

Highlights of the June Sky...

--- 1st ---
 AM: A waning gibbous Moon is about 3° left of Saturn.

--- 3rd ---
 AM: The Moon and Mars, separated by about 3°, rise together in the east-southeast.

--- 6th ---
 Last Quarter Moon
 2:32 pm EDT

--- 10th ---
 PM: Venus and the brightest stars in Gemini, Castor and Pollux, form a straight line as they set in the west.

--- 13th ---
 New Moon
 3:43 am EDT

--- 15th ---
 DUSK: Mercury emerges from the glare of the Sun, low in the west-northwestern sky shortly after sunset.

--- 16th ---
 PM: A thin sliver of a crescent Moon is about 7° to the left of brilliant Venus.

--- 17th ---
 PM: The Moon and Regulus are about 4° apart.

--- 19th ---
 PM: Vesta, one of the brightest asteroids, is at opposition.

--- 20th ---
 First Quarter Moon
 6:51 am EDT

--- 23rd ---
 PM: A gibbous Moon and Jupiter are about 4½° apart.

--- 27th ---
 PM: Saturn is at opposition and 1° to the lower right of the Moon.

--- 28th ---
 Full Moon
 12:53 am EDT

Prime Focus

A Publication of the Kalamazoo Astronomical Society

★ ★ ★ June 2018 ★ ★ ★

This Months Events

General Meeting: Friday, June 1 @ 7:00 pm
Kalamazoo Area Math & Science Center - See Page 10 for Details

Observing Session: Saturday, June 2 @ 9:30 pm
Venus, Jupiter & Globular Clusters - Kalamazoo Nature Center

Observing Session: Saturday, June 16 @ 9:30 pm
Jupiter, Saturn & Globular Clusters - Kalamazoo Nature Center

Board Meeting: Sunday, June 24 @ 5:00 pm
Sunnyside Church - 2800 Gull Road - All Members Welcome

Training Session: Saturday, June 30 @ 9:30 pm
Owl Observatory - Kalamazoo Nature Center - See Page 9 for Details

Inside the Newsletter...

May Meeting Minutes..... p. 2
 Board Meeting Minutes..... p. 4
 Observations..... p. 5
 A.L. Observing Clubs..... p. 6
 NASA Space Place..... p. 7
 Twelve Commandments..... p. 7
 June Night Sky..... p. 8
 KAS Board & Announcements..... p. 9
 General Meeting Preview..... p. 10



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May Meeting Minutes

The general meeting of the Kalamazoo Astronomical Society was brought to order by President Richard Bell on Friday, May 4, 2018 at 7:05 pm EDT. Approximately 54 members and guests were in attendance at the Kalamazoo Area Math & Science Center (KAMSC).

Richard began his President's Report by stating that setup of the KAS Robotic Telescope in Arizona is nearly complete. The Astronomer's Control Panel (ACP) program can now check the weather status, roll the observatory roof off, and control all the software needed to operate the telescopes and cameras. All that remains is some code changes and testing. Some members have requested access to Owl Observatory at the Nature Center, so a training session is being planned for June 30th (see page 9 for details).

A new astronaut, Nicole Aunapu Mann, will be giving a presentation at the Grand Rapids Public Museum on May 9th. (Editor's Note: I decided not to go due to severe weather.) Early registration for Apollo Rendezvous in Dayton, Ohio ends on May 11th. Registration increases by \$5 thereafter. We are hoping a contingent of KAS members will attend. Members are also encouraged to attend the "Quadruple Conjunction" of West Michigan astronomy clubs on May 12th. The Muskegon Astronomical Society is this year's host. Richard ended by expressing interest in doing some observing and imaging at Cherry Springs State Park in Pennsylvania from July 13th - 16th (weather permitting).

Our special guest speaker, Dr. Keith Riles, is a professor of physics at the University of Michigan who carries out research into the fundamental forces of nature, working in both gravitational wave and elementary particle physics. He leads the Michigan Gravitational Wave Group and is a founding member of the LIGO Scientific Collaboration. The title of his presentation, our Stephen Hawking Memorial Lecture, was *The Dawn of Multi-Messenger Gravitational Wave Astronomy*.



Keith Riles, a Professor of Physics at the University of Michigan, presented *The Dawn of Multi-Messenger Gravitational Wave Astronomy* at the general meeting on May 4, 2018.

Gravitational waves are "ripples" in the fabric of spacetime caused by some of the most violent and energetic processes in the Universe. Albert Einstein predicted the existence of gravitational waves in 1916 in his General Theory of Relativity. Einstein's mathematics showed that massive accelerating objects (such as neutron stars or black holes orbiting very close to one another) would disrupt spacetime in such a way that "waves" of distorted space would radiate from the source (like the movement of waves away from a stone thrown into a pond). Furthermore, these ripples would travel at the speed of light through the Universe, carrying with them information about their cataclysmic origins, as well as invaluable clues to the nature of gravity itself. The late theoretical physicist, John Archibald Wheeler explained it this way: "Matter tells spacetime how to curve, and curved space tells matter how to move."

