The Observer

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ad astra**********

Dark Matter! Is there anything cooler than that right now? The observations tell us that it is out there, and in fact the best theories say that it is out there, in here, and everywhere in between — but we can't see it, hear it, or smell it, and we don't know what it is. Thus Dr. Brooks Thomas' presentation at our October meeting was particularly interesting, with the latest findings (at least up until then) of what we know about Dark Matter.

Since that presentation, we've received news that the LIGO project observed gravitational waves from the collision of two neutron stars — and that electromagnetic radiation from the event was observed arriving just 1.7 seconds after the gravitational. That did not really change the story presented by Dr. Thomas, since he already discounts theories such as MOND (Modified Newtonian Dynamics) that would explain the dark matter observations, without requiring actual dark matter. But the neutron-star "kilonova" observation killed most of the MOND theories for good, in one "fell swoop," as it were. We are now more sure than ever that Dark Matter is something real, giving a boost to Brooks and his colleagues who are trying to figure out what it is.

That's fine with me. I think that word has leaked out that I like a lot of things Dark, and Matter is not the least of them; though I think maybe we should consider ourselves lucky that we can't smell it.

Megameet by any other name

Speaking of olfactory perceptions, I will hazard a claim that our evening at Pulpit Rock on Oct. 20 "smelled as sweet" even though I stopped short of officially calling it "Megameet." I couldn't resist having some fun with it, since we had scheduled Megameet and then postponed it 5 times already this year. But the turnout for "Not Megameet" was good; to my eye, the field seemed pretty well populated, and the skies were clear, if not quite as dark as they sometimes get.

I had two missions in mind for that day, and managed to accomplish both of them. The first was improving the collimation on our Tinsley 18" Cassegrain system in the Schlegel-McHugh Observatory, during which I also wrangled the main tube back into a better approximation of a true circular cross-section, with the result that the lens cap now fits much better. I had determined that the secondary was misaligned from the optical axis by 1/4" or so, and upon fixing that, I observed that the laser beam from the collimator was returning to its origin as it ought to. Also, inspecting the defocused image of Vega with a 10mm eyepiece, as well as a Ronchi eyepiece, I decided that the primary was also reasonably well-aligned.

We were then rewarded with a view of M13, the Great Globular Cluster in Hercules, that is fine as any I have seen. You could see a huge number of individual stars, and they were all well-focused pinpoints. Once again, the background sky did not seem as dark as I would have liked, and that may have masked some fainter flaws in the image; but if there were any flaws, I could not see them.

The other mission for the evening involved the 40-inch, and is detailed in The Schlegel Report elsewhere in this issue.

Treasure Masters

Think of the word "treasure" in relation to Astronomy and it will probably bring to mind those telescope views that stick with you, such as the rings of Saturn or the view of M13 that I mentioned above. But if you think of "treasure" in an earthly context, you will probably imagine diamonds and gold. Did you know that we have experts on both of these precious materials within LVAAS?

Eric Loch, our Director of Public Relations and former LVAAS Secretary, is the proprietor of Eric J. Loch Diamonds & Fine Jewelry in Allentown and, according to his website, "the Lehigh Valley region’s only Certified Diamond Grader." Eric is frequently missing from Board of Governors meetings because he is in Antwerp, hunting for just the right gems to fulfill his customers' needs. The business is also a patron of another great Lehigh Valley cause, public radio station WDIY.

And Chris Kiely, husband of LVAAS Director-elect Carol Kiely, is an expert on using gold as a catalyst for chemical reactions! Lehigh University's quarterly engineering review, Resolve, recently featured Chris's work, and his stellar publication record, in an article in the latest issue.

Anniversary Banquet

As I write this column, we making the final preparations for our banquet, but by the time you read it, it will be in the history books (maybe just one or two huge and incredibly boring history books, as an obscure, barely-noticed footnote.) Nevertheless, it should be a memorable evening for about 100 LVAAS'ers and guests. I hope you will be (or were) one of them. Ad Astra!

— Rich Hogg

General Meeting Minutes of October 8, 2017

Director Rich Hogg brought the meeting into session around 7:20 p.m. We shall have our program first, then a short break followed by a business meeting to vote for the new officers of the society. We have to hold a vote for the Secretary position since there are two people running. All other officer positions are running uncontested. After the business meeting we will have membership welcome new members to the society, the Treasurer will give her report and we will cover any other business needing to be discussed.

Rich introduced Brooks Thomas, our speaker for today, by going over what he does and where his research has taken him. Brooks Thomas's talk was called "Re-envisioning the Invisible" A new perspective on the dark matter puzzle. The talk was technical at times but it was very interesting and enlightening. Brooks Thomas is a theoretical particle physicist who is an assistant professor at Lafayette College.

After the talk a short break followed and the meeting reassembled about 8:40 p.m. with Rich calling on Bill Dahlenburg, who handled the nominations for our elected officers. Bill listed the nominees for each of the elected officer positions. Carol Kiely is running for Director, Rich Hogg is running for Assistant Director, Gwyn Fowler is running for a second term as Treasurer. The Secretary position is the only contested position. Tom Duff (was not present) and Earl Pursell are running for Secretary.

Bill Dahlenburg asked for a motion to approve the slate of nominated candidates. Priscella Jacobsen made the motion to approve the slate of candidates. Warren Landis seconded the motion. Rich interrupted Bill to allow the membership director, Scott Fowler to check to see if anyone was present for their second reading. James (Jim) Czik was present for his second reading. We welcomed him to the society and he was allowed to vote in the election. Bill then handed out the ballots to eligible members. Once the votes were collected, Bill Dahlenburg and David Raker then took the collected ballots into the library to count them.

While Bill and Dave counted the votes, Rich turned the meeting over to Scott again to welcome any new members. We welcomed two new members Joe Mangan and Angela Drake to the society. They introduced themselves. Joe mentioned attending the Black Forest Star Party by accident. He was going to the Cherry Springs to get a good view of the Milky Way and it happened to be the same time as the Black Forest Star Party. The Black Forest Star Party was stellar this year in terms of beautiful weather conditions for observing. Many LVAAS members got great astro-images from the Black Forest Star Party.

Rich had Bill Dahlenburg announced the winner of the Secretary election. Congratulations to Earl Pursell!

Rich then called on Treasurer, Gwyn Fowler, for a report. Gwyn gave an update on our Fund Balances with the changes in income and expenses since her last General Meeting Report.

The Banquet Fund had a starting balance of $1,750. Income: $1,720.00 and Expenses: $750 for the room rental. The Banquet Fund has a new balance of $2,720.

The 20" Fund had a balance of $314.67 but with purchasing a power supply, hardware and parts the 20" Fund has been used up completely since the expenditures were slightly over $314.67. The few dollars over were taken out of Pulpit Rock Observatories Budget.

The 40" Fund had a balance of $8,164.57 as of 9/10/2017. We got four new power supplies which cost $176.99 so the new 40" Fund Balance is $7,987.58.

The General Fund Income since 9/10/17 is $255.88 and General Fund Expenses since 9/10/17 were $2,238.63 with the D & O Liability Insurance being one of the larger expenses ($744.)

