

Newsletter of the Baton Rouge Astronomical Society



August, 2014

Next Meeting Augustth, 7:00 PM at HRPO



M27, The Dumbbell Nebula-Taken at HRPO by Ben Toman

What's In This Issue?

President's Message

Final Outreach Message from Dr. Trevor McGuire

Astro Short-Milky Way: Cosmic Cannibal

Message from the HRPO

Globe At Night

Recent BRAS Forum Entries

Observing Notes from John Nagle



President's Message

Summertime in Louisiana isn't always the best time to observe the sky. Even on nights with no cloud cover, there always seems to be a haze of water vapor or dust that washes out the dimmer things we want to see. However, we often get those still nights that are great for viewing the planets. At least we have that. And we always have the Sun.

Speaking of that, we are getting close to selling enough tickets to raffle the Lunt 35mm solar telescope. Once we have sold enough tickets we will make an announcement to draw for the winner at the next BRAS meeting.

In the meantime, we have lots of new (actually inherited) books to raffle, a couple of Messier and Caldwell cards, and a few other odd items. So, until we raffle the solar scope, there will be plenty to choose from between now and then.

On a happy/sad note, we are losing one of our more active BRAS members to his new career. Vice President Muralidar Chakravarthi will be moving to Florida in mid-August for a promotion with his company. The August meeting may be the last one we may see him for quite a while. He is working to schedule BRAS meeting activities till the next election but it would still be good to have someone in that position. We can discuss that at the next meeting. So, please be sure to attend our next meeting and tell Murali how much we will miss him and thank him for his services to BRAS.

That's not all, that same happy/sad note goes out for Trevor McGuire and his lovely wife Angela, who will be moving for his new career in North Dakota (It gets cold up there doesn't it?). We told them they were crazy but they are going anyway. They will already be moved by our next BRAS meeting. I am sure all you other BRAS members share my gratitude not only for Trevor's contributions to the club and to amateur astronomy, in general, but to his friendship. Trevor, we miss you already.

However, that means we will need someone to fill the Outreach Coordinator position. Let me know if you are interested in filling that role.

Clear skies,

Merrill Hess
President

Outreach Report

This marks my final outreach report, and I have no outreach requests to report. However, I thought I should outline exactly what my job has entailed over the last 2-3 years in case anyone wants to step up and fill this vacancy after I leave.

First and foremost, the outreach coordinator does not have to volunteer at all (or any) of the outreach events. The primary duty is to be the contact point within BRAS for anyone who is requesting an outreach events. I have had the volunteer listserv setup already, and more people can be added by contacting our system administrator, Fred Barnett. The coordinator's job is to receive the email, and decide if it is even appropriate for BRAS (I got one last night for an event in New Orleans, to which I gave the contact information for the Pontchartrain Astronomical Society, for example), how many volunteers would likely be needed for the event, and possibly figure out dates that would be good if the requestor doesn't have a date in mind. Once that information is squared away, you write an email to the aforementioned listserv, and wait for the volunteers to respond.

I have also taken to recording more of the BRAS events in a spreadsheet to keep track of who has done what event, how many hours it was, and how many contacts were made. This is probably a little more than I needed to do, though. I also set up the Sidewalk Astronomy program, but that was out of love for outreach, and is beyond the expected duties of this position.

My last duty has been to compose these emails monthly that usually have upcoming outreach requests and the appropriate information. My total amount of work per month was probably less than 2 hours.

In closing, I have no problem helping the transition via email from frozen Fargo, ND. I can probably take a break from all my Northern Lights observations to help you guys out!

-Trevor McGuire

Astro Short

Milky Way: Cosmic Cannibal!

Get ready for a feeding frenzy! The supermassive black hole in the center of our Milky Way galaxy will grab an appetizer in June—right in time for prime summer viewing for northern-hemisphere astronomers!

From Earth, the center of the Milky Way is in Sagittarius near the border of Scorpius. The supermassive black hole, partly named for its host constellation, is called Sgr A* (pronounced “Sage A-star”).

From radio astronomy measurements, the Schwarzschild radius of Sgr A*—that is, of its “event horizon” beyond which light cannot escape—is known to be a quarter the radius of Mercury’s orbit. But that entire volume is jam-packed with a mass 4 million times greater than our Sun.

Starvation diet

Weirdly, Sgr A* “is the most underluminous black hole observed,” remarked Peter Anninos of Lawrence Livermore National Laboratory in northern California, meaning it hardly glows. True, the very definition of a black hole is something so massive that not even light can escape. But supermassive black holes in many other galaxies are surrounded by gas, dust, and other material. When material falls into, or accretes onto, a black hole, it emits a broad spectrum of radiation most intense in X-rays.

SgrA* doesn’t glow, though, because “it is starved for material,” Anninos explains. Observations reveal that hundreds of hot young stars are whirling around SgrA* in orbits within 1 parsec (about 3 light-years). Measurements and calculations suggest their stellar winds blowing away the gas are so fast and furious that “it is difficult to actually get the gas down to the black hole.”

