

**Highlights of the
June Sky...**

--- 5th ---
First Quarter Moon

--- 7th ---
PM: A Waxing Gibbous Moon is below Mars, with Spica to their right.

--- 8th ---
PM: The Moon is near Spica, with Mars to their right.

--- 9th ---
PM: The Moon is to the right of Saturn.

--- 10th ---
PM: The Moon is left of Saturn.

--- 13th ---
Full Moon

--- 19th ---
Last Quarter Moon

--- 21st ---
Summer solstice occurs at 6:51 am EDT.

--- 24th ---
DAWN: A Waning Crescent Moon forms an amazingly close pair with Venus, with the Pleiades to the upper right.

--- 25th ---
DAWN: A very thin Waning Crescent Moon is left of Aldebaran very low in ENE shortly before sunrise, with Venus and the Pleiades above them.

--- 27th ---
New Moon

--- 29th ---
DUSK: Jupiter is well to the right of a Waxing Crescent Moon very low in WNW.

--- 29th → 12th ---
PM: Asteroids Ceres and Vesta are less than 1/2° apart (see p. 8 for more).

Prime Focus

A Publication of the Kalamazoo Astronomical Society

☆ ☆ ☆ June 2014 ☆ ☆ ☆

This Months **KAS** Events

General Meeting: Friday, June 6 @ 7:00 pm

Kalamazoo Nature Center - See Page 10 for Details

Observing Session: Saturday, June 7 @ 9:00 pm

Moon, Mars, Saturn & Double Stars - Kalamazoo Nature Center

Observing Session: Saturday, June 21 @ 9:00 pm

Mars, Saturn & Super Summer Nebulae - Kalamazoo Nature Center

Kiwanis Star Party: Saturday, June 28 @ 9:00 pm

Kiwanis Youth Conservation Area - See Page 9 for Details

Inside the Newsletter...

May Meeting Minutes.....	p. 2
Board Meeting Minutes.....	p. 3
Observations.....	p. 3
Astronomy Day 2014 Report.....	p. 4
NASA Space Place.....	p. 7
June Night Sky.....	p. 8
KAS Board & Announcements.....	p. 9
General Meeting Preview.....	p. 10



☆ ☆ ☆ www.kasonline.org ☆ ☆ ☆

May Meeting Minutes

The general meeting of the Kalamazoo Astronomical Society was brought to order by President Richard Bell on Friday, May 2, 2014 at 7:12 pm. Approximately 45 members and guests were in attendance at the Kalamazoo Area Math & Science Center (KAMSC).

Our featured speaker of the evening was Dr. Jay Strader, an Assistant Professor of Astronomy at Michigan State University. The topic of Dr. Strader's talk was *Globular Clusters & Black Holes: Sparkling Hosts of Frozen Stars*. Globular clusters are an approximately spherical (or globe-shaped) collection of at least 10,000 stars bound by gravity. They are among the oldest system of stars in the universe, so Dr. Strader referred to them as stellar fossils. Like fossils from dinosaurs, astronomers wouldn't understand anything about the history of star formation in the universe if it weren't for globular clusters.

Harlow Shapely used Cepheid variable stars to find the distances of globular clusters in the 1920's. Shapley suggested that globulars formed an outer skeleton to the Milky Way, with the most distant globulars marking its furthest bounds. Thus, Shapely used globular clusters to measure the diameter of the Milky Way Galaxy (his initial estimate was 3 times the current value though). The extreme age of globular clusters allowed astronomers to put a minimum estimate on the age of the universe.

Dr. Strader then gave a brief overview of stellar evolution. Medium mass stars, like the Sun, eventually become red giants and gradually expel their outer layers to space. The core contracts and becomes a white dwarf. Before this happens, the Sun may become a planetary nebula (like M57, the Ring Nebula), but many astronomers now think planetary nebulae only form in binary star systems. Stars that have a



Dr. Jay Strader, from Michigan State University, spoke on globular clusters at the May 2nd general meeting.

core of more than 1.4 solar masses become neutron stars, while the outer layers of the star implode and rebound to become supernova explosions. A rapidly rotating neutron star is called a pulsar. Newborn pulsars should blink rapidly, and old pulsars should blink slowly. However, the handful that blink the fastest may be quite old. These are known as millisecond pulsars because their pulse periods are almost as short as one millisecond. They are thought to form in binary star systems when an old pulsar gains mass and rotational energy from its companion. Many millisecond pulsars have been found in globular clusters.