The Laser Interferometer Gravitational-Wave Observatory (LIGO) is the world's largest gravitational wave observatory. It consists of two detectors situated 1,865 miles apart in isolated regions of Washington and Louisiana. Each L-shaped facility has two arms positioned at right angles to each other and running 2.5 miles from a central building. Lasers are beamed down each arm and bounced back by mirrors, essentially acting as a ruler for the arm. Sensitive detectors can tell if the length of the arms of a LIGO detector varies by as little as 1/10,000 the width of a proton, representing the incredibly small scale of the effects imparted by passing gravitational waves. LIGO has two observatories to act as a check on the other to rule out that a potential gravitational-wave signal detection is not due to a local, terrestrial disturbance; both facilities will detect a true gravitational wave moving at the speed of light nearly simultaneously.

The initial technology used for LIGO was sensitive to movement of 1/1000 the diameter of a proton, but after an upgrade in the 2010s, LIGO's range was boosted 10-fold. The many enhancements included increasing the power of the lasers from 10 W to 20 W and mirror seismic isolation technology improvements. Overall, Advanced LIGO (aLIGO) will be able to detect possible gravitational wave-producing events three times farther away than the initial LIGO setup. Accordingly, a far larger volume (~1,000 times greater) of space will now be within "earshot" of the LIGO project, with the opportunity to catch far more potential sources of spacetime ripples.

Another gravitational wave observatory, the Virgo Interferometer, was completed in June 2003. It is located in Cascina, Italy (near Pisa). The initial Virgo detector was not sensitive enough to detect gravitational waves. Therefore, it was decommissioned from 2011 to 2016 in order to be replaced by the "advanced" Virgo detector which increased its sensitivity by a factor of 10. Virgo is still less sensitive than LIGO, but valuable with triangulating sources by an order of magnitude.

On February 11, 2016, the LIGO/Virgo Collaboration

announced the first confirmed observation of gravitational waves from colliding black holes (designated GW150914). The gravitational wave signals were observed by the LIGO's twin observatories on September 14, 2015. The two merging black holes were estimated to be 36 and 29 solar masses (M_{\odot}) and 1.3 billion light-years away. They resulted in a single black hole of about 62 M_{\odot} . The missing 3 M_{\odot} was converted into gravitational waves at a peak luminosity of 3.6×10^{56} ergs/second. The data confirmed (to a degree) that black holes have no "hair" - meaning all information (except mass, electric charge, and angular momentum) about the matter which formed a black hole or is falling into it "disappears" behind the black hole's event horizon and is therefore permanently inaccessible to external observers. However, the data could not rule out that black holes may have a "crew cut."

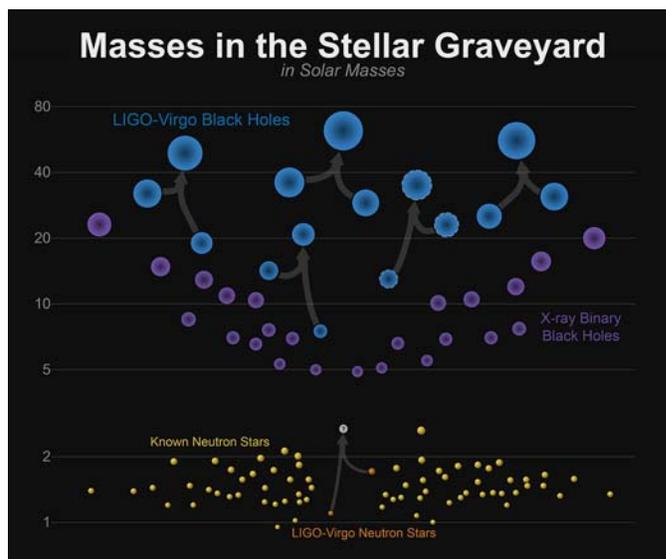
The second confirmed observation of gravitational waves (GW151226) from colliding black holes was detected on December 26, 2015 (Boxing Day). The black holes were 14 and 8 M_{\odot} and formed a single black hole 21 M_{\odot} . The third confirmed observation of gravitational waves (GW170104) from colliding black holes was observed on January 4, 2017. These black holes were 31 and 19 M_{\odot} and formed a single black hole 49 M_{\odot} . This detection appears to be the farthest yet, with the black holes located about 3 billion light-years away. A fourth observation (GW170814) was detected on August 14, 2017. A 53 M_{\odot} black hole was the result after 31 and 25 M_{\odot} black holes merged.

On October 16, 2017 the LIGO and Virgo teams announced GW170817, the first observation of gravitational waves from a pair of merging neutron stars (known as a kilonova). Electromagnetic emission from the resulting collision was also observed through at least 70 ground and space-based observatories at multiple wavelengths. This occurred on August 17, 2017 and represents the first time a cosmic event was observed with both gravitational waves and light.