Within this environment, however, “Sgr A* may occasionally enjoy a relative feeding frenzy,” continues Anninos and his three coauthors from Livermore and the College of Charleston in South Carolina, writing in a November 2012 issue of *The Astrophysical Journal*. Maybe every 10,000 years or so a daredevil star zipping tauntingly close to SgrA*—about the Sun-Earth distance—might get torn apart by tidal forces and consumed. But that’s a long time between meals.

Cosmic cannibalism

Enter the hapless gas cloud G2. In 2011, three astronomers detected a small clump of dusty, ionized gas near the galactic center; dubbed G2, it has a radius of 2 to 20 billion kilometers (about as big as our solar system) and a mass triple Earth’s. G2’s dust is warm—550K, about twice Earth’s temperature; its gas is 10,000K, twice as hot as our Sun. But G2 is far cooler than the heated, rarefied gas at the galactic center. Because cool clouds in such a hostile environment evaporate, G2 either formed shortly before it was detected or is part of a larger extended structure.

Like a comet heading toward the Sun, G2 is plummeting toward Sgr A*. At closest approach (pericenter) in June, G2’s center of mass will scream by only 4 billion kilometers away, scarcely more than 3,000 times the Schwarzschild radius of Sgr A*. Although too distant for G2 to be gulped whole (just as only rarely do sun-grazing comets actually plunge into the Sun), computer simulations reveal that enormous tidal forces will elongate G2 until it begins to fragment and lose angular momentum through interactions with background gas. “The cloud stretches into a stream of gas feeding the black hole,” Anninos explains.

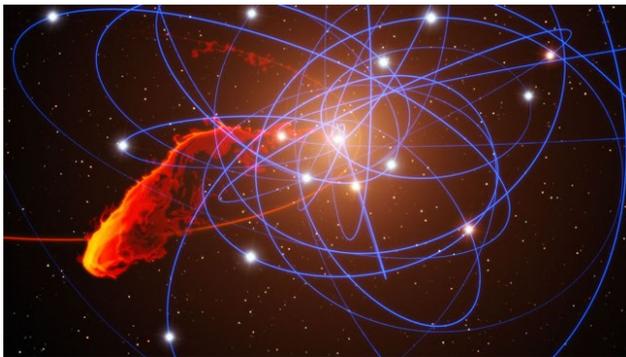
The show will start in June and unfold through 2020.

What might observers actually see? Astronomers are excited to find out. Calculations suggest that

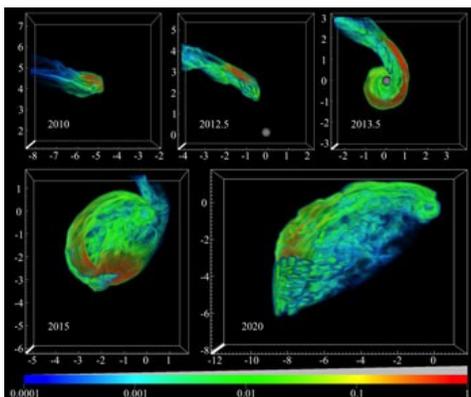
while SgrA* won't turn the center of the Milky Way into an AGN (active galactic nucleus), it could brighten by more than 100 times the luminosity of our Sun, mainly in X-rays. With the right equipment, "this event should be easily observable over the next several years," Anninos estimates. "The break up of G2 will provide an unprecedented opportunity to study accretion physics in the galactic center." – *Trudy E. Bell, M.A.*

Further reading: Link to the paper in *The Astrophysical Journal* is at <http://arxiv.org/abs/1209.1638>. A Lawrence Livermore press release is at <https://www.llnl.gov/news/newsreleases/2012/Oct/NR-12-10-07.html>. A movie of the simulation of G2 being captured and eaten through 2020 is at http://fragilep.people.cofc.edu/research/movies/cloud_new.mov.

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>



Simulations of the dust and gas cloud G2 (orange and yellow) on its orbit around the Milky Way central black hole Sgr A (invisible near center). White objects and orbits depict hot young stars whipping around the supermassive black hole. Credit: M. Schartmann and L. Calcada, European Southern Observatory and Max-Planck-Institut für Extraterrestrische Physik*



Three-dimensional volume visualization spanning the period 2010 to 2020, of the gas and dust cloud as it approaches the Sgr A black hole near the center of the Milky Way galaxy at five points from 2010 to 2020. Credit: Chris Fragile and Julia Wilson*

HRPO

FRIDAY NIGHT LECTURE SERIES

all start at 7:30pm

1 August: "Beliefs about UFOs" (Clinton Pettigrew)

8 August: "Solar Cycle 24" (Chris Guess-Who)

15 August: "The Atchafalaya Basin" (Bryan Piazza) [tentative]

22 August: "Commercial Space Exploration" (Tom Northrop)

29 August: {TBA}

CALL FOR VOLUNTEERS

*Saturday, 9 August from 6pm to 10pm. *Two volunteers in addition to regular BRAS compliment.* **Evening Sky Viewing Plus.** Marshmallow roast, demonstration tables; small telescope; setup and takedown. Easy; training provided.

*Monday, 11 August from 10pm to Midnight. *Two volunteers.* **Perseid Meteor Shower.** Small telescope. Easy.

*Saturday, 23 August from 12pm to 2pm. *One volunteer.* **Solar Viewing.** Small telescope. Easy; training provided.