The cores of the most massive stars in the universe end their existence as black holes. Before the term "black hole" was coined, they were referred to as frozen stars. Dr. Strader showed an artistic image of a black hole pulling in matter from a companion star, forming an accretion disk around the black hole. Matter in an accretion disk becomes very hot and emits X-rays. Dr. Strader showed an X-ray image of a globular cluster from the Chandra X-ray Observatory.

Globular clusters experience mass segregation as they age. The most massive stars that live short lives move toward the center, while lighter stars move to the outer parts of the cluster. Sometimes though lower mass stars can get ejected from the cluster, leading to mass loss and the gradual evaporation of the cluster. Neutron stars and especially black holes tend to be found near the centers of globular clusters and can interact with one another. The first evidence of a black hole in a globular cluster was found around the galaxy M49 (NGC 4472). It was associated with an extremely bright X-ray source that could only come from a black hole.

Using the Very Large Array, Dr. Strader said two candidate black holes were found in the globular cluster M22, which orbits the Milky Way. There are likely hundreds more. One reason this research is important is that globular clusters may contain binary black holes and these would be excellent candidates to discover gravitational waves, predicted by Einstein's general theory of relativity. Dr. Strader ended his presentation by discussing the densest known galaxy, which is near M60. This [dense galaxy](#) is a bright X-ray source and contains a supermassive black hole 10% the mass of the entire galaxy. Supermassive black holes are typically only 0.5% the mass of a galaxy's central bulge. This may help us understand how these systems form.

Richard mentioned that Bill Nigg sold his house in Galesburg and is moving to North Carolina. Bill is a lifetime member, but we may still see him during the summer. Joe Borrello shared an image he took of the [green flash](#) from an airplane. Richard then covered upcoming events including Astronomy Day. The meeting concluded at 8:55 pm.

BOARD Meeting Minutes

The KAS Board met on May 18th at Sunnyside Church. President Richard Bell called the meeting to order at 5:05 pm. In attendance were board members Scott Macfarlane, Jack Price, Don Stilwell, and Roger Williams. After approval of the agenda and in the absence of the Treasurer, the meeting proceeded with a summary of upcoming May/June events. Richard emphasized that the general meeting on June 6th would be at the Kalamazoo Nature Center, not KAMSC.

On the topic of follow-up items from the previous meeting, Richard reported that as of Astronomy Day, the club telescope was responding properly to the control paddle but not pointing accurately to selected celestial objects. He realized only later that after the maintenance performed by board members, the clock had been reset, but the latitude and longitude had not. In further retrospective analysis of Astronomy Day, there was a general conclusion that the Portage District Library site worked well, although by now much of the public expects to find us at the Kalamazoo Valley Museum. Don observed that the attendance seemed a bit below normal in the morning but normal in the afternoon. Both the weather and the behavior of the Sun made for excellent solar viewing. The PDL website was apparently ineffective in publicizing Astronomy Day, and not many attendees had learned about it from this source. Finally, attendance for the featured speaker at KNC in the evening was very good (estimated at 100-120), and the observing session that followed was also well attended.

Richard reported receiving some questions from the Gilmore Foundation about our Robotic Telescope grant application, some of which might require clarification of our policy for using the robotic scope. However, the detail and specificity of the questions were regarded as a favorable sign.

Other possible activities for KAS that were discussed included Blast Into Space Camp at the Air Zoo on June 17th (solar viewing requested), movie night at Kingman Museum on June 20th (activities not yet defined), and Fall Astronomy Day at Kingman on October 4th. The latter has the problems of conflicting with college football games and of coming the day after a general meeting of KAS. Jack also noted that the Parchment Kindleberger Park festival was not on the schedule as yet, and he needed to check the date. All of these were noted as possible events to be considered further.

With no further business, the meeting was adjourned at 5:55 pm. The next meeting was set for June 8th, same time and place, with no planned board meetings for July and August.