The merger took place in the galaxy NGC 4993, located 130 million light-years away in the constellation Hydra. Before the merger, the neutron stars were approximately 1.5 and 1.1 M_{\odot} . The end result of the merger is not known but was likely a black hole. A 59-page paper on the merger was published in the *Astrophysical Journal Letters* and has more than 3,000 authors! The light-based observations show that heavy elements, such as lead, gold and platinum, are created in these collisions and subsequently distributed throughout the Universe. A "back-of-the-envelope" calculation indicated that this single collision produced an amount of gold greater than the weight of Earth. Another calculation says that "tens of times" the mass of Earth was created in gold and platinum. And yet another estimation said "the yield of gold alone was around 200 Earth masses, and that of platinum nearly 500 Earths. One scientist estimated the gold forged alone is worth about $\$10^{30}$ (that's a one followed by 30 zeros or 100 trillion trillion dollars).

Dr. Riles concluded his excellent presentation by discussing how further observations of gravitational waves could help confirm the Hubble constant, the expansion rate of the Universe.

Before beginning the open discussion portion of the meeting,



This graphic shows the masses for black holes detected through electromagnetic observations (purple); the black holes measured by gravitational-wave observations (blue); neutron stars measured with electromagnetic observations (yellow); and the masses of the neutron stars that merged in an event called GW170817, which were detected in gravitational waves (orange). The remnant of GW170817 is unclassified (labeled as a question mark).

Jean DeMott took a minute to thank Phyllis Lubbert. Phyllis made "Chewbacca cookies" as part of Star Wars Day (May the Fourth be with You!). She called them Chewbacca cookies because they were...wait for it...chewie!

Richard started things off by [sharing a video](#) on YouTube of the KAS Robotic Telescope in action. It was provided by Dave Miller of Observatory Solutions. He then gave an impromptu presentation on recent research in KAS history. (Please see Richard's column on page 5 for more.)

Mike Sinclair shared the first observing report. He recently purchased a Sky-Watcher AllView mount, which can be used for wide-field astrophotography, daytime panoramas, time-lapse video or simple sidereal with a small optical tube. Mike purchased it to use with his Astro-Tech 70mm refractor and recently used it to observe the Full Moon. After having difficulty learning to use the mount thanks to the poor directions, he was pleased with its performance. Mike hoped to bring it to a future session for all to see.

Under astronomical news, Jack Price reported that NASA's InSight mission to Mars was due to launch on May 5th. (Update: the launch was successful!) The traditional lander is due to touch down on the Red Planet in November. Its primary mission is to study the interior of Mars. Phyllis mentioned that Hawaii experienced a large earthquake during our meeting. This was due to the recent eruption of the Kilauea volcano.

Jean made one final announcement about the proposed group trip to [Apollo Rendezvous](#). We also plan to visit the National Museum of the United States Air Force in Dayton, as well as the Neil Armstrong Air and Space Museum in Wapakoneta, Ohio. Join the fun! The meeting adjourned at 9:17 pm.

Board Meeting Minutes

The Kalamazoo Astronomical Society Board met on Sunday, May 20, 2018 at Sunnyside Church. President Richard Bell called the meeting to order at 5:07 pm. Members present were Joe Comiskey, Jean DeMott, Lydia Hoff, Scott Macfarlane, Rich Mather, Jack Price, Don Stilwell, and Roger Williams.

The Treasurer's Report as presented by Rich showed some minor discrepancies where the sign of the number did not match the deposit or withdrawal action. Rich said that he would correct the problems. Richard then summarized planned June events, including a general meeting on June 1st, Public Observing Sessions on June 2nd and 16th, and an Owl Observatory Training Session on June 30th. Several board members expressed interest in the training session.

The first follow-up item was the Robotic Telescope Project update. Dave Miller of Observatory Solutions had [recorded a video](#) showing the startup process for the observatory. It appears that we should now be ready for testing to show unambiguously the operation of the observatory over an internet link. So far there has been no payment to Observatory Solutions, but a bill is expected soon. Jean emphasized the importance of demonstrating the performance of the equipment before paying the bill, a point repeatedly raised by the Board in previous meetings.

On the subject of field trips, Jean and Richard had made plans to attend the [Apollo Rendezvous](#), but there were no other clear-cut positive responses. This left no one to need Jean's organization efforts, so others who still decide to go will need to make their own plans. Regarding the proposed trip to Cherry Springs State Park in Pennsylvania on July 13th-16th, Richard was still planning to go if the weather is good, with Don and possibly Scott also interested.

In the outreach area, Jack was following up on a Cub Scout STEM camp possibility and also checking with the organizers of the Kindleberger Festival in Parchment. The

general meeting planned for KNC on July 13th was moved to KAMSC to facilitate reporting from Mike Sinclair's students about their recent balloon launch. The *Mars Watch 2018* lecture and viewing session was still planned for KNC on July 27th and 28th. Finally, Jean and Richard were continuing to work on questions for a membership survey. Suggestions from members are welcome but scarce so far.