GLOBE At Night

15 August to 24 August

Everyone's favorite winter light pollution exercise is back...except it's no longer just for winter. During 2014 the GLOBE at Night staff will collect observations during *all twelve* New Moon periods!

This is an excellent time to start compiling a good historical record of sky glow in Baton Rouge. Each BRAS member should take at least one measurement per season during 2014. The GLOBE at Night website makes it as easy as possible, with step-by-step instructions and an downloadable instruction manual.

In August participants use the constellation Hercules.

The heading on this page hyperlinks to the BRAS Forum thread devoted to GLOBE at Night. Visit there regularly for updates and answered questions.

Recent Entries in the Forum

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

[Metallic Glass, Temper Foam Descendants of American Space Program](#)

[ARRL Field Day a Success!](#)

[There is Still Time to See Saturn](#)

[International Observe the Moon Night Coming](#)

[Major 12 July Fireball: Over One Hundred Reporting Witnesses](#)

[Perseid Meteor Streaks Increasing as Peak Arrives](#)

[Tenth Anniversary of Shoemaker-Levy 9 Impact into Jupiter](#)

Baton Rouge Culmination Times Posted for [NGC 3521](#)

Observing Notes

Sagittarius – The Archer

Position: RA 19 Hours, Dec. -25

Named Stars:

Rukbat al-Rami (Alpha Sgr.), “The Knee of the Archer”, mag. 3.96, 19 23 53.15 -40 36 56.3, is a blue dwarf star believed to have a debris disk. Alpha Sgr. is emitting an excess flux of X-rays and infra-red radiation.

Arkab (Beta Sgr.), “Hamstring” or “Tendon”, is a binary star. Beta Sgr. 1 is called “Arkab Prior”, and is itself a binary star, mag. 3.96, 19 22 38.29 -44 27 32.1, and is composed of two dwarf stars. Beta Sgr. 2 is called “Arkab Posterior”, mag. 4.27, 19 23 13.06 -44 47 58.7, and it is a white giant star. Beta Sgr. 1 and 2 are separated by 0.36°, while the stars of Arkab Prior (Beta Sgr. 1) are separated by 28 arc seconds.

Alnasi (Gamma Sgr.), also called Nashaba, “The Arrowhead”, is a binary system. Gamma Sgr. 1 is at mag. 4.66, located at 18 05 01.22 -29 34 48.3. Gamma Sgr. 2 is an orange giant star at mag. 2.98, located at 18 05 48.52 -30 25 25.1, and the two are separated by 0.86°. The actual Milky Way galactic nucleus is about 4° west-northwest from Gamma Sgr. Gamma Sgr. is also known as W Sgr., a Cepheid variable with a period of 7.5947 days. NGC 6522 and 6528 are about 1/2° north and west, with NGC 6558 about 1.6° to the south-southeast.

Kaus Media (Delta Sgr.), “The Middle Bow”, mag. 2.72, 18 20 59.62 -29 49 40.9, is a multiple star system. Delta Sgr. A has three dim companions, all dwarf stars. Delta Sgr. B is at 14th magnitude at 26 arc seconds of separation. Delta Sgr. C is at 15th magnitude at 10 arc seconds separation, and Delta Sgr. D is at 13th magnitude with 58 arc seconds of separation. About 45’ to the southeast is NGC 6624.

Kaus Australis (Epsilon Sgr.), “The Southern Bow”, mag. 1.79, 18 24 10.35 -34 23 03.5, is a binary star with the companion at 14th magnitude and a separation of 32 arc seconds. Epsilon Sgr. is the brightest star in Sagittarius, the 36th brightest in the sky, and is the bottom part of the Archer’s bow, located about 4.6° to the south of Delta Sgr.

Ascella (Zeta Sgr.), “Armpit”, mag. 2.60, 19 02 36.72 -29 52 48.4, is a white giant double star, with the companion star a sub giant at mag. 3.37, and a separation of 13.4 AU. Zeta Sgr. also has a dim companion star at 10th magnitude at 75 arc seconds away. M 54 is about 1.5° to the west-southwest, and M 70 is midway between Zeta and Epsilon.

Sephdar (Eta Sgr.), “Violent Warrior”, known also as Ira Furoris, “Fierce Wrath”, mag. 3.10, 18 17 37.73 -36 45 40.6, is a multiple star system. Primary component is a red giant irregular variable star. The brightest companion star is a dwarf at mag. 7.77 and a separation of 3.6 arc seconds. Another companion is at 13th magnitude at 33 “ separation, with the faintest companion at 10th magnitude and 93 “ of separation. Before being assigned to Sagittarius, this star system was known as Beta Telescopi. Around the year 6300 AD, this system will have moved into the Coma Australis constellation.

Kaus Borealis (Lambda Sgr.), “The Northern Bow”, mag. 2.82, 18 27 58.27 -25 25 16.5, is an orange giant star, sometimes referred to as a “clump” star – one undergoing the final stages of its existence, but stable and fusing Helium into Carbon and Oxygen in its core. M 28 is 0.8° to the northwest, and M

22 is 2.3° to the northwest.

Polis (Mu Sgr.), “fool” from Coptic Egyptian, mag. 3.84, 18 13 45.81 -21 03 31.8, is a quintuple star, Polis A thru Polis E. Polis A is an eclipsing binary star, a super giant star and a giant star companion. The primary component in the system is a giant star.