Respectfully submitted by Roger Williams



Astronomer's predicted that a new meteor shower would occur during the early morning hours of May 24th. Were they right? Yes and no. The story begins in February 2012 when a small periodic comet, 209P/LINEAR (discovered in 2004), passed within 0.58 A.U. (54 million miles) of Jupiter. This encounter perturbed the comet, and presumably the dust shed by it, into a new orbit that came within 0.003 A.U. (280,000 miles) of Earth's orbit on May 24th. This created the possibility of a new meteor shower.

Joe Rao, who authored an article on the new meteor shower in the May 2014 issue of *Sky & Telescope* said "we're fairly likely to experience a new meteor shower similar in intensity to the Perseids or Geminids." Early predictions said we might experience a zenithal hourly rate (ZHR) as high as 1,000 meteors per hour, qualifying it as a meteor *storm*. The best-case scenario later became 200-400 meteors per hour.

Naturally, the prospects of a new and highly active meteor shower received a lot of publicity. Many astronomers (myself included) were very skeptical. The astronomer's predictions depended on the activity of the comet in the 17th and 18th century. It was those particles shed by the comet that would intersect Earth's orbit. We had no way of knowing how active the comet was during that time. The comet is fairly inactive today and produces very little dust. In fact, the comet passed very close to Earth on May 29th and only had a magnitude of 10 - 12!

Several KAS members ventured out to Richland Township Park on May 24th. I arrived a little after midnight and was later joined by Bob & Barb Havira, Jack Price, Brent Sanford, and Don Stilwell. Mark Miller later told me that he and his wife, Ninah, were also at Richland Township Park but setup somewhere else. Sky conditions were excellent. We enjoyed clear skies the entire night with high transparency. Long story short the meteor shower never materialized. At best we saw 3 meteors that were definitely from the shower. The rest were sporadics, which occur (on average) every 10 minutes every night.

The meteor shower was called the Camelopardalids, since the radiant was in the faint constellation Camelopardalis, the Giraffe. By 3am, we started coming up with derogatory names for the shower. For example: the Camelopardal-didn'ts or the Camelopardal-duds. It turns out though the meteors were there, they were just too faint to be seen. This was determined by radar data. We are 0 for 3 for big astronomical events as of late. First there was Comet ISUCK...err...ISON in December, then a clouded out lunar eclipse in April, and now the "meteor trickle" as Don coined it. Oh well, I'll keep looking up...you know I will!

Astronomy Day 2014 Report

by **Richard Bell & Jean DeMott**

On May 10th the Kalamazoo Astronomical Society, along with other astronomy clubs, museums, and observatories around the world, celebrated Astronomy Day. Its purpose was to “bring astronomy to the people” through educational displays, hands-on activities for children, special presentations, and sharing the splendors of the sky with the entire community. Astronomy Day has become the signature outreach event for the KAS since we (Richard and Jean) became the coordinators in 1998. Thanks to the tireless support of its volunteers, the KAS has received several awards including Best Event in 2009, 2010, and 2012 and Quality Event Year After Year in 2011 and 2013.

Daytime activities were held at the Portage District Library (PDL) for the first time this year. Both the *Introduction to Amateur Astronomy* lecture series and Library Telescope Program have enjoyed the best success at PDL, so we thought it would make an excellent host site. This was certainly the case as the staff was very cooperative and easy to work with, especially Marsha Meyer and Laura Wright.

Astronomy Day has had a variety of themes over the years, mostly dictated by current events. Some of these have included Galileo & the Telescope in 2009, the Hubble Space Telescope in 2010 (its 20th anniversary), and Mars in 2013. This year our theme was our greatest natural resource: The Night Sky. A starry sky has filled us with awe and wonder for centuries. The Moon goes through a stately set of monthly phases, while the planets appear to wander among



Dave Garten shared views of the Sun through his 9.25” Schmidt-Cassegrain and 80mm refracting telescopes.



Dr. Kirk Korista answers another excellent question at our Ask the Astronomer booth.

the stars. Meteors shoot across the sky and northern lights dance above the horizon. Bright comets can appear at any time, while eclipses can be predicted far into the future. The night sky is predictable yet mysterious all at the same time.