Rich then mentioned the 60th Anniversary Banquet. The Banquet will be held at the Wood Dining Hall at Lehigh University on November 3, 2017 from 6 – 9 p.m. Bonnie Buratti will be giving a presentation on Cassini's Grand Finale. Please try to get your registration forms and money to the Treasurer by October 20.

Rich gave a brief update on the 40" Project. Ron and Rich used Sharpcap to check the polar alignment of the 40" telescope. Ron was working on modifications to the pier mount so we could have more range of adjustment for the telescope to polar align it. Ron, Frank and Rich ran new wire to the 40" building and installed a new breaker panel which improves service to the building. Frank and Ron stayed up at Pulpit to clean up after the project, which is why they were not present at the meeting.

MegaMeet is scheduled for October 13-15. The next Star Party will be October 28. Our next General Meeting will be held on November 12th at 2 p.m. at the South Mountain headquarters. Our Holiday Party will be held on Saturday December 9th at 2 p.m. at Grace Community Church, with a snow date of December 10th at 2 p.m.

The meeting adjourned 9:30 p.m.

The minutes were prepared and submitted by Treasurer, Gwyn Fowler.

LVAAS General Meeting

Sunday, November 12, 2:00 p.m
South Mountain Headquarters

"For the love of little stars"

Agnès Kim, Ph.D.

In a journey that physically began with a flight over the Atlantic Ocean, Dr. Kim tells us about how she came to be interested in astronomy and more specifically in little stars called White Dwarfs. She shares recent discoveries in her field, enabled among other things by the NASA space mission Kepler.

Facts about Dr. Agnès Kim:

- She was born in Geneva, Switzerland.
- French is her native language.
- She is fluent in English and can read basic German.
- She earned a Bachelor of Science in Physics from Iowa State University in 1999, a Masters of Science in Astrophysics from Iowa State University in 2003, and a Ph.D. in Astrophysics from the University of Texas at Austin in 2007.
- Since 2013 she has been an Assistant Professor of Physics at Penn State Worthington Scranton.
- From 2008 until 2013 she was Assistant, then Associate Professor of Physics at Georgia College & State University (Milledgeville, GA.)
- From 2007 until 2008 she was Postdoctoral Research Associate at the University of Texas at Austin.

For more information about Agnès Kim, see https://sites.google.com/view/agneskimphd/profile.

Ron's Ramblings

Ron's Ramblings is a monthly series of articles describing some recent or otherwise important event in astronomy. The ramblings will attempt to describe both the astronomical event and its significance. Obviously, the description will be that of a rambling amateur astronomer.

Ultra Compact Dwarf Galaxies

In the early 2000s, astronomers began to recognize the existence of a new class of galaxies called 'ultra compact dwarf galaxies' (UCDs.) UCDs may be as large as a few hundred light years in diameter and contain hundreds of millions of stars. Thus UCDs are distinct from globular star clusters in that they may contain multiple hundreds of times more stars than a globular cluster, but in a comparable sized structure. In addition to being structurally distinct from globular clusters, UCDs also have distinct dynamic properties from globular clusters. Dynamically they act as the centers of larger galaxies. UCDs are the densest galaxies known.

It is theorized that UCDs are the remnant cores of dwarf elliptical galaxies whose outlying stars and gas have been stripped by tidal interactions with much larger galaxies. Many such cases of galactic cannibalism result in the complete disruption and assimilation of the dwarf galaxy into the larger galaxy, but if the center is compact and dense enough, it can survive the tidal interaction. This theory is supported by the fact that UCDs are found near the hearts of rich clusters of galaxies, such as the Virgo Cluster, Fornax Cluster, Abell 1689, Coma Cluster, amongst others. UCDs avoided detection for so long because in ground-based telescopes they appeared as foreground stars, and through Hubble their slightly fuzzy halos made them look like distant galaxies. Further support of the theory that UCDs are the remnant cores of cannibalized dwarf galaxies is the recently announced detection of super massive black holes in the cores of two Virgo UCD galaxies.

Astronomers from the University of Utah, using image stabilization (aka adaptive optics) on the Gemini North telescope measured the motions of stars in two UCDs named VUCD3 and M59cO in the Virgo galaxy cluster. They detected a super massive black hole in both galaxies. VUCD3's black hole has a mass equivalent to 4.4 million suns, making up about 13 percent of the galaxy's total mass. M59cO's black hole has a mass of 5.8 million suns, making up about 18 percent of its total mass. To put these sizes into comparison, the black hole in the center of the Milky Way has a mass of 4 million suns, but it makes up less than 0.01 percent of the galaxy's total mass. Additionally the Milky Way's diameter is in excess of 100,000 light years. UCDs are truly ultra and compact galaxies.

References:

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Phil Plait. (July 29, 2015). The Densest Galaxies Ever Discovered. Retrieved from http://www.slate.com/blogs/bad_astronomy/2015/07/29/ultra_compact_dwarfs_tiny_mighty_galaxies.html

(April 17, 2017). Supermassive Black Holes Found in Two Tiny Galaxies. Retrieved from https://unews.utah.edu/supermassive-black-holes-found-in-two-tiny-galaxies/

Schlegel Observatory Report

by Rich Hogg

October, 2017

This month we made two very relevant observations about the 40-inch telescope, with an impact on two important theories about it. One theory we had is that most of the weight of the telescope and mount is born by the north side of the pier, with very little, if any weight, on the single post that forms the southern apex of the pier triangle. This theory is confirmed.

The other theory was that the mount was securely fastened top of the aforementioned southern pier post. This theory was negated when the telescope, mount and all, began an unplanned movement to the north, rotating about an east-west horizontal axes. The movement amounted to only a degree or two, and was quickly arrested, but it was sufficient to pull the 1/2" bolt entirely from the south pier post, exposing the hole that it had been resting in, and with hardly any weight on it at all. Apparently, we had accidentally worked loose the hidden nut securing it into the post.

This is a setback, and it sounds much worse than it is. It occurred on the evening of Tuesday, October 17th, as Ron Kunkel and I were attempting to bring the unfinished instrument into rough polar alignment. We had determined by how much it was misaligned, as I will detail below, and we thought we were ready to get it much closer, prior to moving on with other aspects of the construction. But the instrument resisted our attempts to adjust it in azimuth.

The altitude adjustment was fairly easy, though we may have mis-handled it slightly; we allowed the 1/2" threaded rod to turn a bit before realizing we needed to hold it with a "vice-grip," and this may have caused the retaining nut on the inside of the post to fall free, allowing the disconnection event that ended the attempt for now. Either that, or the nut had already worked free somehow; we're not sure which.

But it was the azimuth adjustment that really gave us trouble. We know that the mount needed to rotate to the left (or counter-clockwise, as seen from above) by a little over a degree, and we had prepared for that by making more clearance behind one of the adjustment brackets, a tough job with a grinder that was taken on by Ron. However, it seemed to want to slide left, rather than rotate around the southern bolt as a pivot point, and our attempts to persuade it ended up exposing the weakness in the system.

So, we are back a couple squares, and making plans to improve the mount-pier interface at all three corners of the triangle. On the north side, we will do something to enable it to slide more freely; Frank Lyter proposed a material he has used in his job for similar purposes, and we will probably try it. On the south side, if we can figure out how, we will install a larger bolt; if not, we will use the same size bolt as we had before, but more firmly secured to the post.