Ainal Rami (Nu Sgr.), “The Necklace”, is a binary system. Nu Sgr. 1 is at mag. 4.86, 18 54 10.18 -22 44 41.4, and Nu Sgr. 2 is at mag. 5.00, 18 55 07.07 -22 40 16.5.

Manubrium (Omicron Sgr.), mag. 3.76, 19 04 40.93 -21 44 28.9.

Albaldah (Pi Sgr.), “The Town”, mag. 2.88, 19 09 45.83 -21 01 24.7, is a triple star system. The primary, Pi Sgr. A, has two companions, Pi Sgr. B at 0.1 arc seconds separation and Pi Sgr. C at 0.4 arc seconds separation.

Nunki (Sigma Sgr.), mag. 2.05, 18 55 19.52 -26 17 47.7, is a dwarf star and a very fast rotator, spinning with a speed of more than 200 km/sec. Nunki has a faint, mag. 9.5 companion at about 5.2 arc seconds away.

Hecatebolus (Tau Sgr.), “Sharpshooter” or “Far Darter”, mag. 3.32, 19 06 56.44 -27 40 11.3, is an orange giant star and a suspected binary star.

Aoul al Sadirah (Phi Sgr.), mag. 3.17, 18 45 39.35 -26 59 26.8, is a giant star.

Deep Sky:

M 8 (NGC 6523) “The Lagoon Nebula”, mag. 5.8, 18 03.8 -24 23, 90'x39', is a very large, very bright emission nebula containing open cluster NGC 6530, and is located 1.5° south-southeast of the Triffid Nebula (M 20). The central area of the Lagoon Nebula is also known as the Hourglass Nebula – it has the shape of an hourglass that is formed because of matter that is propelled by Herschel 36.

M 17 (NGC 6618), “The Omega Nebula”, Sharpless 45, also called the Swan Nebula, or the Horseshoe Nebula, or the Lobster Nebula, mag. 7.0, 18 20.8 -16 11, 45'x37', is a large and bright nebula with a large (9') and bright open cluster of about 40 stars that illuminate the nebula. It is a radio source on 9.4 cm and is within 2° of the X-ray source Sgr. XR-2.

M 18 (NGC 6613), mag. 6.9, 18 19.9 -17 08, 8', is an open cluster of 20 stars; detached, weak concentration of stars. M 18 can be found between M 24 and M 17 (approximately 1° south-southwest of M 17).

M 20 (NGC 6514), “The Triffid Nebula”, mag. 6.3, 18 02.6 -23 02, 28', is a very bright, very large nebula, trisected by prominent dark lanes at the northeast, south, and west. It contains a very bright, very large open cluster of 60 stars – the brightest being at mag. 7.3, and is located about 1.5° north-northwest of M 8. M 20 is a combination of emission nebula (the lower part), a reflection nebula (the upper part), and an open cluster. It is an HII region, containing a stellar nursery full of embryonic stars.

M 21 (NGC 6531), mag. 5.9, 18 04.6 -22 30, 12', is an open cluster of 70 stars, located approximately 0.5° northeast of M 20.

M22 (NGC 6656), “The Sagittarius Cluster”, mag. 5.1, 18 36.4 -23 54, 33', is a medium concentration of stars; very bright, very large, rich, round, and well resolved. A dark gash runs southwest to northeast across the core. Contains about 700,000 stars, and extends 75 ly. It is located 1 1/2 ° north and 2° east of Lambda Sgr. , and is notable for being one of only four known globular clusters that contains a planetary nebula – GJJC1. NGC 6642 is 1° to the west-northwest.

M 23 (NGC 6494), mag. 5.5, 17 56.8 -19 01, 26', has about 150 stars; detached, no concentration of stars. Brightest star is at mag. 9.2, and it extends 16ly. M 23 is located 4° northwest of Mu Sgr. and 1° north. M 20 is about 4° to the south-southeast.

M 24 (NGC 6603), IC 4715, “The Sagittarius Star Cloud (Delle Caustiche), mag. 4.5, 18 16.9 -18 29,

95'x35', also called the Milky Way Star Cloud or Milky Way Patch. It is not a true cluster, but a detached portion of the Milky Way; visible to the naked eye on a clear night. Sometimes M 24 is incorrectly equated with the open cluster NGC 6603, which it contains. NGC 6603 can be located to the northeast of the "diamond shaped" group in M 24, immediately to the north of a distinct red or orange tinted star. Barnard's dark nebula, B 92, lies to the west.

M 25 (IC 4725), mag. 4.6, 18 31.6 -19 15, 32', has 30 stars; detached, strong concentration of stars; moderate range in brightness; large; brightest star - mag. 6.7, it extends 18ly. M 25 is located 2° north and 4° east of Mu Sgr., or 3° south and 2° east of M 17.

M 28 (NGC 6626), mag. 6.8, 18 24.5 -24 52, 11', has a high concentration of stars, very bright, large, and very well resolved, extending 60ly. M 28 is located 1° northwest of Lambda Sgr., or 1° south and 2 1/2 ° west of M22. M 28 contains 18 RR Lyrae type pulsating variable stars, and the first globular cluster in which a millisecond pulsar was discovered – in 1986.

