

The Observer

The Official Publication of the Lehigh Valley Amateur Astronomical Society

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February, 2018

Volume 58 Issue 2



ad astra*****

One of the things I love about being a member of our society is that I get to meet people from all walks of life. The thing they all have in common is when they look at a object, whether it be the Sun or even a model of the Moon, through a telescope for the first time they all say, “Wow!” and then big smiles come across their faces. OK, a model of the Moon may not be a normal target for astronomers, it was just one of several objects we had our scopes focused on at Abbie’s Space Party at the DaVinci Center.

Abbie Zukowski , a little girl from Emmaus, had a passion for astronomy. She spent may hours looking through her telescope at the stars and hoped to be an astronaut when she grew up. Sadly in 2015, she was struck by a car and killed while crossing the road on the way home from school. On what would have been her 14th birthday, Saturday, January 27, 2018, her family held a party at the DaVinci Center to celebrate her life and to raise money for the Abigail Zukowski Memorial Scholarship Fund, which helps support Emmaus High School students who want to go to college.

Matt Easterwood, Blaine Easterwood’s son who works at the Center, asked his dad if LVAAS could help out at the event and we gladly said, “Yes.” To help raise funds, Blaine decided to run a silent auction on behalf of LVAAS. He kindly donated an American Girl doll, Luciana Vega, and a spacesuit to go with it. These, together with the “Women of NASA” Lego set, donated by Kate Heflin from the DaVinci Center, raised over \$300. Here is Blaine helping one little girl look at the model of the Moon he had put high up on a wall.





Rich, our Assistant Director, had the brilliant idea of attaching a model of Saturn to some balloons filled with helium. It worked! Here are Mark and Earl helping visitors see “Saturn.” We also had a small refractor focused on the teeth of a dinosaur.

While all this was going on, Ron, Bill and Warren were outside setting up their solar scopes. In the morning, the weather gods were kind to us. There were three huge prominences emanating from the Sun. Ron even had the images sent live time to his phone. Unfortunately, in the afternoon the clouds moved in, but people were still interested in seeing the telescopes. There were lots of other activities going on at the same time, including a pop-up planetarium, a virtual reality solar system demonstration, stomp rockets and a talk all about the history of space flight by Astronaut Terry Hart.





Priscilla was in her element explaining the concept of “birthday stars,” and here is me showing a group of people some stereo images of lunar dust. And, yes, I am wearing my favorite T-shirt.

It was 6 o’clock when we finally got home and, would you believe it, Abbie’s Space Party, was the first item on WFMZ 69News and Earl was chosen the public face of LVAAS.

Before we left, Abbie’s family and the staff at the DaVinci Center asked me to pass along their heartfelt thanks to all the volunteers from LVAAS - Blaine Easterwood, Earl Pursell, Mark Elstein, Priscilla Jacobsen, Warren Landis, Ron Kunkel, Bill Dahlenburg, Rich Hogg, Chris Kiely and myself - for helping make the event such a success. It was a pleasure!

This is just one example of the many outreach activities our society has been involved with recently. Last year, there were nine public star parties at South Mountain and sixteen events off site. This year’s schedule is already starting to fill up. I understand that some of you might feel that you don’t know enough about astronomy to play an active role in these activities, but I think getting involved is the best way to learn. So next time the call for volunteers goes out, why not give it a try.