Measuring Polar Alignment **-** we were pretty sure that some mechanical work was needed before we would be able to achieve polar alignment, although it turned out that more was needed than we thought. But with this in mind, we approached the problem as one of first measuring exactly how far we were off, so that we could plan the mechanical preparations.

As I mentioned last month, we decided to use SharpCap with my QHYCCD guide/planetary camera and the artifact that we are calling the PMHGT. As we went through the process several times, we refined the setup until we ended up with the configuration shown.

Occupying most of the background of this image is one side of the fork of the 40" and the large gear for the declination decoder. The bright red object is a powerful magnet that is attached to the fork.

To the magnet, we attached a Manfrotto 410 Junior geared tripod head. We started off using Ron's, until I broke down and decided that I needed to buy one of my own. It's a very cool piece of photography gear, but it's a little pricey. We needed an adapter to connect the 1/4-20tpi threaded hole on the magnet to the 3/8-16tpi threaded holed in the base of the geared head.

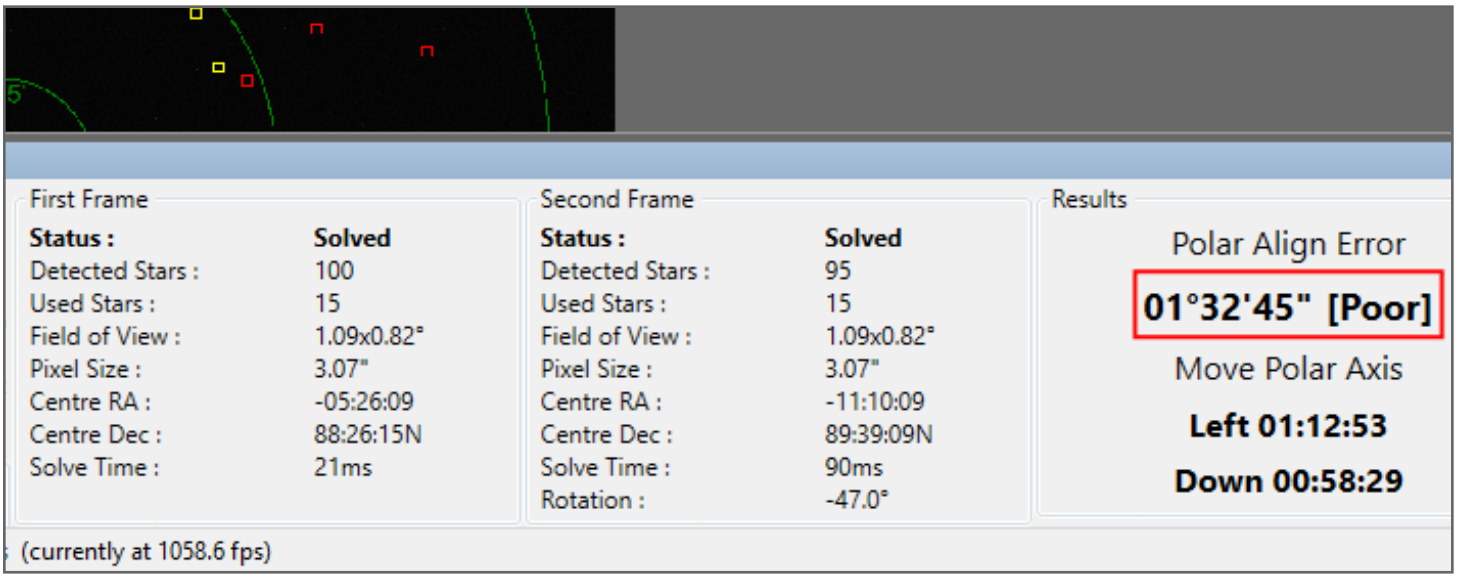
On the tripod head we have a cradle fabricated from pine, with a nylon 1/4-20 screw and a blue rubber band holding the PMHGT in place. The QHY camera is inserted into the back of the PMHGT; focus is achieved by loosening the nylon set screw and delicately repositioning the camera. The USB cable is taped to the fork with white duct tape.

Using SharpCap **-** with that setup in place, using SharpCap to measure the polar alignment is pretty easy. You need to mess with the focus and exposure settings until you can see a dozen or so relatively good star images; they don't need to be great at all. You need to get within 5 degrees of the pole.

Then, you activate the Polar Alignment tool in SharpCap, and if everything is cool it will quickly report that it has plate-solved the image, and give you the RA and DEC of the center of the frame, as well as the size of the frame and the pixel size. A picture is worth a thousand words, especially if you can do some math on it.

SharpCap then invites you to rotate the telescope in RA, without changing anything else, which is why we had this setup mounted on the fork. As you do so it continues to plate-solve, and once you have

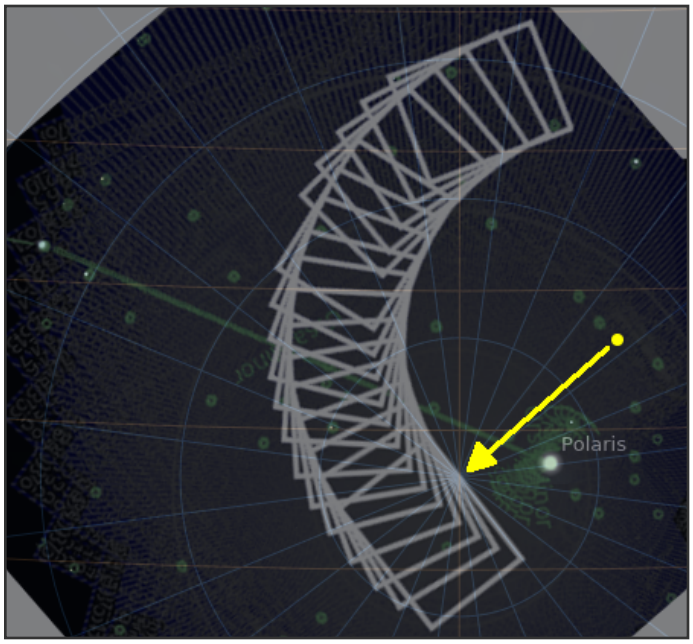
rotated far enough you can quickly "see what condition your condition is in" - how good your polar alignment is, and how far it is off.



The thing is, I did not want to trust this completely, at least not right away. The reason is that SharpCap is designed not so much for performing the measurement we were after, but for interactively guiding you to achieve very good polar alignment, quickly and interactively. Thus there is a "next step" that takes place where it provides you real-time guidance while you adjust the mount in azimuth and elevation.

To do this, it needs to convert RA and DEC to ALT and AZ, but it doesn't need to be very accurate; so it doesn't even bother to ask you for your latitude or longitude. It assumes that your time-of-day and timezone settings in your PC are pretty close, and it assumes that your latitude is 45 degrees, and that is good enough for its intended purpose. For our purpose, we wanted to refine and double-check the measurement a bit.

Using astrometry.net - my first method for doing this was to use a website called astrometry.net. I captured a whole bunch of frames as I rotated the fork through about 90 degrees, and then once I was back home and connected to the Internet, I uploaded them one-by-one to the website. It was able to plate-solve most of them, and it gave me back all kinds of information, including an outline of the frame superimposed on a larger star chart.