M 54 (NGC 6715), mag. 7.7, 18 55.1 -30 29, 12', has a high concentration of stars; very bright, large, and round. At the cluster's north edge, two arms of very faint stars appear to swirl counterclockwise around the nucleus, and an orange star is superposed on one of these arms. Extending for 170 ly, it contains over 82 variable stars – 55 of them being RR Lyrae type. Located 1/2° south and 1 1/2° west of Zeta Sgr. M 54 is believed to belong to the Sagittarius Dwarf Elliptical Galaxy.

M 55 (NGC 6809), mag. 7.0, 19 40.0 – 30 58, 19', has a low concentration of stars; pretty bright, large, round, and very rich. Several dark lanes infiltrate the cluster, and a bright star lies in a dark hole near the center. M 55 extends 110 ly, and is located 1° south and 7° east of Zeta Sgr.

M 69 (NGC 6637), mag. 7.7, 18 31.4 -32 21, 10', has a medium concentration of stars; bright, large, round, and very well resolved. M 69 extends 70 ly, and is located 2 ½° south and 2° east of Delta Sgr. or 2° north and 1 1/2° east of Epsilon Sgr. M 69 requires a fairly high power to resolve. NGC 6652 is 1° to the southeast, and M 70 is about 2° to the east.

M 70 (NGC 6681), mag. 8.1, 18 43.2 -32 18, 7', has a medium concentration of stars; bright, pretty large, and round, extending 130 ly. M 70 is located 2 1/2° east of M 69, or 2 1/2° south and 4° west of Zeta Sgr.

M 75 (NGC 6864), mag. 8.6, 20 06.1 – 21 55, 7', has a high concentration of stars; bright, round, pretty large, partially resolve, extending 150 ly. M 75 is located less than 1/2° from the Capricornus border, about 8° southwest of Beta Capricornis.

NGC 6530, mag. 4.6, 18 04.8 -24 20, 15', has 100 stars, detached; weak concentration of stars, with the brightest star at mag. 6.9. NGC 6530 is involved with nebulosity of the Lagoon Nebula (M 8).

NGC 6723, mag. 6.8, 18 59.6 -36 38, 12', is a globular cluster with a medium concentration of stars; very large and well resolved.

NGC 6716, mag. 6.9, 18 54.6 -19 53, 7', is an open cluster of 20 stars; not well detached from the surrounding star field; brightest star is at mag. 8.3.

NGC 6595, mag. 7.0, 18 17.0 -19 53, 10', is an open cluster of 30 stars, possibly an asterism, and is involved in nebulosity.

NGC 6544, mag. 7.5, 18 07.4 -25 00, 7', is a globular cluster that is quite faint, pretty large, and irregularly round.

NGC 6520, mag. 7.6, 18 03.4 -27 54, 6', is an open cluster of 60 stars; detached, strong concentration of stars; brightest star is at mag. 9(photo); pretty small. B 86, called the "Inkspot", is on one edge of NGC 6520.

NGC 6624, mag. 7.6, 18 23.7 -30 22, 4.3', is a globular cluster with a medium concentration of stars; very bright, pretty large, round and very well resolved.

NGC 6546, mag. 8.0, 18 07.2 -23 20, 12', an open cluster of 150 stars, detached, no concentration of

stars, very large; the brightest star is at mag. 10.6.

NGC 6469, mag. 8.2, 17 52.9 -22 21, 12', an open cluster of 50 stars; detached, no concentration of stars, moderate range in brightness.

NGC 6553, mag. 8.3, 18 09.3 -25 54, 6', is a globular cluster with a low concentration of stars; faint, large, slightly elongated, partially resolved.

NGC 6569, mag. 8.4, 18 13.7 -31 50, 7', is a globular cluster of a medium concentration of stars; quite bright, large, round, very well resolved.

NGC 6717, mag. 8.4, 18 55.1 -22 42, 10', is a globular cluster with a low concentration of stars towards its center, Palomar 9.

NGC 6645, mag. 8.5, 18 32.6 -16 54, 10', is an open cluster of 40 stars, detached, no concentration of stars; small range in brightness; brightest star is mag. 12 (photo), pretty large.

NGC 6652, mag. 8.5, 18 35.8 -32 59, 5', is a globular cluster with a medium concentration of stars; bright, small, slightly elongated and very well resolved.

NGC 6558, mag. 8.6, 18 10.3 -31 46, 4.2', is a globular cluster that is pretty bright, pretty large, round, and very well resolved.

NGC 6568, mag. 8.6, 18 123.8 -21 36, 13', is an open cluster of 50 stars; detached, no concentration of stars; a large and coarse cluster of minute stars.

NGC 6822, "Barnard's Galaxy", IC 4895, Caldwell 57, mag. 8.8, 19 45.0 -14 48, 15'x14', is a very faint, large, and elongated barred irregular galaxy that is a little less than 2° northeast from the wide double star 54 Sgr. The brightest portion is an elongated central core or bar measuring 8'x3' and oriented almost due north-south. This galaxy has blue giant stars and 5 patches of diffuse nebulosity, and some Cepheid variable stars. The small planetary nebula NGC 6818 is about 36' to the north and slightly west.