The first item of new business was our Astronomical League membership. Richard said that the yearly dues payment to A.L. should be subject to a vote, which had not been done in the recent past. The payment has already been made for this year. Richard intended to vote against renewing our A.L. membership, because of the way the KAS Astronomy Day Award was largely ignored at the ALCon meeting in Wyoming this past August. For the record, A.L. membership is the default state for KAS members, being paid for out of their local dues. If less than 95% of the membership choose to maintain A.L. membership, the A.L. dues are \$7.50 per member, while at 95% or over, the dues are \$5.00. The Board had some discussion about the advantages of A.L. membership, including participating in observing programs and receiving *Reflector* magazine.

Continuing with new business, the Board discussed the proposal from [Backridge Observatory](#) near Spruce Knob, WV to offer remote telescope time to KAS. The consensus was that we need to have more experience in using the Arizona telescope before adding another remote setup. The final item of new business was examination of proposed KAS Robotic Telescope Usage Guidelines. Richard had e-mailed a copy of the current draft to the Board, but it turned out that it had escaped notice of some and had not been studied in enough detail for discussion at the meeting. A motion was made by Jean (seconded by Joe) that the subject be tabled until there was time for further examination and e-mail discussion. The motion passed.

In other business, Richard reported that Autumn Cain had accepted a different position for her post-graduation gap year, and that she would therefore not be able to work on a project for the KAS as previously reported. She also will be unable to give the program at the September General Meeting. Richard had found a replacement for that meeting in Craig Whitford, who will give a program on the Michigan Meteor. Jack displayed a model white owl that he had bought and that he thought would be a fine mascot for the Owl Observatory roof. After a motion (Don) and second (Joe), the Board voted to authorize Jack to install the owl on the roof.

With several restrictions on possible board meeting dates in June, the Board discussed the possibilities and settled on June 24th. The formal meeting was adjourned at 6:40 pm, to be followed by an informal report from Richard and Jean about the "Quadruple Conjunction" meeting of West Michigan clubs held at Muskegon on May 12th.

Respectfully submitted by Roger Williams



Thanks to the work of Observatory Solutions, setup of the KAS Robotic Telescope is nearing completion.

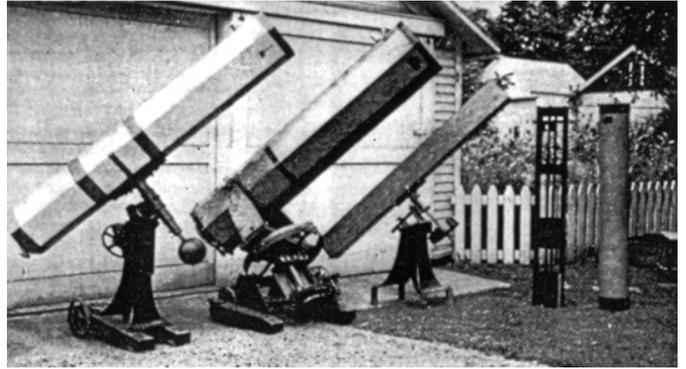
Observations

by Richard S. Bell

Much of our 82-year history has been lost because newsletters, schedule booklets, and other documents sit in member's homes only to eventually be discarded once they leave the club and/or pass away. Last year, while selling Eclipse Shades at the Earth Day Festival in Bronson Park, Jean DeMott and I met a lady who was a relative of Leonard James Ashby. She described him as one of the founders of the Kalamazoo Amateur Astronomical Association (KAAA).

Nothing was done with this information at the time, but I recently began doing a little digging on the Internet. I found a 1945 issue of the *Kalamazoo College Alumnus*. It contains an obituary for Mr. Ashby and describes him as the "founder and former president of the Kalamazoo Amateur Astronomy Association," confirming what we learned in Bronson Park. The problem is that the obituary also says he taught physics at K-College from 1921 - 1924 and spent the rest of his life at the University of Michigan. Did he make regular commutes between Ann Arbor and Kalamazoo enough to help start an astronomy club in 1936?

Mr. Ashby was born on December 8, 1890 in Oldham, England. I'm not sure, but he may have went to school at



All these telescopes were built by Alfred Bryant. They are on display outside his residence at 516 Egleston Avenue.

Manchester University. As mentioned, he was an assistant professor of physics at Kalamazoo College before relocating to the University of Michigan. He died on June 12, 1945 in Ann Arbor. His obituary in the *Alumnus* also mentioned he had a son, Frederick Ashby, who was an ensign in the navy. I'm assuming he served in World War II.