These charts were consistent enough to stack (manually, in the GIMP, a free Photoshop replacement), with the result shown at right. It is easy to see the center of rotation, which is the celestial point with which the RA axis is aligned, and how far

it is off from the North Celestial Pole. Then, using a planetarium program such as Stellarium, set up for the correct location, date, and time, we could determine exactly how far and in what direction we were off.

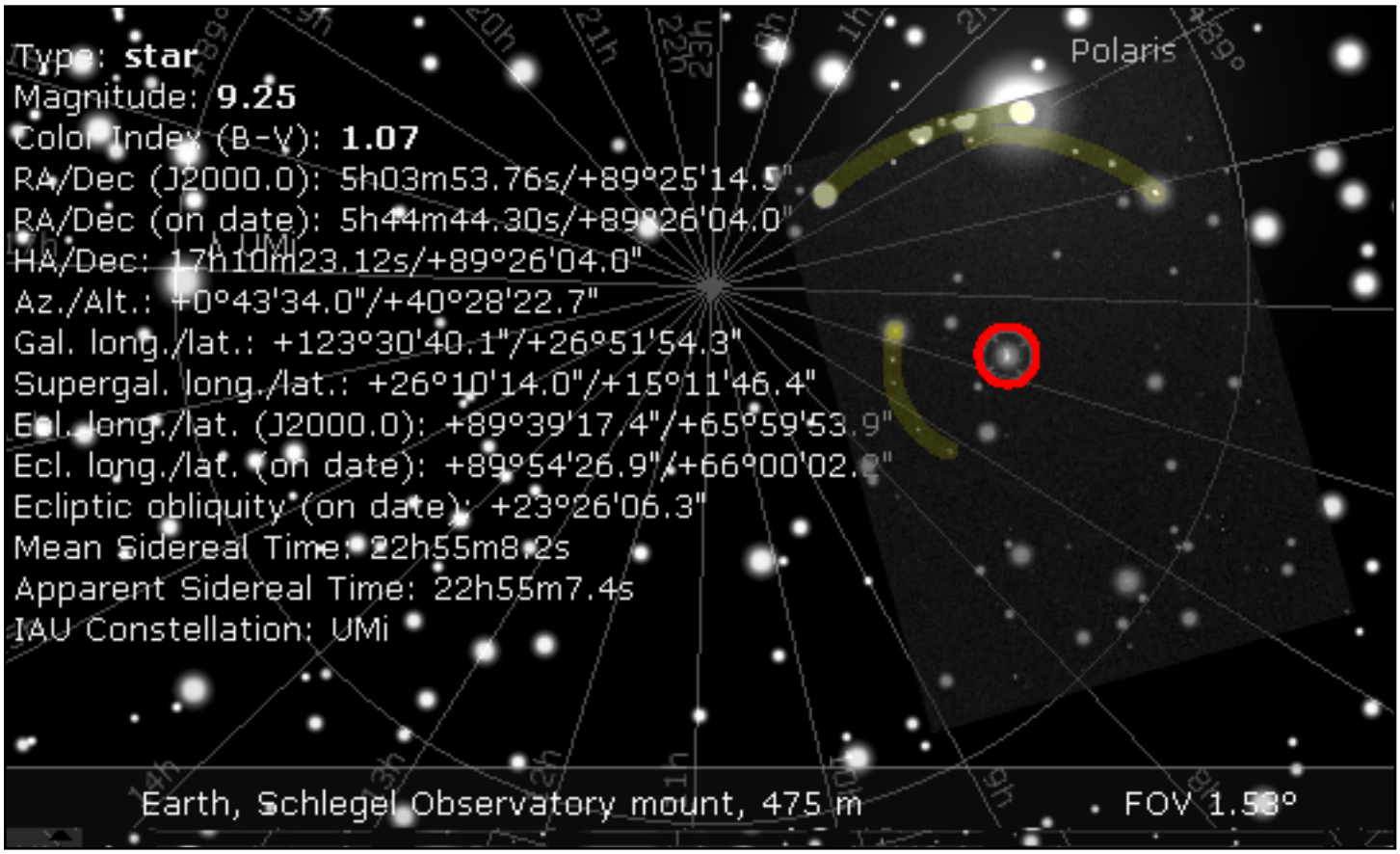
Framing up the C.O.R. **-** somewhere along the way we figured out how to take advantage of the geared tripod head to get the center of rotation in the frame, which makes the result more compelling and easier to understand. It helps to set up the tripod head so that two of the adjustment axes are aligned orthogonally to the camera, and then align the camera so that "up" on the captured frame is aligned with one of these axes. Just to keep it simple we usually made this direction truly "up" in real life, by rotating the fork if necessary.

Then it is a matter of rotating the fork in RA while observing what happens on the screen. Generally, at this point the center of rotation is off-screen, so all of the stars are moving in the same direction. What is required then is a bit of geometrical reasoning, such as "the stars are moving to the right on the frame, therefore the camera is moving left. Now, I know I am rotating the axis counter-clockwise facing north, which is where the camera is pointing. For the camera to be moving left while turning counter-clockwise, it must be pointed higher than the rotational axis." It helps to make hand-puppets of the RA axis and the camera, and have a little performance with your hands of what's happening with the gear. Having done this, we could use the tripod head to adjust the camera a bit, and try again.

In a few iterations the center of rotation would be either in-frame or very close to it, and then we could visualize the C.O.R. directly on the frame, and quickly adjust the camera while looking at the star field to move it close to the center.

Plate-solving manually **-** another thing that helped is that by this time, we were seeing Polaris in the frame, and we knew how big the frame was on the sky - a little over a degree on the long axis. With that information, astrometry.net became unnecessary; it was easy enough to match up the stars by eye, with a view in Stellarium.

After we experienced our drama with the mount becoming disconnected from the pier, and we had it secured with C-clamps and vice-grips, we took one more measurement to see where were pointed; we'll use that to help us work out the details of the mechanical fix. Earl Pursell and I did this last measurement on the evening of Oct. 20, during our quasi-Megameet event when a good part of the club was set up in the field, doing other kinds of observing. For this one we just took a few frames while rotating the axis, and then stacked them in the GIMP, along with a screen-capture from Stellarium. See the next page for the result.



The stacked frames from the camera are superimposed on the Stellarium view as a dark-gray, left-tilted rectangle, and in it you can see a few brighter stars whose images are describing arcs around the center of rotation (I've highlighted three of these arcs.) At that time on that evening, the center of rotation was very conveniently aligned with a 9.2-magnitude star that Stellarium does not have a name for; SkySafari tells me that it is #578 in the Smithsonian Astrophysical Observatory Star Catalog. So again, we can look up the ALT/AZ of SAO 578 at that date and time, and from that we know precisely where our polar axis is currently aligned.

And it's still about 3/4 of a degree to the right, despite all of our horsing around. The mechanical interface between the pier and the mount currently favors allowing the mount to slide east and west, without rotating much. Now that the south side of the mount is too high (with the bolt pulled out of the hole), the axis is pointing about a tenth of a degree too low.

Status and Activities: Attempts to achieve polar alignment have failed, due to mechanical issues that we are working to solve; but have worked out a good method for measuring the polar alignment status and, ultimately, aligning it correctly.