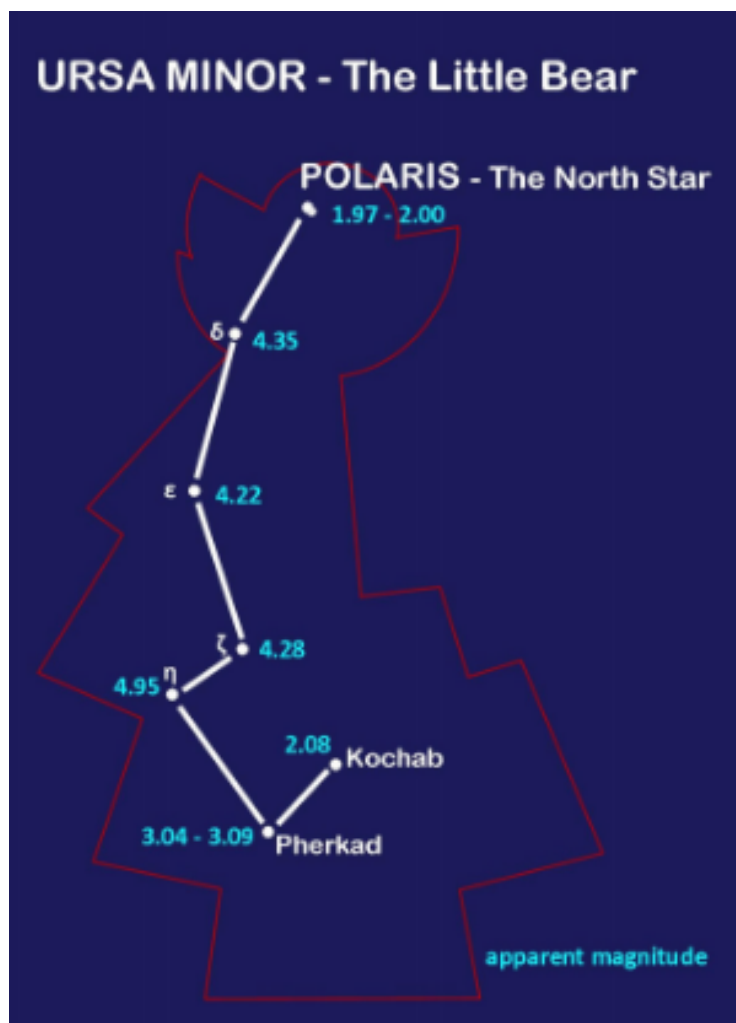


A Call for Star Party Speakers

I am still looking for volunteers to give talks at the April, June and September star parties. If you would like to give it a try but are uncertain about what topic to choose, the Night Sky Network (NSN), <https://nightsky.jpl.nasa.gov/download-list.cfm>, is a treasure trove of ideas and resources (powerpoints and kits) to help you. They also organize webinars each month. LVAAS is a member of NSN and I am the club coordinator. If you would like to become an NSN club member, it is free to join, just let me know.

The NSN website also has lot of information about light pollution and how to prevent it. This subject came up at our Board Meeting on January 28th due to a public hearing that is being held at the Tilden Elementary Center on February 14th concerning the proposed amendment of the Tilden Township Zoning Ordinance and Map to accommodate a Logistics Park Overlay District. If this proposal is accepted and the most up-to-date best practices for light control (as advocated by the Pennsylvania Outdoor Lighting Council (POLC) and the International Dark-Sky Association (IDA)) are not fully implemented in the planning and construction of such a large facility, it would have a serious negative impact on LVAAS's ability to pursue meaningful astronomy activities at our Pulpit Rock site.

To flag up this potential problem, I have, as directed by the Board, written a letter, on behalf of the society, to Gene Schappell, Chairman of the Board of Supervisors of Tilden Township, expressing our concerns and have offered to work with them to implement the most up to date best practices for stray light control . I have also copied the letter to Joan London, the Township Solicitor, and have asked for it to be placed in the official record.



An easy way to check for the amount of light pollution in your area is to count how many stars you can see in the Little Dipper. There has to be a clear sky, of course. If you can see all of them, then you are looking at a 'magnitude 5 sky' or better. The sky at Pulpit Rock is much darker than this. In most towns and cities, however, you are lucky to see Polaris, Kochab and Pherkad.

On the NSN's Outreach Resources page, there is a link to an article titled, "Light Pollution and You." It explains how you can become a Globe at Night citizen scientist and has magnitude charts of a different constellation each month to help you determine the quality of the sky throughout the year.