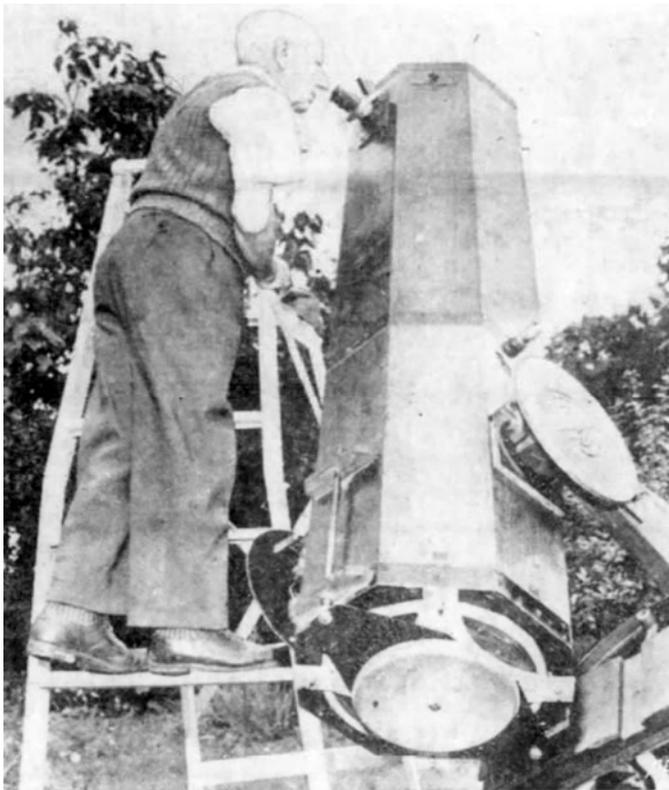
Another interesting member of the past was Alfred M. Bryant. I first heard his name from Philip Steffey, who joined the KAAA in 1953 at the age of 14 and remained a member until 1960. He [wrote an article](#) where he mentions first joining the KAAA. I came across it some time ago and contacted him. He described Mr. Bryant "as the patriarch of astronomy in the Kalamazoo area." This certainly seems to be the case from what I found in old newspapers archived on newspaper.com (I signed up for a trail subscription).

The first article was published in the *Detroit Free Press* on March 28, 1937 (page 10). It describes how he and his neighbor, Bliss Wheaton, learned to build telescopes. One paragraph reads as follows: "The city has an active Astronomers' Club with a score of enthusiastic members. An evening class in astronomy has drawn another eager group." This is the earliest reference I've ever found to an astronomy club in Kalamazoo.

Mr. Bryant would go on to become a prolific telescope builder. Several of his telescopes were shown in an article written by Albert Ingalls in the January, 1943 issue of the *Amateur Telescope Making Journal*. Mr. Bryant gave a demonstration on mirror grinding in front of 300 people at Kingman Museum in April, 1949. This was part of an event featuring a movie about the 200-inch Hale telescope.

Mr. Bryant was a superintendent of the Bryant Paper Co., which was founded by his uncle Noah Bryant in the late 19th century. He passed away at the age of 84 in March, 1962.

My next step is to search through old issues of the *Kalamazoo Gazette* at the library. Part of this is about uncovering lost KAS history, but I personally would like to name our robotic telescope after one of our early members. These two gentleman seem like worthy candidates.



Alfred M. Bryant (at the age of 79) observes through his homemade telescope with a 12-inch mirror that he ground himself. This picture was published in the *Detroit Free Press* on September 7, 1956 as part of an article on the opposition of Mars that year. A mirror-image version of this picture was also published in the *Lansing State Journal* on the same date.



Observing Clubs

Motivate & Direct Your Viewing

by **Roger Williams**



Have you had the experience of waiting days for clear viewing weather and then finding excuses for not setting up all of your equipment when a good night finally presents itself? One way to maintain enthusiasm for getting out under the sky is to have a long-range viewing plan or goal. As a member of the KAS, you are also automatically a member of the [Astronomical League](#). This makes you eligible to receive observing awards from a large variety of observing clubs. These are summarized on KAS Online's [Astroweb Yellow Pages](#), with links to the A.L. site. Each club has a set of required observations or activities to be carried out and documented. After verification of the observing logs, A.L. awards a certificate and a pin.

There are appropriate clubs for every level of experience and equipment. For the new enthusiast, a planisphere and eyeballs are all that is needed to carry out the observations of the Constellation Hunter Club or Universe Sample Club. Add a pair of binoculars, and you can do the Lunar Club, Sky Puppy Club (children 10 or younger), or Binocular Messier Club. For telescopic observations, several levels of difficulty are presented.

The Messier Club requires observation of 70 of the 110 M-objects, with an Honorary certificate available for observation of all 110 (there are eight KAS members on the Messier Club list). Moving up in difficulty, the Herschel 400 Club chooses 400 NGC objects from the Herschel catalog that are not on the Messier list. Two members (Mark Miller and Robert Wade) have completed this list. An even greater challenge is offered by the Herschel II Club, with a list of another 400 NGC objects. Other observing clubs concentrate on asteroids, comets, double stars (five KAS members completed this one, the last in 2009), meteors, planets, and the Sun.

While some of the observing programs require dark skies and large-aperture telescopes, others are deliberately oriented towards mediocre viewing conditions. The Urban Observing Club actually requires that light pollution should prevent the Milky Way from being visible to the naked eye.