NGC 6642, mag. 8.9, 18 31.9 -23 28, 8', is a globular cluster with a medium concentration of stars; pretty bright, pretty large, irregularly round.

NGC 6638, mag. 9.2, 18 30.9 -25 30, 7', is a globular cluster with a medium concentration of stars; bright, small, round, and partially resolved, located approximately 1° southeast of M 22 and 1° southwest of M28.

NGC 6440, mag. 9.3, 17 48.9 -20 22, 5', is a globular cluster with a medium concentration of stars; pretty bright, pretty large, and round.

NGC 6818, "The Little Gem Nebula", PK25-17.1, mag. 9.3, 19 44.0 -14 09, 20", is a planetary nebula that is bright and very small; has a ring structure; central star is at mag. 15. The nebula is blue and looks like a star out of focus. It is accompanied by several small stars, four of which form a square around it.

NGC 6528, mag. 9.6, 18 04.8 -30 03, 5', is a globular cluster with a medium concentration of stars; pretty faint and quite small.

NGC 6522, mag. 9.9, 18 03.6 -30 02, 7', is a globular cluster with a medium concentration of stars; bright, pretty large, round, and very well resolved. NGC 6522 is possibly the oldest globular cluster in the Milky Way – estimated age of the cluster is more than 12 billion years. This cluster is located in an area of the sky known as Boade's Window – the region has relatively low amounts of dust and allows a view of the galactic center.

Cr 394, mag. 6.3(photo), 18 52.5 -20 23, 21', is an open cluster that is not well detached; has a moderate brightness range; moderately rich.

Cr 367, mag. 6.4, 18 09.6 -23 59, 37', is an open cluster of 30 stars; not well detached; has a large brightness range; involved in nebulosity (IC 1273, IC 1274, IC 4685, dark nebulas B 91 and B303).

Cr 367 is located about 1° east-northeast of M 8 (Lagoon Nebula).

The Bubble Nebula (Hubble 19251) is an emission nebula located in Barnard's Galaxy (NGC 6822). It contains areas of massive H II emission and large clouds of partly ionized gas.

The Sagittarius Dwarf Elliptical Galaxy (SagDEG), sometimes also called The Sagittarius Dwarf or Sagittarius Dwarf Spherical, mag. 4.5, is an elliptical galaxy shaped like a loop. It is a satellite galaxy of the Milky Way, and it contains at least 4 globular star clusters– the one that lies at its center is M 54. It can be found near Zeta Sgr.

The Sagittarius Irregular Dwarf Galaxy (SagDIG), mag. 15.5, is a dwarf galaxy that contains mainly intermediate age stars. It is one of the most metal poor galaxies known.

Sagittarius A is a radio source located at the center of the Milky Way, consisting of the supernova remnant Sagittarius A East, the spiral structure Sagittarius A West, and a bright radio source located at the center of the spiral –Sagittarius A* (suspected super massive black hole at the center of the Milky Way).

Sagittarius B2 is a very large molecular cloud of dust and gas spanning an area of 150ly across.

Sagittarius B is one of the largest molecular clouds in our galaxy and the single largest one in the vicinity of the galaxy's core. It has a mass of 3 million times that of the Sun.

Other Stars:

Rho Sgr., mag. 3.92, 19 21 40.38 -17 50 50.1, is a binary star with a separation of 0.46°. Rho Sgr. 2 is at mag. 5.84, 19 21 50.83 -18 18 29.4.

Upsilon Sgr., mag. 4.52, 19 21 43.62 -15 57 18.0, is a spectroscopic binary and eclipsing variable star. It is one of only four star systems known to be hydrogen deficient. The primary component is a supergiant star classified as an irregular variable star with a period of 20 days. The companion star is more massive than the primary, but it is so faint that optical telescopes cannot detect it. It is probably a main sequence dwarf that has accreted much of the primary star's mass.

KW Sgr., mag. 11, 17 52 00.7 -28 01 20.6, is a red supergiant star – a hyper giant that is one of the largest known stars.

Ross 154 (V1216 Sgr.), mag. 10.44, 18 49 49.36 -23 50 10.4, is a red dwarf flare star only 9.68 ly from the solar system, and is a known X-ray source.

The Pistol Star, 17 46 15.3 -28 50 04, is a hyper giant star and a member of the Quintuplet star cluster. It is a blue variable star and one of the most luminous stars known – about 4 million times as luminous as our Sun and 120 -200 times as massive. Located in the galactic center region, it illuminates the

Pistol Nebula, and if interstellar dust was not in the way, it would be a 4th magnitude star.

HD 169830, mag. 5.90, 18 27 49.48 -29 49 00.8, has two planets (b and c).

V5652, mag. 6.25, 19 15 33.15 -24 10 44.8, has one planet (b).

HD 187085, mag. 7.22, 19 49 39.97 -37 46 50.0, has one planet (b).

HD 181342, mag. 7.55, 19 21 04.23 -23 37 10.5, has one planet (b).

HD 180902, mag. 7.78, 19 19 17.71 -23 33 29.35, has one planet (b).

HD 190647, mag. 7.78, 20 07 19.67 -35 32 19.1, has one planet (b).

HD 181720, mag. 7.86, 19 22 52.99 -32 55 08.6, has one planet (b).