For more information check out the Globe at Night website: <https://www.globeatnight.org/>

I really enjoyed Dr. Sheehan Ahmed's talk at our last General Meeting. He presented a very good case for the need to include baryons in cosmological simulations - the universe, even on that scale, is not just dark matter and dark energy. There were lots of questions at the end of his talk which is always a good sign. He then joined us for dinner in the Muhlenburg dining hall and the discussion continued.

Just a reminder : The **February General Meeting** will be held **Sunday, February 11th at 2:00 p.m.** in the **Trumbower Science Building, Muhlenberg College** in Allentown.

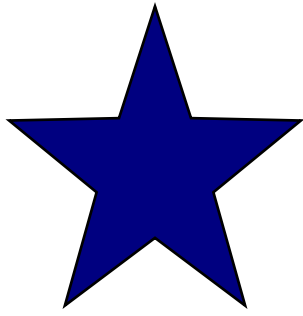
Our speaker is Krittanon "Pond" Sirorattanankul, President of the Lehigh University Astronomy Club. His talk is entitled, "Unfolding The Mysterious Evolution of Cepheid Variables." Judy Parker has invited everyone to join her for dinner in the Muhlenburg dining hall after the meeting (around 4 p.m.) The cost is \$9 each if we go as a group, however, if you wander over by yourself you'll be charged \$18.

I hope to see you there.

ad Astra,

Carol Kiely, Director

P.S. Did anyone see the partial lunar eclipse on January 31st? I woke up early and drove to a place not far from my house where I could see the moon. It looked beautiful! Anyway, I stood there out in the cold (and, yes, it was really cold) with my camera ready. Then just as things were starting to happen the clouds moved in. Did anyone manage to take some photos? If so, I'd love to see them.



Membership?



2018 Dues are overdue!

If you have not yet renewed your membership in the Society for the year 2018, please consider it. We need your financial support. Keep your standing in LVAAS current by making payment before March 1st.

Dues can be paid in person at the next General Meeting or mailed at any time to our membership chair. A renewal form with the mailing address can be downloaded here:

http://lvaas.org/filemgmt_data/files/2018_Membership_Renewal_Form.pdf

Interested in Membership?

You can join at one of our monthly General Meetings. You can also join and support the Society as an associate member at any time by paying dues and submitting the application form. Visit this page for more info:

http://lvaas.org/filemgmt_data/files/LVAASNewMemberForm.pdf

Thank you for your support of LVAAS!

Minutes for the LVAAS General Meeting - 14 January 2018

The January 2018 LVAAS General Meeting was held at Trumbower Hall, Muhlenburg College in Allentown. The meeting was opened by Director Carol Kiely at ~2:00 p.m. The speaker for the event was Sheehan Ahmed, Visiting Instructor of Physics at Lafayette College. His topic was "Baryons and Dwarf Galaxies in Cosmological Simulations" and involved creating mathematical models to describe the universe, specifically, the formation of galaxies and the dwarf galaxies that orbit them. The talk started with a justification of the existence of dark matter and energy. Since dark matter and dark energy seem to make up the vast majority of the universe, 23% and 73%, respectively, the question is just how much of an effect does the inclusion of luminous and non-luminous matter (baryonic matter) have on the models. Several models were developed, with and without the inclusion of baryonic matter, and then compared to the observed galaxies. The conclusion is that although baryonic matter makes up a small fraction of the universe, it is necessary to include it in the models so that the results match the observed universe, specifically, the location and quantity of dwarf galaxies orbiting major galaxies. The talk and follow-up questions lasted until ~3:00 p.m.

After a short break, Scott Fowler, Membership Chair, conducted the readings of new members. Barbara Boyd, Gary Campbell, and Tejus Shah had their first readings; Brian Becklin and Rob Eustice had their second readings and are now full members of LVAAS. Scott also reminded everyone that it is membership renewal time again, and that they could renew at the meetings or download the form from the website and mail it to him with the dues payment.