Solar observing was one of the more successful activities at PDL this year (making up for last year’s abysmal conditions). The high temperature was around 71° F and skies were mostly sunny to partly cloudy through the morning and afternoon. Solar activity was very good thanks to a large collection of sunspots that came into view just in time for Astronomy Day. **Dave Garten** setup his Celestron 9.25” Schmidt-Cassegrain with an Orion ShortTube 80mm refractor riding piggyback. Both scopes were equipped with white light solar filters. **Tim Kurtz** also had a white light filter on his Meade 4” apochromatic refractor. The Sun looked impressive in hydrogen alpha as well. Prominences were in abundance and one long filament curved off the solar surface, giving an amazing three dimensional effect. **Jim Kurtz** brought his Lunt 60mm H-alpha scope on an iOptron MiniTower mount and **Dave Wolf** shared his new Lunt 60mm double-stacked H-alpha scope. Both Astronomy Day attendees and regular library patrons made sure to stop by our collection of solar telescopes. Thanks to all our intrepid solar observers for sharing views of our local star throughout the entire day.

Our greeting table was located at the end of PDL’s entrance



One of our more popular (and messy) hands-on activities during Astronomy Day 2014 was “Decorate a Star.”

ramp, so everyone that entered the library passed by. Volunteers were on hand to answer Astronomy Day programming and general KAS questions. Co-coordinator **Jean DeMott** and Vice President **Jack Price** were on staff during the first shift. **Mike Sinclair** also filled in while Jean was off performing other tasks. The second shift crew comprised of **Mike Cook** and **Don Stilwell**.

All other Astronomy Day activities were located in PDL’s lower level. The first thing attendees saw when going down the stairs was our Ask the Astronomer booth; making its return after a 6 year absence. The Ask the Astronomer booth was inspired by Lucy’s “Psychiatric Help 5¢” stand from *The Peanuts* cartoons and built by **Dick & Jackie Gillespie** in 2007. All three members that volunteered at the booth when it was last used in 2007 and 2008 returned this year and shared their knowledge with the public. These include **Mark Miller** (10am – 12pm), **Kirk Korista** (12pm – 2pm), and **Mike Sinclair** (2pm – 4pm). While the 5¢ fee is not required we still managed to make \$1.55, which Mike says should go toward the Robotic Telescope Project since he took in the most fees. Okay Mike...whatever!

Hands-on activities were located in PDL’s Long Lake Room. Some of our best activities from past events that fit in with this year’s Night Sky theme returned this year. The “Make a Planisphere” table was staffed by **Joe Borrello** and first-time volunteer **Brent Sanford** during the first shift. The second shift crew consisted of **Joe Comiskey** and his daughter **Jeanne**. The “Build a Big Dipper Clock” crew consisted of **Rich Mather** and **Frank Severance** in the morning, with **Susan Bond** and **Stephanie Stratton** helping out in the afternoon. The “Create a Constellation Can” table was run by **Scott & Scotty Macfarlane** in the morning, and then **Bob & Barb Havira** in the afternoon. And finally, the popular and very messy “Decorate a Star” activity was skillfully operated by **Angela Newton** in the morning, and then by **Erin Grace Dupuis** and **Ron Williams** in the afternoon. A special thanks to our entire hands-on crew. Everyone did an outstanding job at Astronomy Day’s most important area.

Displays and the Freebie Table were located in PDL’s Sugar Loaf Lake room. Traditional Astronomy Day displays, such as *KAS Member Astrophotography* and *Meet the Telescopes* returned this year. **Don Stilwell** supplied his Orion 120mm refractor and volunteered at the telescope display in the morning. A Newtonian reflector was provided by **Joe Comiskey** and **Rich Mather** brought his 8” Schmidt-Cassegrain for the display. **Mike Dupuis** covered the telescope display in the afternoon. Two new displays to go along with our Night Sky theme were *A Sky Full of Wonders* and *The Vanishing Night*. The *Wonders* display showed all the amazing phenomena people can see in the night sky without binoculars or a telescope. *The Vanishing Night* display covered the greatest threat to the night sky: light pollution. Richard and Jean have wanted to create a light pollution display for many years. This display will become a regular feature at many outreach activities for years to come.