Also, Frank Lyter, Ron Kunkel, and I installed a new main electrical feed in the existing conduit, a 100' underground run from the electrical shed to the observatory building. We also installed a new main panel and rewired several circuits. This improvement eliminates the possibility of water in the basement shorting out the feed, and gives us additional breakers for more circuits in the building.

StarWatch

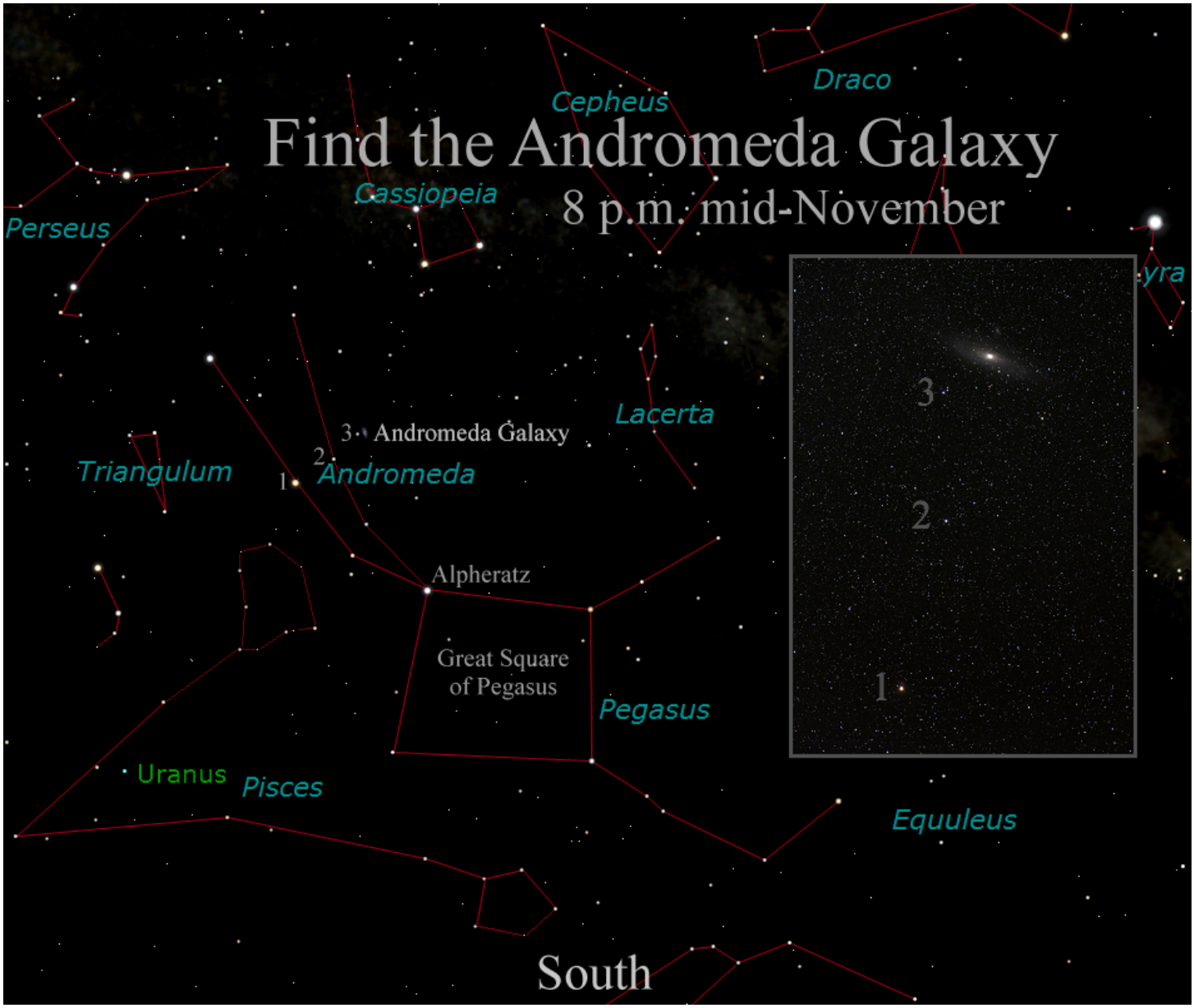
by Gary A. Becker

Andromeda Worthy

For a week in mid-October it seemed as if fall was in the air. The skies cleared and my students finally saw the stars under a moonless firmament from the Sky Deck on top of Moravian College's Collier Hall of Science, and from Shooting Star Farm, east of Hellertown. From the Sky Deck it is possible to determine the basic framework of constellations formed by brighter luminaries. Students can count about 75 stars from center city Bethlehem, but from Shooting Star Farm at least 10 times that amount can be witnessed, with the Milky Way straddling as least half of the sky. On a good night at Shooting Star Farm, especially in the fall, the Andromeda Galaxy can be viewed with the unaided eye as a fuzzy patch of light. Its distance is about 2.5 million light years, the farthest that the human eye can peer into space. In other words, traveling on a light beam at 186,000 miles per second, the ultimate speed limit of our universe, it would require 2.5 million years to reach this assemblage of about 600 billion stars.

To see whether your site is Andromeda worthy, go outside at about 9 p.m. on a crisp fall evening and look due south.Vaulting upward about three-quarters of the distance from the horizon to the zenith will be found the four stars that compose the body of a great horse. They form a square, the Great Square of Pegasus the Flying Horse. The steed transits the heavens upside down, so it will be the star to the upper left in the square that will be of most interest, Alpheratz, where what appears to be the “back legs” of the horse are joined to his body. The “back legs” sweep away from Pegasus’ body in two large arcs, the bottom curve brighter than the top. They are not actually legs at all, but rather Andromeda, the daughter of Cassiopeia, the eventual wife of Perseus the Hero.

You are now ready to find the Andromeda Galaxy. Using binoculars if you have them, jump from the middle star of the lower arc to the middle star of the upper arc of stars that create Andromeda. Again, as far up, will be another star that is always binocular-visible from center city Bethlehem and suburbia. Right next to it will be a small football-shaped, fuzzy patch of light, the Great Galaxy in Andromeda. A locator map for the Andromeda Galaxy can be found below. If you can see it with the unaided eye from where you live, your observing location will be “Andromeda worthy,” a wonderful place to view the nighttime heavens.



bonus

StarWatch

by Gary A. Becker

Action Figures Dominate Fall Sky

The star pattern of the teenager, Andromeda, the daughter of evil Cassiopeia, Queen of Ethiopia, hangs onto Pegasus the Flying Horse as she is being conveyed to the kingdom of Polydectes, on the island of Seriphos, and away from imminent death. There, Perseus the Hero, rescuer of Andromeda, will change Polydectes and his court into stone with the head of the Medusa who he has just slain. The "snake-beheaded" Medusa, one of three Gorgon monsters, was so scary that simply looking into her eyes metamorphosed the viewer into stone. Perseus then assumes his rightful place as king, marries Andromeda, has lots of kids, and lives happily ever after. Sounds like the making of a Hollywood blockbuster, and indeed the story has been told several times on the big screen in two versions of ***Clash of the Titans*** (1981 and 2010).