Gwyn Fowler, Treasurer, gave an abbreviated financial report. Income for the General Fund for the previous month was \$3263.63, with expenses of \$2814.75. The banquet came in under budget, mostly because our speaker, Bonnie Buratti, donated her services. Thanks Bonnie! The income for the banquet was \$4665.00, with expenses of \$4171.55, netting \$493.45. Gwyn also reminded everyone that subscriptions to Astronomy and Sky & Telescope, if placed through the club, can be obtained at a discount.

Carol also made the following announcements:

There will be a partial lunar eclipse visible in the Lehigh Valley area on Wednesday, January 31, 6:48 - 7:17 a.m. The next Astroimaging group meeting will be on Thursday, February 1st at 7 p.m. at South Mountain. The next Star Party will be Saturday, March 24. There will be a fundraiser for the Abigail Zukowski Memorial Scholarship Fund at the DaVinci Science Center in Allentown on Saturday, January 27th, from 11:00 a.m. until 4:00 p.m. LVAAS will have a demo booth at the event. Volunteers willing to donate their time (all or part of the event) should contact Carol ASAP. See DaVinci Science center website for a list of activities.

The next General Meeting will be held on Sunday, February 11th, 2:00 p.m. at Muhlenburg College's Trumbower Hall.

Minutes recorded and submitted by Earl Pursell, Secretary.

LVAAS General Meeting

Sunday, Feb. 11, 2:00 p.m.

Trumbower Science Building

Muhlenburg College, Allentown, PA

"Unfolding the Mysterious Evolution of Cepheid Variables"

presented by

Krittanon "Pond" Sirorattanakul

President, Lehigh University Astronomy Club



Cepheids are a type of variable star in which a star's brightness changes through time as a result of a type of pulsation in the star. The period of the brightness variation can be used to determine the star's luminosity, which can inform us about the distance between the Cepheid and the Earth. Because of this Period-Luminosity relationship, Cepheids are used to determine the distance to other galaxies. However, the period of pulsation of many Cepheids is itself changing noticeably, complicating the accuracy of the Period-Luminosity relationship. This talk will examine how we might solve this enigma through understanding the evolution of a Cepheid's internal structure.

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.



Emergent Gravity Theory Passes First Test

My October 2017 ramblings discussed Dutch theoretical physicist Erik Verlinde's theory of Emergent or Entropic Gravity, a proposed theory of gravity based on the first principles of quantum theory. Verlinde's theory describes gravity as an emergent property of the space-time continuum. Gravity is a property that emerges from the entanglement of bits of information stored in the very structure of space-time. The controversial theory, first proposed in 2010, has sparked much research and experiments to test its validity. Now a team of Dutch astronomers, lead by Margot Brouwer, has used the gravitational lensing effect from around more than 33,000 galaxies to test Verlinde's theory against the observed distribution of gravity.

Brouwer's team used Verlinde's theory to calculate the predicted lensing effect for the galaxies. This theory predicts the strength of gravity based only on the mass of the visible matter in the galaxies. It does not need to invoke dark matter to explain the additional gravitational effects because in the emergent theory of gravity the strength of gravity varies from the typical $1/r^2$ dependence on distance to the more simple $1/r$ dependence when the distances between the objects is very large.

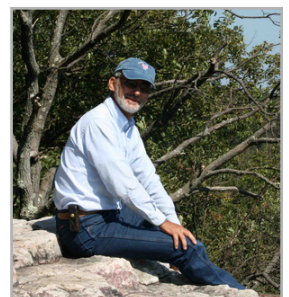
While Brouwer's team concludes the Verlinde's theory agrees well with the observed gravity distribution based on the observed gravitational lensing, she emphasizes that the dark matter, if proved to exist, could also explain the observed extra-gravitational forces. In general relativity theory, the mass of dark matter is a free parameter that must be adjusted to fit the observation. Verlinde's theory provides a direct prediction of the strength of gravity, without the need for the free parameter, the dark matter content.