Items for our popular Freebie Table were supplied by NASA Goddard Space Flight Center, NASA Space Place, the Jet Propulsion Laboratory, and *Astronomy* magazine. Our keynote speaker, **Michael Bakich**, made sure *Astronomy* supplied us with 300 copies of their June issue and 1,000 copies each of their *Welcome to Astronomy* and *How to Buy Your First Telescope* guides. We’ll have those guides for several years to come! Thanks to both **Dennis Stuart** and **Danielle Dupuis** for volunteering at the Freebie Table on Astronomy Day. We would also like to thank Meijer for donating a box of plastic grocery bags, so attendees could carry away their freebies and hands-on activities. We’ll have an ample supply of bags for years to come as well!

The last of our activities at PDL were a series of presentations on the Night Sky. These were all held in PDL’s Austin Lake room. **Joe Comiskey** presented *Rhapsody on Lunar Observing* at 11am. This was a condensed version of his talk at the March General Meeting. It covered the wealth of features you can see on Earth’s nearest celestial neighbor with a pair of binoculars or an inexpensive telescope. **Mike Sinclair** then talked about *Oddballs, Snowballs & Other Strange Stuff to See in Space* at 1pm. Mike covered



Bob & Barb Havira helped young astronomers create Constellation Cans during the afternoon shift.

everything you can see in the night sky beside the Moon and constellations. KAS President & Astronomy Day Co-coordinator **Richard Bell** presented *Sky Pictures: Finding the Constellations* at 3pm. Richard taught participants how to read a monthly star map or planisphere, so they could find the stars and constellations on their own. He also gave a seasonal tour of the major constellations.

We must also thank all the students at the Kalamazoo Area Math & Science Center (KAMSC) that volunteered this year. Some students held up Astronomy Day signs along South Westnedge Avenue, while others passed out Astronomy Day Programs outside PDL's main entrance. Other assisted at our hands-on table for part of the day. The KAMSC volunteers were **Fiona Beaton, Ryan Brozovich, Ansh Chaudhary, Michael Crandell, Michael Elluru, Marie Freudenburg, Spencer Henning, Humza Mirza, Jacob Naranjo, Sarah Piper, Rachel Polus, Katherine Rothe, and Genevieve Sertic**. Thanks again to all our Astronomy Day volunteers. You make this event possible.

Evening activities began at the Kalamazoo Nature Center at 7pm. Both **Jean DeMott** and **Arya Jayatilaka** greeted visitors. This year's keynote speaker was **Michael Bakich**, a life-long amateur astronomer and a Senior Editor at *Astronomy* magazine (the world's best-selling astronomy magazine). Mr. Bakich's keynote presentation was entitled *How Big is the Universe*. It was an entertaining and highly illustrated look at the immensity of our cosmos. Starting on Earth, Mr. Bakich took the audience on a trip through the solar system, out of our Milky Way, and then to the very edge of the observable universe. Mr. Bakich finished up with a preview of observing highlights for the Public Observing Session. He also answered many questions from the audience. One excellent question came from a young astronomer. He asked Mr. Bakich where all the energy for the Big Bang came from! Naturally Mr. Bakich couldn't answer (nobody can right now), but let's hope that young astronomer continues the search on his own.



Astronomy magazine Senior Editor Michael Bakich was the Astronomy Day 2014 Keynote Speaker. He presented *How Big is the Universe* to over 100 people at the Kalamazoo Nature Center on May 10th.



A large number of people that attended the keynote presentation stayed for the Public Observing Session, making for a memorable evening.

Astronomy Day's grand finale was observing under the night sky and conditions were excellent. Many people that attended the keynote presentation stayed for the observing session, giving it more of a star party feel. Multiple KAS members setup telescopes. These include **Richard Bell, Joe Comiskey, Dave Garten, Jim Kurtz, Tim Kurtz, Scott Macfarlane, Scotty Macfarlane, Rich Mather, Brent Sanford, Mike Sinclair, Don Stilwell, and Stephanie Stratton**. **Dave Woolf** operated the 12" Schmidt-Cassegrain in Owl Observatory.