Whatever program is chosen, it is important to learn the details of the requirements from the A.L. website before beginning observations, because the rules differ. Programs that want to teach recognizing the skies and finding deep-sky objects may prohibit using GOTO telescopes and computers to find the objects. Those that concentrate more on observing the objects may allow any method of finding them. Some are strictly visual, while others may allow or even recommend imaging.

All require keeping observing logs that include specified data fields. Most of the targets can be downloaded as lists from the A.L. site, but a few (i.e., the Globular Cluster Club)

require buying a guidebook. Finally, some certificates are awarded based on confirmation of the observations by your ALCOR, while others require a copy of the observing log to be submitted to a specified A.L. representative. So find a club that fits with your interests, learn the rules, and get out there under the skies! It is time for more KAS member names to be added to those awards lists.

Here's a breakdown of observing clubs completed by past and present KAS members:

Binocular Messier Club

Richard Bell, Mike Cook, Becky Csia, Michael Dupuis, Mark Miller, Eric Schreur, and Mike Sinclair.

Comet Observers Club

Roger Williams

Deep Sky Binocular Club

Richard Bell, Mark Miller, and Mike Sinclair.

Double Star Club

Richard Bell, Michael Dupuis, Jim Kurtz, Mark Miller, and Mike Sinclair.

Globular Cluster Program

Mike Cook

Herschel 400 Club

Mark Miller and Robert Wade.

Lunar Club

Richard Bell, Joe Comiskey, Mike Cook, Becky Csia, Mark Miller, Mike Sinclair, and Don Stilwell.

Messier Club

Richard Bell, Mike Cook, Michael Dupuis, Mark Miller, Eric Schreur, Don Stilwell, Mike Sinclair, and Henry Van Gamert.

Southern Sky Binocular Club

Mark Miller

Universe Sampler

Jeff Kavanaugh, Christopher Sinclair, Karen Sinclair, Kimberly Sinclair, and Mike Sinclair.





What is the Asteroid Belt?

by Linda Hermans-Killiam

There are millions of pieces of rocky material left over from the formation of our solar system. These rocky chunks are called asteroids, and they can be found orbiting our Sun. Most asteroids are found between the orbits of Mars and Jupiter. They orbit the Sun in a doughnut-shaped region of space called the asteroid belt.

Asteroids come in many different sizes — from tiny rocks to giant boulders. Some can even be hundreds of miles across! Asteroids are mostly rocky, but some also have metals



inside, such as iron and nickel. Almost all asteroids have irregular shapes. However, very large asteroids can have a rounder shape.

The asteroid belt is about as wide as the distance between Earth and the Sun. It's a big space, so the objects in the asteroid belt aren't very close together. That means there is plenty of room for spacecraft to safely pass through the belt. In fact, NASA has already sent several spacecraft through the asteroid belt!

The total mass of objects in the asteroid belt is only about 4% the mass of our Moon. Half of this mass is from the four largest objects in the belt. These objects are named Ceres, Vesta, Pallas and Hygiea.

The dwarf planet Ceres is the largest object in the asteroid belt. However, Ceres is still pretty small. It is only about 587 miles across — only a quarter the diameter of Earth's moon. In 2015, NASA's Dawn mission mapped the surface of Ceres. From Dawn, we learned that the outermost layer of Ceres — called the crust — is made up of a mixture of rock and ice.

The Dawn spacecraft also visited the asteroid Vesta. Vesta is the second largest object in the asteroid belt. It is 329 miles across, and it is the brightest asteroid in the sky. Vesta is covered with light and dark patches, and lava once flowed on its surface.

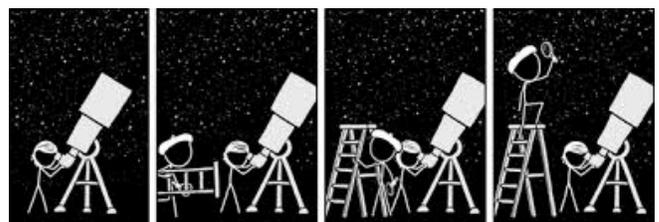
The asteroid belt is filled with objects from the dawn of our solar system. Asteroids represent the building blocks of planets and moons, and studying them helps us learn about the early solar system.

For more information about asteroids, visit:

<https://spaceplace.nasa.gov/asteroid>

TWELVE COMMANDMENTS for Amateur Astronomers

1. Thou shalt have no white light before thee, behind thee, or to the side of thee whilst sharing the night sky with thy fellow stargazers.
2. Thou shalt not love thy telescope more than thy spouse or thy children; as much as, maybe, but not more.
3. Thou shalt not covet thy neighbor's telescope, unless it exceeds in aperture or electronics twice that of thy wildest dreams.
4. Thou shalt not read *Astronomy* or *Sky & Telescope* on company time, for thine employer makes it possible to continue thine astronomical hobby.
5. Thou shalt have at least two telescopes so as to keep thy spouse interested when the same accompanies thee under the night sky or on eclipse expeditions to strange lands where exotic wild animals doth roam freely.
6. Thou shalt not allow either thy sons or thy daughters to get married during the Holy Days of Starfest.
7. Thou shalt not reveal to thy spouse the true cost of thy telescope collection; only the individual components and that shall be done with great infrequency.
8. Thou shalt not buy thy spouse any lenses, filters, dew shields, maps, charts, or any other necessities for holidays, anniversaries, or birthdays unless thy spouse needs them for their own telescope.
9. Thou shalt not deceive thy spouse into thinking that ye are taking them for a romantic Saturday night drive when indeed thou art heading for a dark sky site.
10. Thou shalt not store thy telescope in thy living room, dining room, or bedroom, lest thou be sleeping with it full time.
11. Verily, observe not through thy neighbor's Astro-Physics or Takahashi, lest thee be utterly consumed by the lust of apo-fever, and thy brain and thy bank account shall shrivel and wither like branches in a flame.
12. Verily, observe not through thy neighbor's Dob of Goliath, lest thee be lain bare to the fires of aperture-fever, and thy sanity, thy sacroiliac and thy life savings be crushed as ye grapes of wrath.



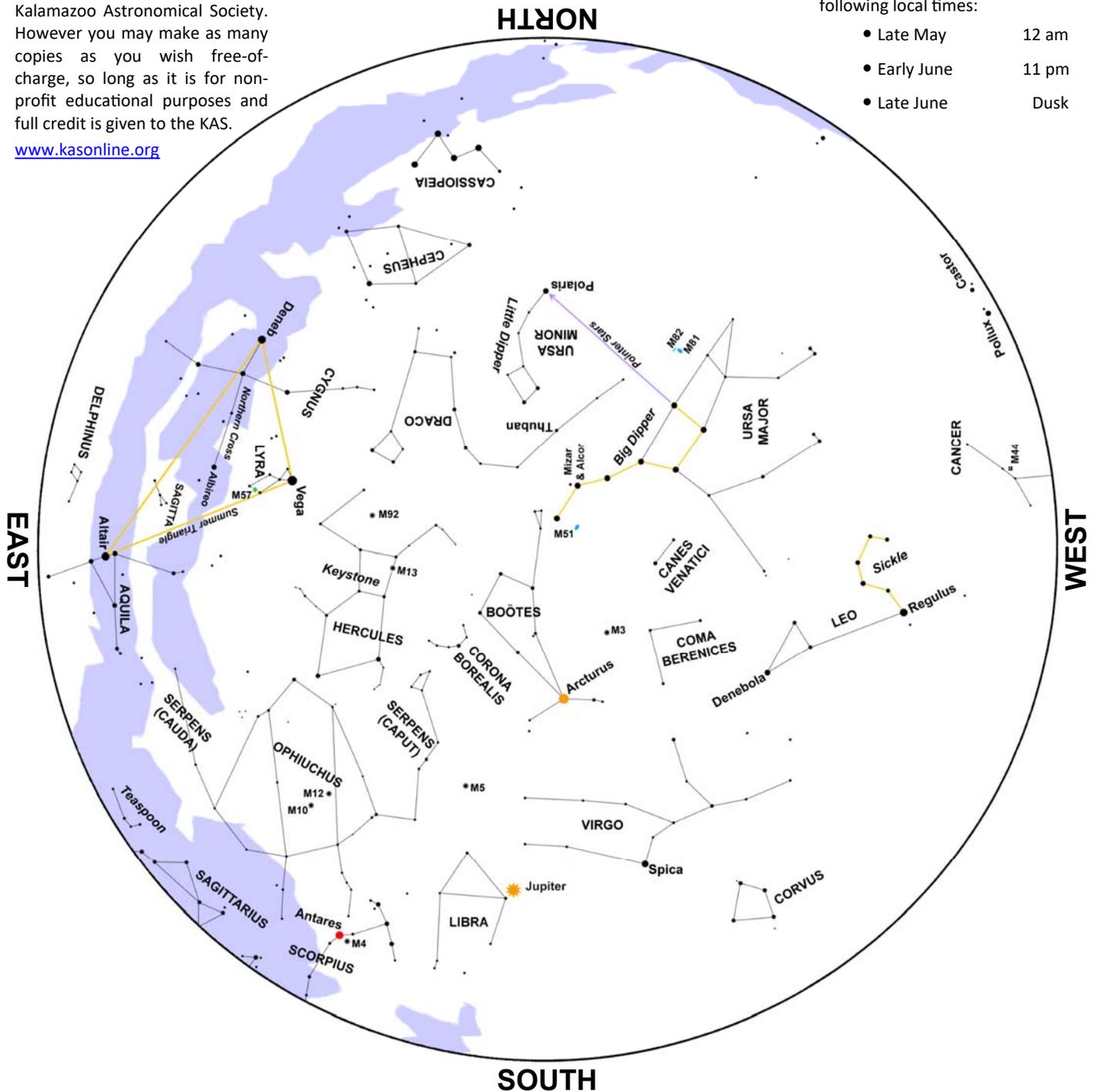
— June Night Sky —

This star map is property of the Kalamazoo Astronomical Society. However you may make as many copies as you wish free-of-charge, so long as it is for non-profit educational purposes and full credit is given to the KAS.

www.kasonline.org

This map represents the sky at the following local times:

- Late May 12 am
- Early June 11 pm
- Late June Dusk



A thin sliver of a crescent Moon near Venus is always a grand sight, but there will be a special bonus on the evening of June 16th. The Moon and Venus will be separated by a 8°, but between them will be the Beehive Cluster (M44). The sky should be sufficiently dark by 11pm to see the Beehive nestled between the two.