HD 171238, mag. 8.66, 18 34 43.67 -28 04 20.3, has one planet (b).

HD 164604, mag. 10.4, 18 03 06.93 -28 33 38.3, has one planet (b).

There are 11 more stars beyond mag.10 that have planets – if interested, see me.

There are 48 more deep sky objects beyond mag. 10 – see me if you want the list.

Asterisms:

The “Teapot” consists of some of the brightest stars in Sagittarius – Delta, Epsilon, Gamma 2, Lambda, Zeta, Phi, Tau, and Sigma Sagittarii form an asterism known as the “Teapot”. Sigma and Tau Sagittarii mark the handle. Delta, Epsilon, Zeta, and Phi Sagittarii form the body of the teapot. Lambda Sagittarii marks the point of the lid, and Gamma 2 Sagittarii marks the tip of the spout.

The “Teaspoon” is a cluster of stars arranged in a ragged V with eastern side forming a conspicuous curve, consisting of stars Rho 1, 43 Sgr., Pi, Omicron, and Xi Sagittarii.

The “Terebellum” is a quadrilateral formed by four 4th magnitude stars, all within 2° of each other, Omega Sgr. marking the northeast corner, 59 Sgr in the southeast corner, 60 Sgr. in the northwest corner, and 62 Sgr. in the southwest corner.

The “Summer Christmas Tree” is formed by 25 stars in the shape of a fir tree 35’ tall with the tip pointed north-northwest. A yellow star tops the tree and an orange star marks its southwest corner. The tree top star is HD 173928, mag. 4.9, 18 49.0 -18 55.

Meteor Showers:

The Persids peaks on the night of August 12th/13th, just 2 days after a full Moon. Bright moonlight will wash out fainter meteors and render the bright ones less impressive. Best viewing is one hour before morning twilight on August 13th – face north, with the Moon to your rear, and if possible, behind a building or trees.

Asteroids:

4 Vesta and 1 Ceres in Virgo (mag. 7.6 and 8.9 respectively at mid month), reside about 10° above Mars and Spica in the southwest sky as darkness settles in. Around mid August, the field of stars between 4th magnitude Iota and Kappa Virginis make a nice framework for locating the pair.

Best Viewing Times:

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

Dark Sky Dates Primary –August 23rd Secondary – August 30th

August Sky Happenings

Aug. 2nd – A waxing crescent Moon floats about 5° to the right of Mars.

Aug. 3rd- The Moon passes 2° north of Mars at 5:00 AM CDT.

Dusk – 1st Quarter Moon occurs at 7:50 PM CDT, and lies between Mars and Saturn.

Aug. 4th- The Moon passes 0.07° south of Saturn at 6:00 AM CDT.

Aug. 6th- Asteroid Psyche is at opposition at 10:00 PM CDT.

Aug. 7th- Venus passes 7° south of Pollux at 4:00 PM CDT.

Aug. 8th- Mercury is in superior conjunction at 11:00 AM CDT.

Aug. 10th- The Moon is at perigee (221,756 miles from Earth) at 12:43 PM CDT.

Full Moon occurs at 1:09 PM CDT. It will be the largest Full Moon (Super Moon) of the year.

Aug. 11th- The Moon passes 5° north of Neptune at 9:00 PM CDT.

Aug. 12th- The Perseid meteor shower peaks, but the waning gibbous Moon will hide the faintest meteors.

Aug. 14th- The Moon passes 1.2° north of Uranus at 12:00 noon CDT.

Aug. 17th- Last Quarter Moon occurs at 7:26 AM CDT.

Venus passes 0.2° north of Jupiter at 11:00 PM CDT.

Aug. 18th- Venus and Jupiter appear next to each other (within 0.5°) in the predawn sky.

Aug. 23rd- Dawn- The waning crescent Moon forms an elegant triangle with Venus and Jupiter.

The Moon passes 5° south of Jupiter at 12:00 noon CDT.

Aug. 24th- The Moon passes 6° south of Venus at 1:00 AM CDT.

The Moon is at apogee (252,602 miles from Earth) at 1:09 AM CDT.

Mars and Saturn are 3.5° apart tonight and the next two nights, near Alpha Librae (Zubenelgenubi) in the evening sky.

Aug. 25th- New Moon occurs at 9:13 AM CDT.

Aug. 27th- The Moon passes 3° south of Mercury at 1:00 AM CDT.

Mars passes 4° south of Saturn at 8:00 AM CDT.

Aug. 29th- Neptune is at opposition at 10:00 PM CDT (its closest approach to Earth and its brightest for 2014) and is close to 4.8 magnitude Sigma Aquarii.

Aug. 31st- The Moon forms a fairly tight triangle with Mars and Saturn.

The Moon passes 0.4° north of Saturn at 2:00 PM CDT and 4° north of Mars at 7:00 PM CDT.

Mercury – Mercury passes behind the Sun, from our viewpoint, on August 8th, and then slowly climbs into view after sunset by month's end. The first opportunity to see Mercury comes on Aug. 27th when it lies 10° to the right of the waxing crescent Moon. The two will appear just 2° to 3° high in the west 30 minutes after sundown. Mercury shines brightly at mag. -0.4. Mercury's elongation from the Sun increases to 19° by Aug. 31st, but its altitude barely budes. This is Mercury's worst appearance of 2014 for Northern Hemisphere observers.