The perpetrator of these malevolencies in the mythology is Cassiopeia, who plays the old "mirror, mirror on the wall" game, and truly believes that she is the fairest of them all. This starts a whole sequence of events that first infuriates Nereus, who is the father of the Sea Nymphs. The Nereids are considered by man and god to be the most beautiful women in existence. A storm and tidal wave sent by Nereus does little to persuade Cassiopeia to quit her offensive behavior and that sets Nereus to ask his good friend Poseidon, God of the Oceans, to take care of the matter once and for all. Poseidon conjures up a sea monster called Cetus the Whale to ravage Ethiopia. Hollywood ramped up the excitement by substituting the Kraken for Cetus, a really hideous creature. The Kraken does get Cassiopeia's attention. The oracle that she consults to vanquish the monster declares that she should offer Andromeda as a sacrifice. Cassiopeia complies without hesitation. Meanwhile another myth is unfolding with Perseus trying to slay the Medusa, a ploy that Polydectes has devised to get rid of Perseus permanently, so that he can marry Perseus' beautiful mother, Danae. Perseus decapitates the Medusa with the help of Hermes (Mercury) and Aphrodite (Venus), putting her head into a sack, but on the way home, airborne Perseus gets blown off course by the terrible storm Nereus has wrought against Cassiopeia. The skies clear for Perseus just as Cetus is about to devour Andromeda. You've got to know what happens next. Cetus is "stoned," Andromeda rescued and Perseus and Andromeda return to Polydectes' court where a lot of limestone statues are created.

All of these action figures are on display this week in the NE right after it gets dark.A map can be found at http://www.astronomy.org/StarWatch/November/index-11-17.html#11-5-17. Look for the sideways "W" in the sky, which represents the upside-down chair Cassiopeia was thrown onto by the angry survivors of Ethiopia. Perseus rises below Cassiopeia, and Andromeda and Pegasus are high above and to the right. Good observing!

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Moravian College Astronomy - astronomy.org

From the LVAAS Archives:

"Rainmakers" Observe a Transit of Mercury

by Sandy Mesics

On Monday November 7, 1960, LVAAS members observed a partial transit of Mercury, which began at 9:34 a.m. and ended at 2:11 p.m.

According to the December, 1960 Lehigh Valley Satellite, the precursor to The Observer, 15 members "...enjoyed the hospitality of Walter Leight at his observatory to watch the transit of Mercury. From 9 a.m. until mid-afternoon the group was very busy watching for openings in the heavy clouds to observe the transit. Early morning was quite beautiful, almost cloudless, in fact! As usual, when the L.V. Rain-makers set up to observe, something is bound to happen weather-wise. We had a bit of hail and rain, very dull light, cold winds, and except for short periods when the Sun broke through, were we able to see the projected image on white cards and record a photographic sequence of several hours of the transit. Hot coffee and doughnuts, supplied by Joe and Walter, along with the warm room adjoining Walter's Observatory, made the most uncomfortable observing quite satisfactory.

"Even under such trying conditions, our first attempt to record an event like this was an inspiration to cultivate the friendship of 'old hands' like Prof. (Ralph) Van Arnam and Walter Leight in the quest for knowledge of the sky. May you both be with the LVAAS for many years to teach and guide us."

Ralph Van Arnam, a Professor of Mathematics and Astronomy at Lehigh University, was considered a "true friend" and an honorary member of LVAAS. He donated books to the LVAAS library, as well as optical equipment. He spoke occasionally at LVAAS meetings, and invited members to lectures at Lehigh University. He passed away on August 10, 1977.

Walter Leight remained involved with LVAAS until his death at the age of 90 on January 28, 2000. He was a photo engraver at the former Sandura Tarkette, Fullerton. A true renaissance man, he not only made exquisite violins and telescopes, he also invented a camera and a color processing system, and shot the film of the building of the LVAAS headquarters building.

According to former LVAAS member Vic Laczo, "I played hooky going to Notre Dame High School that day and drove to the Center Valley backyard of (LVAAS member) Walter Leight. He set up a long distance mirror projection system to view the sun. One picture shows Joe Grady, the first LVAAS Director, walking with coffee by the 19-inch reflector."

“Another picture shows L to R: Earl Bodder, a master machinist, facing us, Washington Telepchak hidden under the mirror, Walter Leight with his back to us, Dorothy Temperly, Joe Grady, and Frank Sarkozy.”

“Another picture has the same people with Earl Bodder with his back to us, etc.”

The significance of this particular transit was that the use of better observing techniques enabled researchers to measure the diameter of Mercury to better than 1 percent accuracy. Using this data with what was already known about Mercury’s mass, the density was calculated to be very high, indicating the presence of a metallic core, which was at odds with the understanding at that time of how the solar system formed (Ulivi & Harland, 2007.)

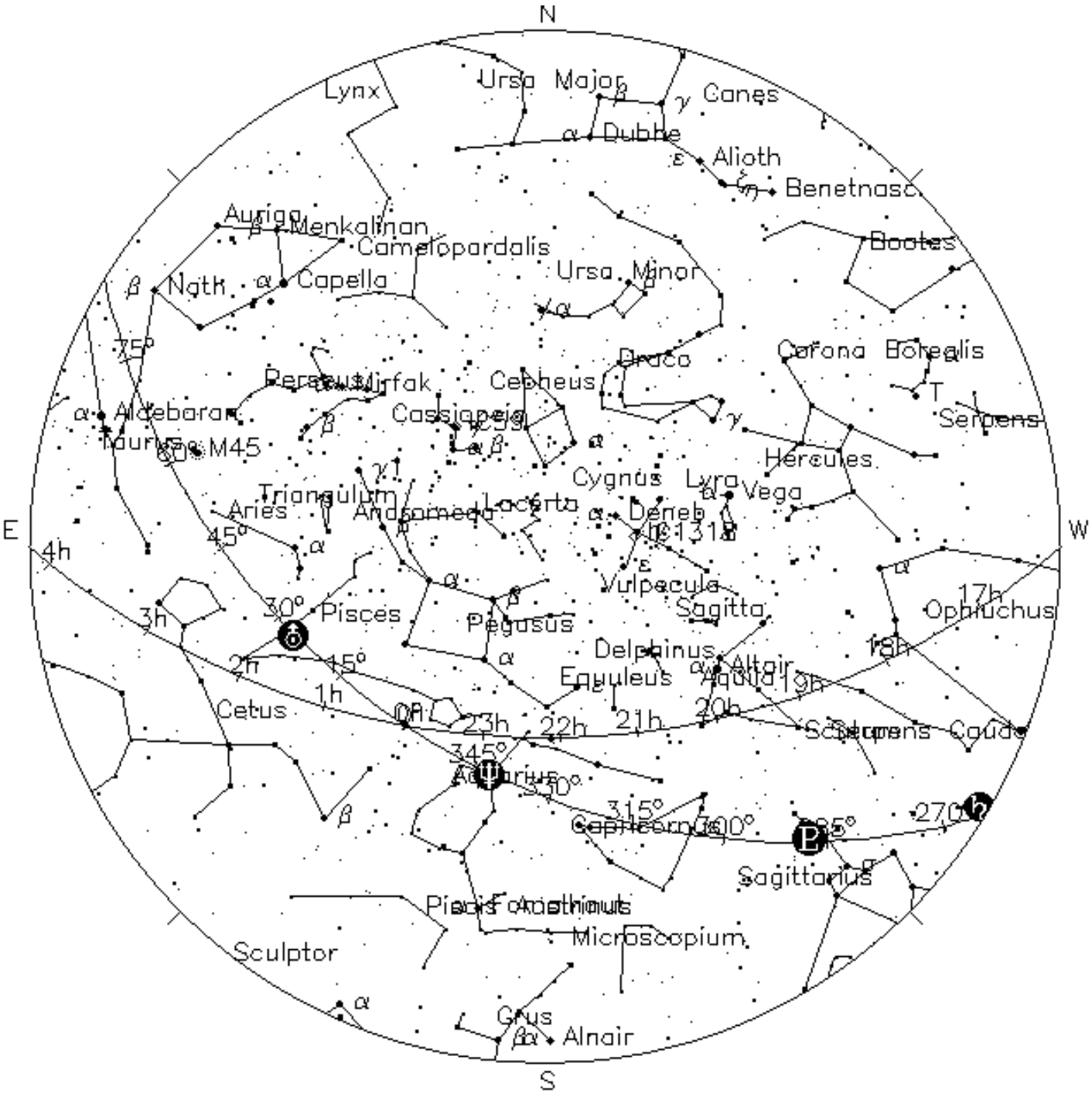
Interestingly, this transit took place the same day that Republican presidential candidate Richard M. Nixon appeared on the first telethon in the history of presidential campaigning. From 2 p.m. to 6 p.m. EDT on all three major networks, he answered questions called in to a Detroit studio. This tactic failed to secure him the presidency. The day after the transit, the presidential election took place, and John F. Kennedy was elected the 35th president. Though he easily won the electoral votes, the popular vote was the closest in history. Kennedy would go on to enter the U.S. in the space race that ultimately led to the first manned lunar landing in 1969.