So while Emergent Gravity correctly predicts the observed distribution of the strength of gravity in this first test, the theory is currently only applicable to an isolated, spherical and static system. But the universe is dynamic and complex. So while the result of this first test is definitely interesting, the theory needs to be developed further and then needs additionally testing.

References:

Verlinde's new theory of gravity passes first test. (2016, December 16.) Retrieved from <https://phys.org/news/2016-12-verlinde-theory-gravity.html>

The end of my ramblings until next month. Ron Kunkel





The conjunction of Mars and Jupiter in the southeastern sky, 6:00 a.m. EST, Sunday January 7, 2018. Mars is passing just south of Jupiter. The planet pair at this time had an angular separation of 17' 13". Two of the moons of Jupiter, Ganymede and Callisto, can be seen in their own conjunction just off the upper right limb of the planet. The double star Zubenelgenubi (α Librae) is resolved to the west (right) of the planet pair. The RealFeel temperature in Neffs, PA was -8F at the time.

Nikon1 mirrorless SLR, 1Nikkor VR 30-110mm @ 65mm, 2 sec @ f4.5, ISO 3200, tripod.
David M. Moll photo.

by Gary A. Becker



Sizing Up The Universe

For my first lesson, which focuses on developing a simple but meaningful definition of astronomy and discussing the subject in its broadest sense, I have my students write a list of all the words that each believes are related to the subject. It is a timed exercise, five minutes in length, and currently Joe Hall, a former Moravian astronomy student, holds the record for having written 70 entries in that space of time. I'm not even sure I could ever be that quick. In fact, after Joe's record-setting accomplishment, I had to redesign the page to accommodate additional spaces, because originally there were only 60. The winner this semester was Beth Thomas who had 66 words. The definition that I developed for astronomy 46 years ago, and that my students discover during the lesson, goes something like this: Astronomy is the science that investigates all matter and energy in the universe.

When I met my first astronomy class in 1972, we didn't know exactly how old the universe was, as the estimates ranged from eight to 20 billion years. Now we know that it is 13.82 billion years in the making, and because of that fact, we know from "end to end" it measures over 50 billion light years. A light year is the distance that light travels in one year, or about 5.8 trillion miles.

In 1972 we fully understood that the universe was expanding, but the fact that we didn't have the most accurate rate of expansion produced the improbability of its size and age. Then there was the problem of how the universe began. We are still puzzling the answer to that one, but because it was expanding we anticipated that it had a beginning. Astronomers envisioned an explosive event, something that today we call the "Big Bang." Currently, it appears to be more of a very gentle pop, although the term "Big Bang" is here to stay. An explosion would have triggered humongous amounts of turbulence, which would have created large thermal differences in our observation of the early universe. What we find instead are differences in temperature across the early universe of a minuscule $1/100,000$ K- about $1/180,000$ degree Fahrenheit. This is exactly what we should expect if the universe evolved based upon what we observe its structure to be today - a sponge with huge voids, the spongy material being vast superclusters of galaxies.

Another question was the ultimate fate of our universe. The current answer is not philosophically pleasing. We thought (hoped) at one time that the gravity of all of the structures in the cosmos would pull the universe back together to be reborn in perhaps another Big Bang, the Oscillating Universe, but today we know that won't happen. In the mid-1990s Hubble telescope observations of distant supernovae (exploding stars) revealed that the universe was accelerating, and that what we see in the cosmos around us is only about five percent of the real picture. Twenty-seven percent of the universe represents something called dark matter, which we have hypothesized since the 1930s, and the rest of the universe, about 68 percent, is composed of dark energy. As the universe expands, the amount of matter (dark and what we see) continues to thin, but the amount of dark energy remains constant per unit volume, thus causing the acceleration.

Although no matter can touch the speed of light, space may well expand beyond that limit. One day into the distant future, sentient creatures may wake up to a universe where all of the stars of our Milky Way, and the other galaxies that have combined with it, have died. The few other galaxies that might still be shining will be so distant that no light from any of them will reach us. The heavens will be black.

