct. 8<sup>th</sup>** – Dawn – The crescent Moon, Venus, and Regulus form an irregular triangle approximately 20° above the eastern horizon, with Mars and Jupiter glowing 4° apart to the lower left.

--The Moon passes 0.7° south of Venus at 4 PM CDT

--Mercury is stationary at 5 PM CDT.

**Oct. 9<sup>th</sup>** – Dawn – The Moon forms a triangle with Mars and Jupiter, with Venus and Regulus blazing above

--The Draconid Meteor Shower peaks before dawn

--The Moon passes 3° south of Mars at 12 noon CDT

--The Moon passes 3° south of Regulus at 4 PM CDT

--The Moon passes 3° south of Jupiter at 7 PM CDT.

**Oct. 11<sup>th</sup>** – The Moon passes 0.9° south of Mercury very low in the east at 7AM CDT

--The Moon is at apogee (252,518 miles from Earth) at 8:18 AM CDT

--Uranus is at opposition at 11 PM CDT.

**Oct. 12<sup>th</sup>** – New Moon occurs at 7:06 PM CDT.

**Oct. 13<sup>th</sup>** – Asteroid Papagena is at opposition at 2 AM CDT.

**Oct. 15<sup>th</sup>** – Mercury is at greatest western elongation (18°) at 10 PM CDT.

**Oct. 16<sup>th</sup>** – The Moon passes 3° north of Saturn at 8 AM CDT.

**Oct. 17<sup>th</sup>** – Mars passes 0.4° north of Jupiter at 9 AM CDT.

**Oct. 18<sup>th</sup>** – Dawn – Mars gleams less than 1/2 ° from Jupiter.

**Oct. 20<sup>th</sup>** – First Quarter Moon occurs at 3:31 PM CDT.

**Oct. 21<sup>st</sup>** – Orionid meteor shower peaks.

**Oct. 23<sup>rd</sup>** – The Moon passes 3° north of Neptune at 2 PM CDT.

**Oct. 24<sup>th</sup>/26<sup>th</sup>** – Dawn – the triple lights of Venus, Jupiter, and little Mars shines above the eastern horizon. Jupiter and Venus are less than 2° apart, with a dimmer Mars just 3° below them.

**Oct. 26<sup>th</sup>** – Venus passes 1.1° south of Jupiter at 3 AM CDT, just 1 hour after Venus reaches greatest western elongation (46°)

--The Moon passes 0.9° south of Venus at 5 AM CDT

--The Moon is at perigee (222,739 miles from Earth) at 8:01 AM CDT.

**Oct. 27<sup>th</sup>** – Full Moon occurs at 7:05 AM CDT.

**Oct. 28<sup>th</sup>** – Mercury passes 4° north of Spica at 2 PM CDT.

**Oct. 29<sup>th</sup>** – The Moon passes 0.6° north of Alderbaran at 6 PM CDT.

**Mercury** – Mercury brightens rapidly early in the month and may first be visible about 1° above or upper left of the slim crescent Moon on the 11<sup>th</sup> at an altitude of 8° a mere 40 minutes before sunrise. On Oct. 15<sup>th</sup>/16<sup>th</sup>, Mercury reaches greatest western elongation when it stands 18° from the Sun and climbs 8° above the eastern horizon 45 minutes before sunrise, at the start of astronomical twilight. Mercury is in Virgo, shining at mag. 0.2 on the 11<sup>th</sup>, brightening to mag. -0.6 by greatest elongation. On the 11<sup>th</sup>, Mercury's disk spans 8" and appears 1/3<sup>rd</sup> illuminated. By the 31<sup>st</sup>, its diameter has shrunk to 5" and its phase has waxed to more than 90% lit.