Venus – August starts with Venus low in the east-northeast, but bright at mag. -3.8 at dawn. On Aug. 12th, Venus rises at 4:30 AM LDT, and Jupiter 30 minutes later – Jupiter will lie 5.8° to the lower left of Venus. Each morning thereafter, the two planets will appear 1° closer, and on Aug. 17th, they will lie just 0.8° apart. On Aug. 18th, they will be a mere 15' (half the full Moon's diameter) apart. Venus will

shine at mag. -3.8 and Jupiter at mag. -1.8. Note: The Beehive Cluster will be just to their left (about 5° above the horizon an hour before sunrise. After the conjunction, Venus crosses into Leo on Aug. 26th.

Mars – Mars comes into view in the southwest sky at dusk during August, beginning the month in Virgo, but crossing into Libra on Aug. 10th. Mars, Saturn, and Spica line up from the upper left to lower right in the order of Saturn (mag. 0.5), Mars (mag. 0.4), and Spica (mag. 1.0) from Aug. 1st through 4th. Mars then starts to close the gap on Saturn (from 13°) as both planets move eastward. Mars nudges 1 1/2° under 3rd magnitude Alpha Librae (Zubenelgenubi) on the evening of Aug. 21st, then 3 1/2° under Saturn from Aug. 23rd through 26th. Mars shrinks from 8" to 7" wide in August. On Aug. 31st, the waning crescent Moon will form a tight and elegant triangle with Mars and Saturn. The trio will set around 10:30 PM LDT.

Jupiter – Jupiter was in conjunction with the Sun on July 24th, and will not be visible until a week into August when it should be visible to the lower left of Venus shortly before sunrise, appearing dim although it shines at mag. -1.8 in Cancer – see Venus notes above. Jupiter's globe spans 32" across the equator.

Saturn – Saturn and Mars move toward each other, starting in Virgo and moving into Libra on Aug. 10th. The two approach to within 4° of each other by Aug. 20th and remain within that distance until Aug. 29th, both shining at mag. 0.6. For more details, see Mars notes above.

Uranus – Uranus is in Pisces now and will remain there until 2018. Uranus rises about 90 minutes after Neptune and reaches its peak in the south in the morning twilight – at that time Uranus is at mag. 5.8 and has a 3.6" wide disk. You can find Uranus by first identifying the 4th magnitude star Epsilon Piscium – it lies 14° east-southeast of Algenib (Gamma Pegasi), the star at the southeast corner of the Great Square of Pegasus. As Aug. opens, Uranus lies 2.2° south-southwest of Epsilon Pegasi. The planet's slow motion relative to the background carries it only 0.4° farther from Epsilon Pegasi by month's end.

Neptune – Neptune glows at mag. 7.8 with a disk of just 2.4" wide, against the backdrop of central Aquarius. Neptune's peak appearance of 2014 is reached with its opposition on Aug. 29th, when it rises at sunset and appears highest in the south at around 1:00 AM LDT. Locate Neptune by first zeroing in on the 5th magnitude star Sigma Aquarii. The planet begins Aug. 1.4° northeast of this star, moving steadily westward all month, and by opposition it is only about half as far away. The near full Moon passes near Neptune on the night of Aug. 12th/13th, washing out the planet, and washing out the Perseid meteor shower peak on the 13th.

Pluto – Dim Pluto is in northern Sagittarius and is near its highest in the south at nightfall. Pluto travels from RA 18h49m to 18h46.5m at about Dec. 20° 22" to 20° 27". On about Aug. 10th, Pluto should be about 10' south of V356 Sgr. and 1 1/2° east of 29 Sgr., and at mag. 14.1, you will probably need a 12 inch telescope and very dark sky low in the south to be able to see this planet.

The Legend:

Sagittarius is depicted in the sky as a centaur, with the body and four legs of a horse but with the upper torso of a man. He is shown wearing a cloak and drawing a bow, aimed in the direction of the neighboring Scorpion. Aratus spoke of the Bow and the Archer as though they were separate constellations. Sagittarius is sometimes misidentified as Chiron. But Chiron is in fact represented by the other celestial centaur, the constellation Centaurus.

Sagittarius is a constellation of Sumerian origin, subsequently adopted by the Greeks, and this helps

explain the confusion over its identity. Eratosthenes doubted that this constellation was a centaur, giving as one of his reasons the fact that centaurs did not use bows. Instead, Eratosthenes described Sagittarius as a two foot creature with the tail of a satyr. He said that this figure was Crotus, son of Eupheme, the nurse to the Muses who were nine daughters of Zeus. According to the Roman mythographer Hyginus, the father of Crotus was Pan, which confirmed the view of Eratosthenes that he should be depicted as a satyr rather than a centaur.

Crotus invented archery and often went hunting on horseback. He lived on Mount Helicon among the Muses, who enjoyed his company. They sang for him, and he applauded them loudly. The Muses requested that Zeus place him in the sky, where he is seen demonstrating the art of archery. By his forefeet is a circle of stars that Hyginus said was a wreath “thrown off as by one at play”. This circlet of stars is the constellation Corona Australis.