It makes me happy to realize that we are at least living in the springtime of our universe, an epoch when it is awash with the glow and brilliance of billions of new stars and vibrant galaxies wherever we look. That fragile blush of youth will not last forever.

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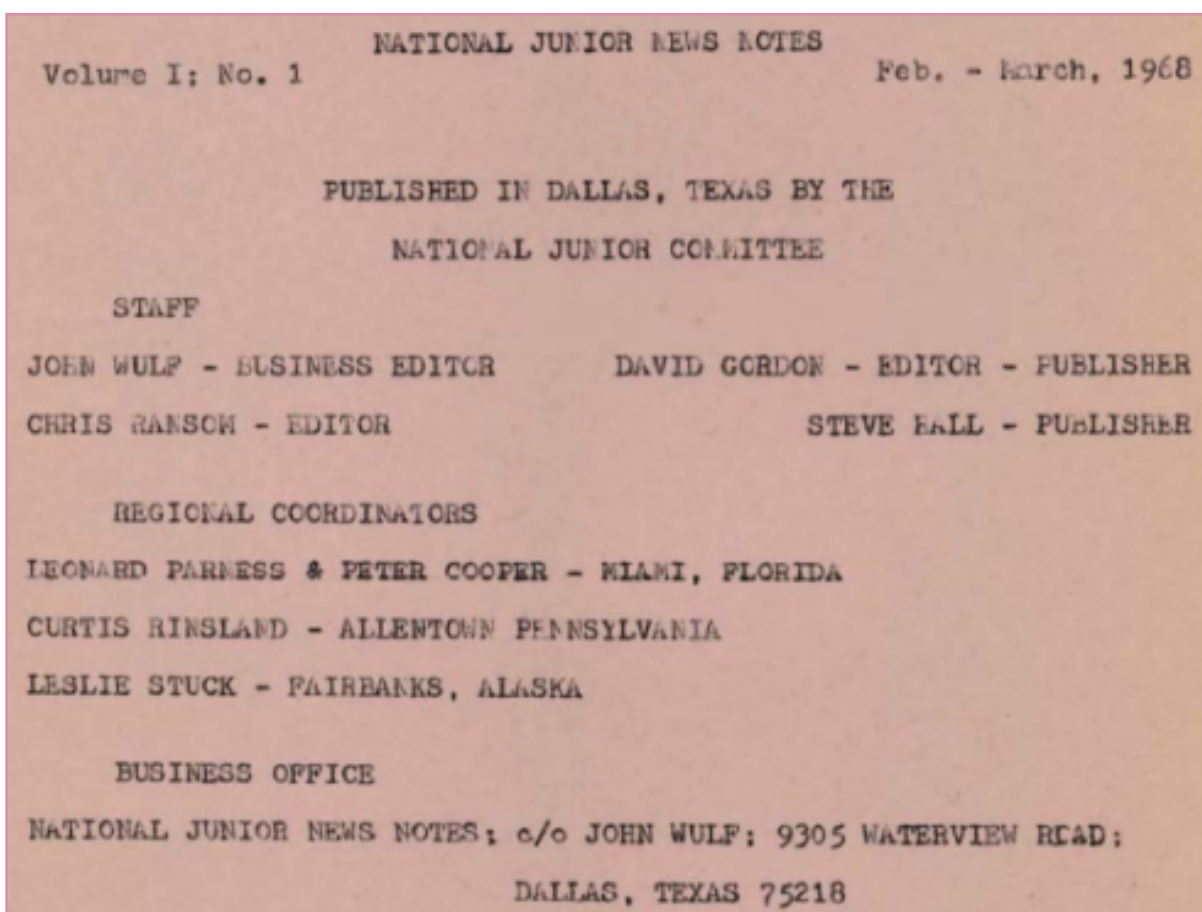


From the LVAAS Archives:

The Space Age Baby Boomers

by Sandy Mesics

In 1968 the baby boomers were coming of age. In amateur astronomy, this meant a flood of “junior” members and “junior” organizations. The LVAAS was no exception: our junior members formed the Ursa Major Astronomical Society (UMAS), which soon became one of the premier junior astronomy groups in the United States. These junior societies began to exchange correspondence, shared newsletters, and made efforts to organize on a national level. They met at the 1967 Astronomical League convention in Washington DC, and decided to publish a national newsletter.