**Venus** – On Oct. 1<sup>st</sup>, Venus rises about 3:30 AM local daylight time, followed by Mars just after 4 AM, and then Jupiter at 4:30 AM, with 17° separating them in the predawn. In the predawn hours of Oct. 8<sup>th</sup>, a waning crescent Moon forms a compact triangle **MARS**, with Venus and Regulus about 2 ½ ° apart. Venus will be 4° east

of the Moon with Mars and Jupiter 9° and 13° farther east, respectively. The next morning, Oct. 9<sup>th</sup>, the Moon forms a second tight triangle with Mars and Jupiter only about 10° below **Jupiter** Venus and Regulus. On Oct 17<sup>th</sup> and 18<sup>th</sup>, mag. +1.7 Mars shines less than ½ ° from mag. -1.8 Jupiter, with Venus less than 7° to their upper right, and closing on them. On Oct. 25<sup>th</sup> and 26<sup>th</sup>, Venus blazes just 1.1° from Jupiter. This is the last in the current series of Venus-Jupiter conjunctions, one that closely resembles the 3 -2 BC series that may have been the appearances that became known as the “Star of Bethlehem”. Venus has dimmed a bit from mag. -4.7 at start of Oct. to -4.5 on the mornings of the conjunction. Oct. 26<sup>th</sup> is also the day Venus reaches greatest western elongation from the Sun (46°), rising just short of four hours before the Sun; appearing 25° high as twilight begins. The three planets all reside within a 3.5° wide circle. The three planets travel as a “trio”- within a 5° circle – all the way from Oct. 22<sup>nd</sup> to the 29<sup>th</sup>. On Oct. 28<sup>th</sup>, Mars and Jupiter appear 4.5° apart with Venus hanging between the two. By the final morning in Oct., Jupiter stands highest while Venus has closed to within 1.4° of Mars. Mars and Venus are in conjunction (1° apart) on Nov. 2<sup>nd</sup> through 4<sup>th</sup>. Venus’s apparent diameter shrinks from 33” to 23” during Oct., while Jupiter’s grows from 31” to 33” in the same period – while Venus’s phase thickens from 34% to 53% sunlit. Unfortunately, Mars reveals a featureless disk 4” across. Venus, Mars, and Jupiter spend all month in Leo.

**Saturn** – Saturn stands in the southwest as evening twilight falls, with Antares located 10° southeast (left) of the planet. At mag. 0.6, Saturn shines brighter than Antares. If you look carefully, you will notice a closer and fainter companion; second magnitude double star Beta Scorpii. As Saturn moves eastward relative to the background stars, the gap between it and Beta Scorpii narrows. Saturn passes 0.7° due north of Beta on Oct. 24<sup>th</sup>. A waxing crescent Moon passes through the scene in mid-Oct. On the 15<sup>th</sup>, it lies 8° to Saturn’s right. The following evening, the Moon appears 6° to Saturn’s upper left. Saturn starts the month setting 2 1/ hours after the Sun in eastern Libra, but ends it setting less than 1 ½ hours after the Sun in western Scorpius. In early Oct., Saturn’s disk measures 16” across while the rings span 36” and tilt 25° to our line of sight. If you want to catch a view of Saturn, do so early in the month. On Oct. 1, Saturn stands about 15° high an hour after sunset. By month’s end, Saturn has dropped to 5° altitude at the equivalent time.

**Uranus** – Uranus reaches opposition on the night of Oct. 11<sup>th</sup>/12<sup>th</sup>, and also lies closest to Earth, shining at mag. 5.7. Under a dark sky, Uranus will be visible to the naked eye, though binoculars make the task much simpler. Uranus is in Pisces this month. On Oct. 1<sup>st</sup>, Uranus stands 2° east-southeast below Epsilon Piscium. The planet tracks westward all month but covers only about 1° of sky. It spends the last three weeks of Oct. traveling just north of a conspicuous triangle of 6<sup>th</sup> magnitude stars (80 Psc is the westernmost star). Uranus will show a 3.7” diameter disk with a distinctive blue-green color.

**Neptune** – Neptune lies among the background stars of central Aquarius. In early Oct., Neptune appears well; above the southeast horizon after darkness falls and climbs higher in the south around 11 PM LDT. It reaches the same peak position two hours earlier by month’s end. Neptune glows at mag. 7.8, so to spot it, use binoculars or a telescope. Neptune lies 4° to 5° southwest of 4<sup>th</sup> magnitude Lambda Aquarii. Locate Lambda, and then scan to the southwest for 5<sup>th</sup> magnitude Sigma Aquarii. On Oct. 1<sup>st</sup>, Neptune stands 2° northeast of Sigma and 0.9° due east of a 7<sup>th</sup> magnitude star. The planet’s motion carries it west-southwest this month, and by the 31<sup>st</sup>, it has cut the gap to this latter star in half. Neptune shows a disk of 2.3”, and is blue-grey in color.