Thanks to Vic Laczo for sending the photographs and Dave Moll for passing them along to me.

Sources:

https://www.timeanddate.com/eclipse/in/usa/allentown?iso=19601107
LV Satellite, December 1960.
Ulivi, P., & Harland, D.M., Robotic Exploration of the Solar System: Part I: The Golden Age 1957-1982. Chichester, UK: Springer-Praxis. 2007.
https://en.wikipedia.org/wiki/November_1960#November_7.2C_1960_.28Monday.29

Sky above 40°33'58"N 75°26'5"W at Thurs 2017 November 9 0:00 UTC



Your Sky was implemented by John Walker in January and February of 1998. The calculation and display software was adapted from Home Planet for Windows.

The GIF output file generation is based upon the ppmtogif module of Jef Poskanzer's pbmplus toolkit, of which many other components were used in creating the images you see here.

ppmtogif.c - read a portable pixmap and produce a GIF file

Based on GIFENCOD by David Rowley [mgardi@watdscu.waterloo.edu].

Lempel-Zim compression based on "compress"

Modified by Marcel Wijkstra [wijkstra@fwi.uva.nl]

Check out additional features of ***Your Sky*** *at* : http://www.fourmilab.ch/yoursky/

Please visit lvaas.org for up-to-the-minute calendar information

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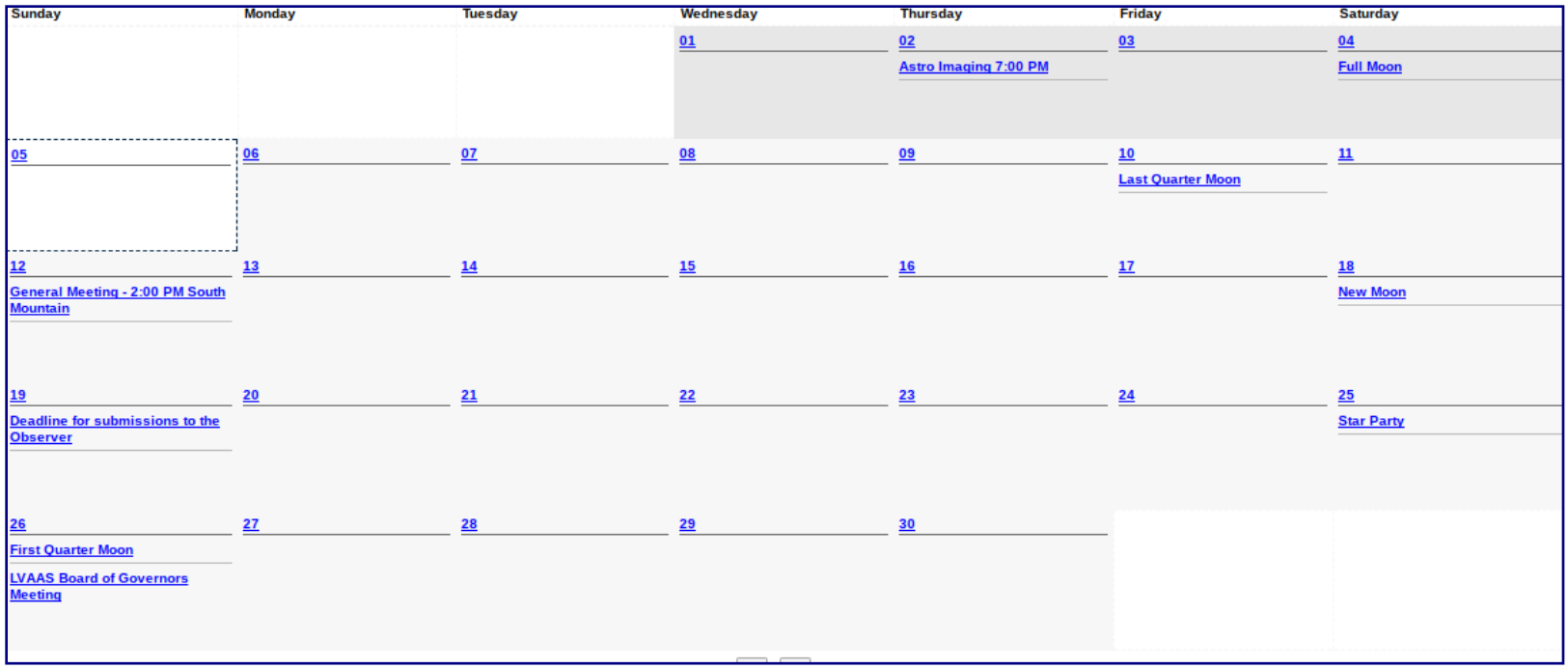

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			01	02 Astro Imaging 7:00 PM	03	04 Full Moon
05	06	07	08	09	10 Last Quarter Moon	11
12 General Meeting - 2:00 PM South Mountain	13	14	15	16	17	18 New Moon
19 Deadline for submissions to the Observer	20	21	22	23	24	25 Star Party
26 First Quarter Moon LVAAS Board of Governors Meeting	27	28	29	30		