The “National Junior News Notes” was published by members of the Junior Texas Astronomical Society in Dallas Texas, with regional coordinators in Miami, Allentown, and Fairbanks Alaska. There were five aims of this publication:

- “To promote interest among Juniors to attend the various astronomical conventions in 1968
- To furnish information concerning junior activity
- To provide an organized system of correspondence between societies
- To encourage juniors to increase their internal activities
- To make all of the above information available to as many juniors as possible.”

The premier issue had reports from the UMAS, The Greater New Bedford Astronomical Society, The Rochester Academy of Science Junior Astronomy Section, The Detroit Astronomical Society, and an observing report from Fairbanks Alaska. Other clubs starting out at that time included The Richland Astronomy Society in Ohio and the Amateur Astronomers Club in Alabama.



By January, 1969, the publication was now being produced by the Junior Astronomical Society of Harrisburg and edited by Blake Davis. Apparently Mr. Davis was having trouble getting submissions from member clubs. In April 1969, he wrote: “I can’t publish the newsletter without your articles. I threatened each of the regional coordinators with death to meet the deadline for this issue. There might not be another issue without your articles.”

This issue, though robust, is the last one the author has in her possession. If there were subsequent issues, I am not aware.

The Astronomical League published a Junior Activities Manual to assist those involved with working with junior astronomers, particularly sponsoring clubs or individuals. The AL looked at two types of groups: the Sponsor-Run groups, usually composed of individuals aged 8-12, which were mostly run by the sponsors, and Self-Governing organizations, composed of individuals 12-18 years old, who needed minimal assistance from sponsors. The manual acknowledged the cyclical nature of junior clubs, as members leave for college, and newer members are assimilated into the clubs.

“Any junior astronomical organization may affiliate with the Astronomical League. The League can provide counseling, communications, and some incentives in the form of award certificates. The annual conventions, both regional and national, offer opportunities for the juniors to meet other amateur astronomers and to have a thoroughly good time. A junior paper session is included in almost every convention program. The League’s Junior Activity section will offer whatever assistance it can to a junior group. This assistance is, however, somewhat limited by the nature of the League. The local sponsor will find League affiliation invaluable for assistance, education, and experience, but the League cannot replace the local sponsor. His is the most important affiliation the junior group will have.”

In January, 1968, the UMAS sent a letter to 103 junior astronomy clubs to determine if there would be interest in a 3-day national convention of junior astronomers to be held in the Lehigh Valley August 23- 25. There were responses from only six groups, and the event never happened. However, in June 1969, the UMAS organized a meeting of juniors at the MERAL meeting at LVAAS and the Hotel Bethlehem.



Figure 1: The UMAS in 1968.

On June 13-15 1969, the UMAS participated in hosting the Middle East Regional Convention of the Astronomical League, but there were no separate activities by the junior groups. There was considerable junior activity going on around the country at this time, as evidenced by articles in the Astronomical League's Reflector. The Denver Astronomical Society juniors refurbished an observatory with a 12.5 inch f/6 newtonian reflector that featured a finder made

by Alvin Clark. The Junior Texas Astronomical Society was a very active club going back to 1955. By 1969 they reported having two meetings and one observing session per month, and were in the process of completing an observatory with at 12.5 inch reflector and a 6 inch f/15 refractor. In the early 1970s, the Astronomical League featured Junior "sky gazer," "junior observer" and "junior astronomer" awards for different levels of accomplishment.

References:

- Astronomical League, Junior Activities Manual, date unknown.
- National Junior News Notes, Vol. 1, No. 1, February-March 1968
- National Junior News Notes, Vol. 2 No. 1, January-March 1969
- National Junior News Notes, Vol. 2, No. 2 April-August 1969.