**Pluto** – Pluto lies in northern Sagittarius, an area that stands 25° high in the south-southwest as twilight ends. To see Pluto, you will need an 8-inch or larger telescope and a clear, moonless sky or a telescope-camera combination that can reach to mag. 14.2 Pluto. Pluto’s general location lies 5° due north of mag. 2.1 Sigma Sagittarii in the handle of the Teapot asterism and within shouting distance of mag. 3.5 Xi<sup>2</sup> Sgr. During Oct., Pluto moves from a position 0.7° west of Xi<sup>2</sup> to a spot just 0.40° west of this star.

**Moon** – The Moon pairs spectacularly with Venus and Regulus on Oct. 8<sup>th</sup>, and on the 9<sup>th</sup>, it forms an equally splendid triangle with Jupiter and Mars. Just before sunrise on Oct. 11<sup>th</sup>, the slim crescent Moon can be spotted just below Mercury. The waxing crescent Moon is to the upper left of Saturn on the evening of Oct. 16<sup>th</sup>.

Moon libations: Longitude- Eastern limb most exposed on Oct. 4<sup>th</sup> (+7.9°)

--Western limb most exposed on Oct. 19<sup>th</sup> (-6.9°)

Latitude – Northern limb most exposed on Oct. 4<sup>th</sup> (+6.8°) and on Oct. 31<sup>st</sup> (+6.7°)

--Southern limb most exposed on Oct. 18<sup>th</sup> (-06.8°)

**Asteroids** –Vesta, mag. 6.5, will be about 1 ½ ° to 2° south of Iota Ceti on Oct. 20<sup>th</sup> through 27<sup>th</sup>.

**Comets** – 67P/Churyumov-Gerasimenko resides among the background stars of Leo, near the gathering of the bright morning stars. On Oct. 15<sup>th</sup>, Comet 67P lies a short hop from Venus and Regulus, and passes a mere 16' north of mag. 3.5 Eta Leonis. If we are lucky, 67P may outburst and glow at mag. 10, within reach of a 4-inch telescope under a dark sky. If we are not lucky, 67P could be at 12<sup>th</sup> magnitude and would require an 8-inch or larger telescope.

**Meteor Shower(s)** – The Draconids of early Oct. are widely variable. Most years, nothing happens. Some other years have produced lesser displays than in 1933 and 1946 – two of the great meteor storms of the last century. Lesser years have had 20 to more than 500 meteors visible per hour by an ideally situated observer. The Draconid particles are shed by Comet 21P/Giacobini-Zinner, a short period comet that currently rounds the Sun about every 6.6 years. The radiant is at the head of Draco, which is circumpolar. The radiant is highest in the evening, rather than in the morning for most showers, so start watching at dusk on Oct. 8<sup>th</sup> and 9<sup>th</sup>. This year, the Moon is a waxing crescent, so there will be no problem with moonlight interfering with seeing these exceptionally slow-moving meteors.

The Orionid Meteor shower peaks on Oct. 21<sup>st</sup>.

### **When to view the Planets:**

#### **Evening Sky**

Saturn (southwest)

Uranus (east)

Neptune (southeast)

#### **Midnight**

Uranus (south)

Neptune (southwest)

#### **Morning Sky**

Mercury (east)

Venus (east)

Mars (east)

Jupiter (east)

Uranus (west)

## **Dark Sky Viewing: Primary – Oct. 10<sup>th</sup>, Secondary – Oct. 17<sup>th</sup>**

### **Lacerta – The Lizard**

The inconspicuous constellation, sandwiched between Cygnus and Andromeda, was introduced by the Polish astronomer Johannes Helvetius in his star atlas "Firmamentun Solaescianum" in 1687. Helvetius also gave an alternate title of "Stellio the Newt" to the constellation, which soon fell into disuse. Lacerta's stars are of the fourth magnitude and fainter, and none have names, nor are there any legends associated with the constellation.