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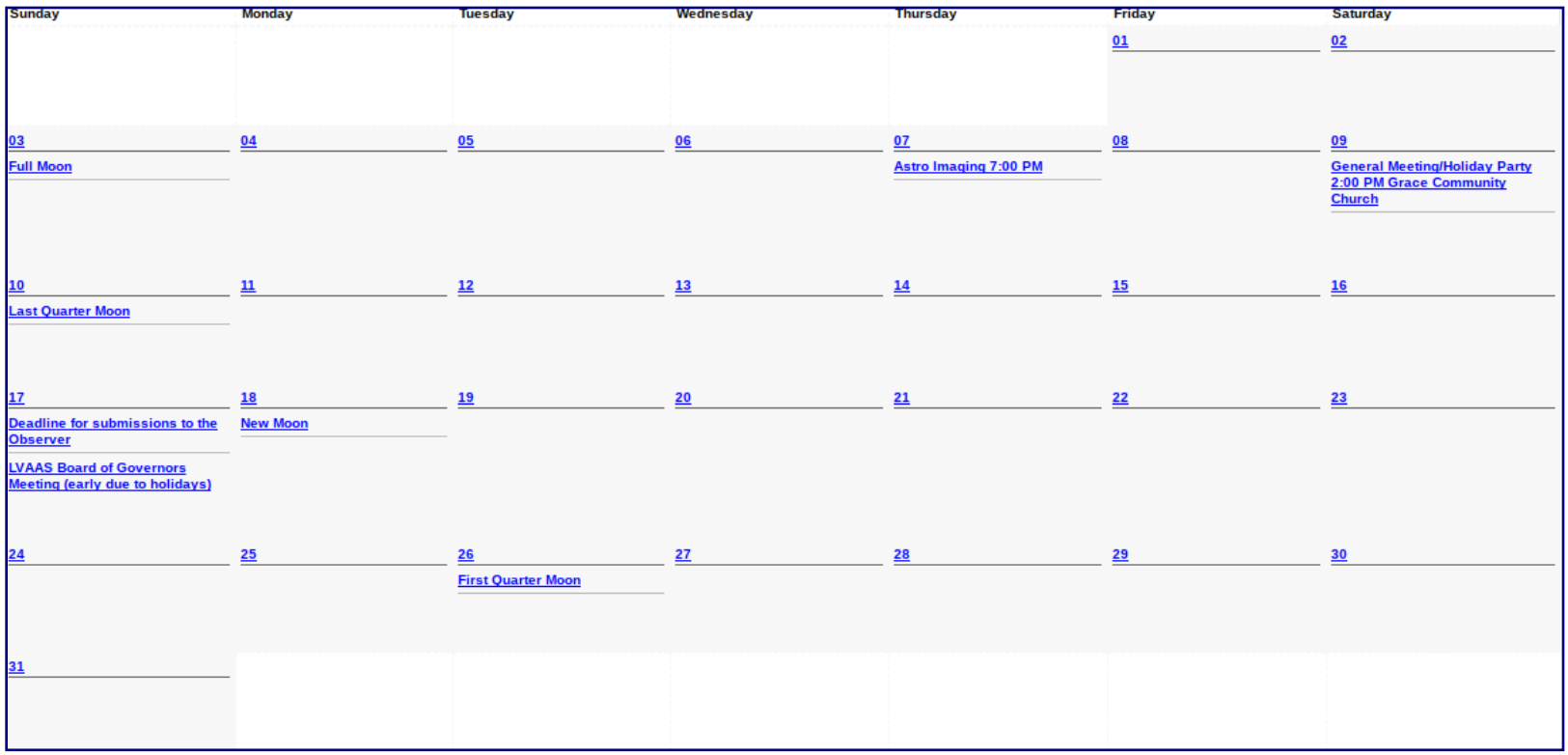

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					01	02
03 Full Moon	04	05	06	07 Astro Imaging 7:00 PM	08	09 General Meeting/Holiday Party 2:00 PM Grace Community Church
10 Last Quarter Moon	11	12	13	14	15	16
17 Deadline for submissions to the Observer LVAAS Board of Governors Meeting (early due to holidays)	18 New Moon	19	20	21	22	23
24	25	26 First Quarter Moon	27	28	29	30
31						

2017 LVAAS Event Calendar

*** Lunatics and Stargazers has been discontinued until further notice**

2017 LVAAS Event Calendar												
	Sundays			Thursday	Friday	Saturday	Mondays	Multi-Day Weekends	Moon Phase			
	General Meeting time	General Meeting location	Board meeting	Astro-Imaging	Lunatics and Stargazers	Star Parties	Scouts at S. Mountain	Scouts at Pulpit R.	New	First	Full	Last
January	2:00 PM 8	Muhlenberg	29	12	no mtg	no mtg		no camping	27	5	12	19
February	2:00 PM 12	Muhlenberg	26	9	no mtg	no mtg		no camping	26	3	10	18
March	2:00 PM 12	Muhlenberg	26	9	3 & 31	4		no camping	27	5	12	20
April	9	S.M.	30	13	no mtg	1		7 – 9	26	3	11	19
May	7	S.M.	21	11	5	6		19 – 21	25	2	10	18
June	11	S.M.	25	no mtg	2	3		9 – 11	23	1 30	9	17
July	05:00 PM 8	S.M.	30	no mtg	28	29		14 – 16	23	30	9	16
August	12	Pulpit	27	no mtg	25	26		4 – 6	21	29	7	14
September	10	S.M.	24	7	29	30		8 – 10	20	27	6	13
October	8	S.M.	29	5	27	28		6 – 8	19	27	5	12
November	2:00 PM 12	S.M.	26	2	no mtg	25		3 – 5	18	26	4	10
December	2:00 PM 9	Grace Community	17	7	no mtg	no mtg		no camping	18	26	3	10

Megameet is currently scheduled for September 15-17. A new rain date will be announced.

July, Aug & Dec are Saturday meetings with rain date on Sunday
Jan., Feb., and March meetings are at Muhlenberg College
August meeting is at Pulpit Rock
December meeting / Holiday Party is at at Grace Community Church
All meetings 7 P.M. unless otherwise noted

Contributed by Bill Dahlenburg

Publishing images is a balancing act!

When preparing your images for publication in The Observer, please consider the following guidelines:

Put the quality in:

- Considering the "print" size of the image, make sure you have at least 150 pixels/inch.
- Use a reasonably good quality for the JPEG compression ratio.

But watch the "waistline"!

- Don't go too much above 200 pixels/inch max.
- Use the lowest JPEG quality that still looks good!
- Shoot for <300KB for a 1/2 page image or <600KB for a full page.

Tip: If you're not Photoshop-savvy, you can re-size and compress undemanding images ("human interest", not astroimages), with an online tool such as http://www.ivertech.com/freeOnlineImageResizer/freeOnlineImageResizer.aspx. It will also tell you the pixel size and file size of your original, even if you don't download the processed copy.

The Observer is the official monthly publication of the Lehigh Valley Amateur Astronomical Society (LVAAS) Inc., 620-B East Rock Road, Allentown, PA, 18103 and as of June 2016, is available for public viewing. Contact the editor at editorlvaas@gmail.com.

Members please use above email address for submissions.

Society members who would like to submit articles or images for publication should kindly do so by the Sunday before the monthly meeting of the BOG (please see calendar on website) for the article to appear in the upcoming month's issue. PDF format is preferred. Early submissions are greatly appreciated. Articles may be edited for publication. Your comments and suggestions are welcome.

To become a member of LVAAS, please follow the directions on the application form, which can be downloaded at: http://lvaas.org/filemgmt_data/files/LVAAS2017MembershipRenewalForm.pdf.

For existing members to update LVAAS information, or to make member contact changes or corrections, please email the membership director membership@lvaas.org.