The Schlegel Observatory Report is on hiatus.

*Look for news on the progress of work being done at Pulpit Rock Astronomical Park
in future issues of The Observer.*

NASA

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What's Up - February 2018

What's Up For February?



This month, in honor of Valentine's Day, we'll focus on celestial star pairs and constellation couples.

<https://nasa.tumblr.com/post/170423515174/whats-up-february-2018>

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.

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18

FEBRUARY 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				<u>01</u> Astro Imaging 7:00 PM (<u>02</u>	<u>03</u>
<u>04</u>	<u>05</u>	<u>06</u>	<u>07</u> Last Quarter Moon	<u>08</u>	<u>09</u>	<u>10</u>
<u>11</u> General Meeting - 2:00 PM Muhlenberg	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u> New Moon	<u>16</u>	<u>17</u>
<u>18</u>	<u>19</u>	<u>20</u>	<u>21</u>	<u>22</u>	<u>23</u> First Quarter Moon	<u>24</u>
<u>25</u> LVAAS Board of Governors Meeting	<u>26</u>	<u>27</u>	<u>28</u>			

MARCH 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				<u>01</u> Full Moon Astro Imaging 7:00 PM	<u>02</u>	<u>03</u>
<u>04</u>	<u>05</u>	<u>06</u>	<u>07</u>	<u>08</u>	<u>09</u> Last Quarter Moon	<u>10</u>
<u>11</u> Daylight Savings Begins General Meeting - 2:00 PM Muhlenberg	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u> New Moon
<u>18</u>	<u>19</u>	<u>20</u> Spring Begins	<u>21</u>	<u>22</u>	<u>23</u>	<u>24</u> First Quarter Moon Star Party
<u>25</u> LVAAS Board of Governors Meeting	<u>26</u>	<u>27</u>	<u>28</u>	<u>29</u>	<u>30</u> Good Friday	<u>31</u> Full Moon Passover 1st Day

2018 LVAAS Event Calendar

2018 LVAAS Event Calendar												
	Sundays			Thursday	Friday	Saturday	Mondays	Multi-Day Weekends	Moon Phase			
	General Meeting time	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	14 Muhlenberg	28	4		no mtg		no camping	16	24	1 31	8
February	2:00 PM	11 Muhlenberg	25	1		no mtg		no camping	15	23		7
March	2:00 PM	11 Muhlenberg	25	1		24		30-31-1	17	24	1 31	9
April		8 S.M.	29	5		21		27-28-29	15	22	29	8
May		6 S.M.	20	3		19		25-26-27	15	21	29	7
June		10 S.M.	24	no mtg		23		29-30-1	13	20	28	6
July	5:00 PM	7 S.M.	29	no mtg		21		27-28-29	12	19	27	6
August	7:00 PM	11 Pulpit	26	no mtg		18		24-25-26	11	18	26	4
September		9 S.M.	30	27		15		21-22-23	9	16	24	2
October		14 S.M.	28	25		13		26-27-28	8	16	24	2 31
November	2:00 PM	11 S.M.	25	29		17		no camping	7	15	23	29
December	2:00 PM	8 Grace Com	30	20		no mtg		no camping	7	15	22	29

July, Aug & Dec are Saturday meetings with rain date on Sunday
 Jan, Feb & March meetings are at Muhlenberg College
 August meeting is at Pulpit Rock
 December meeting / Holiday Party is at Grace Community Church

NEAF
 Cherry Springs S.P.
 Stellafane
 Black Forest
 Mega Meet

April 21-22
 June 14-17
 August 9-12
 September 7-9

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, Inc. (LVAAS), 620-B East Rock Road, Allentown, PA, 18103 and as of June 2016, is available for public viewing. Please 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 board of governors (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. Comments and suggestions are welcome.

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Existing members please update your LVAAS profile information by emailing the membership director at membership@lvaas.org.

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