Vesta, the second largest object in the asteroid belt in both mass and diameter, will be at opposition on June 19th. Already the brightest asteroid in the main belt, it'll shine at magnitude 5.3 putting it within reach of the unaided eye from dark observing sites.

A waxing gibbous Moon and Jupiter will

be 4½° apart in Libra on June 23rd, no doubt throwing the scales off balance!

Saturn reaches its opposition on June 27th. Its magnificent system of rings will be tilted at almost maximum extent, so the planet will reach magnitude 0.0. The Full Moon will be only 1° away, but this won't spoil the view through a telescope.

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June 2018

Page 9

PST Available for Checkout!



The Kalamazoo Astronomical Society's Coronado Personal Solar Telescope (PST), mounted on the light and ultra-portable Tele Vue Tele-Pod, is available for loan.

If you'd like to observe the Sun in hydrogen alpha and see prominences dance along the solar-limb and filaments crisscross its surface then contact the KAS Equipment Manager, **Arya Jayatilaka**, today:

<http://www.kasonline.org/loanscopes.html>



owl **Observatory** **TRAINING SESSION**

Interested in learning how to gain access to Owl Observatory and using the 12" Schmidt-Cassegrain telescope? Registration is required; no walk-ins please. Sign-up through the KAS [Contact Page](#) by **June 29th**. Please read the User's Manual on the Owl Observatory [web page](#) before attending the session.

SATURDAY, JUNE 30TH @ 9:30 PM

Public Observing Sessions



Saturday, June 2nd

Features: Venus, Jupiter & Globular Clusters



Saturday, June 16th

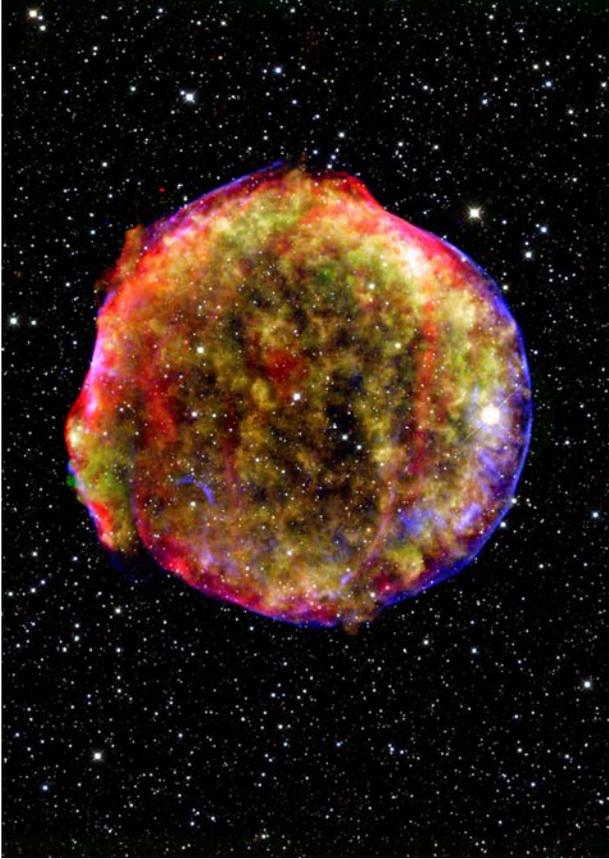
Features: Jupiter, Saturn & Globular Clusters

Gates Open: 9:30 pm • Observing Begins: 10:00 pm

Kalamazoo Nature Center

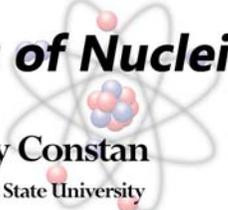
— 7000 N. Westnedge Ave. —

General Meeting Preview



14 Billion Years of Nuclei

presented by
Dr. Zachary Constan
Michigan State University



It has taken a long time to make all the nuclei in your body, and MSU's National Superconducting Cyclotron Laboratory (NSCL) is finding out how. Explore what we know about the origins of the 92 naturally-occurring elements from Big Bang nucleosynthesis to recently-discovered neutron-star mergers!

Friday, June 1 @ 7:00 pm

Kalamazoo Area Math & Science Center

600 West Vine, Suite 400 • Use Dutton St. Entrance

– Dutton Entrance Locked by 7:10 pm –

Kalamazoo Astronomical Society
c/o KAMSC
600 West Vine, Suite 400
Kalamazoo, MI 49008

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