The first target of the night was the waxing gibbous Moon. This was followed by a planet palooza! Mercury made a brief appearance in the northwestern sky. Its phase was barely discernable, but it was a rare treat to see the planet closest to the Sun. The red planet, Mars, was about a month past opposition, but was still close enough to see the polar caps and dark markings on its rusty surface. Jupiter put on a good show as always with its cloud belts and zones, plus its four Galilean moons. Saturn was a show-stopper and was at opposition on May 10th, so in prime position for viewing. Despite the glare of the Moon, many deep sky objects of late spring and early summer were visible. Festivities officially came to a close after about 11:35 pm when a nice Iridium Flare was seen.

In many ways this year's Astronomy Day was the opposite of last year's event. Weather conditions for Astronomy Day 2013 were cloudy and cold, which really helped indoor attendance. Conditions this year were excellent and this hurt indoor attendance to a degree, but made day and night time observing a big success. Many of us were very worried during Astronomy Day 2014's first hour, because attendance was *very* light. Things picked up after that and the hands-on area maintained a steady pace. The keynote presentation was an amazing success. Richard hoped for 60 attendees, but the actual total was around 100 – 110. The general nature of Michael Bakich's talk helped attract families with young children. Astronomy Day 2015 will be held in late April and we look forward to returning to the Portage District Library.



The Hottest Planet in the Solar System

by Dr. Ethan Siegel

When you think about the four rocky planets in our Solar System — Mercury, Venus, Earth and Mars — you probably think about them in that exact order: sorted by their distance from the Sun. It wouldn't surprise you all that much to learn that the surface of Mercury reaches daytime temperatures of up to 800° F (430° C), while the surface of Mars never gets hotter than 70° F (20° C) during summer at the equator. On both of these worlds, however, temperatures plummet rapidly during the night; Mercury reaches lows of -280° F (-173° C) while Mars, despite having a day comparable to Earth's in length, will have a summer's night at the equator freeze to temperatures of -100° F (-73° C).

Those temperature extremes from day-to-night don't happen so severely here on Earth, thanks to our atmosphere that's some 140 times thicker than that of Mars. Our average surface temperature is 57° F (14° C), and day-to-night temperature swings are only tens of degrees. But if our world were completely airless, like Mercury, we'd have day-to-night temperature swings that were *hundreds* of degrees. Additionally, our average surface temperature would be significantly colder, at around 0° F (-18° C), as our atmosphere functions like a blanket: trapping a portion of the heat radiated by our planet and making the entire atmosphere more uniform in temperature.



Image credit: NASA's Pioneer Venus Orbiter image of Venus's upper-atmosphere clouds as seen in the ultraviolet, 1979.



Venus from the surface as seen by the Soviet lander Venera 13 in 1982. Processing and color: Dr. Don P. Mitchell and Dr. Paolo C. Fienga.

But it's the *second* planet from the Sun -- Venus -- that puts the rest of the rocky planets' atmospheres to shame. With an atmosphere **93 times as thick as Earth's**, made up almost entirely of carbon dioxide, Venus is the ultimate planetary greenhouse, letting sunlight in but hanging onto that heat with incredible effectiveness. Despite being nearly twice as far away from the Sun as Mercury, and hence only receiving 29% the sunlight-per-unit-area, the surface of Venus is a toasty 864° F (462° C), with *no difference* between day-and-night temperatures! Even though Venus takes hundreds of Earth days to rotate, its winds circumnavigate the entire planet every four days (with speeds of 220 mph / 360 kph), making day-and-night temperature differences irrelevant.

Catch the hottest planet in our Solar System all spring-and-summer long in the pre-dawn skies, as it waxes towards its full phase, moving away from the Earth and towards the opposite side of the Sun, which it will finally slip behind in November. A little atmospheric greenhouse effect seems to be exactly what we need here on Earth, but as much as Venus? No thanks!

Check out these “10 Need-to-Know Things About Venus”:

<http://solarsystem.nasa.gov/planets/profile.cfm?Object=Venus>

Kids can learn more about the crazy weather on Venus and other places in the Solar System at NASA's Space Place:

<http://spaceplace.nasa.gov/planet-weather>

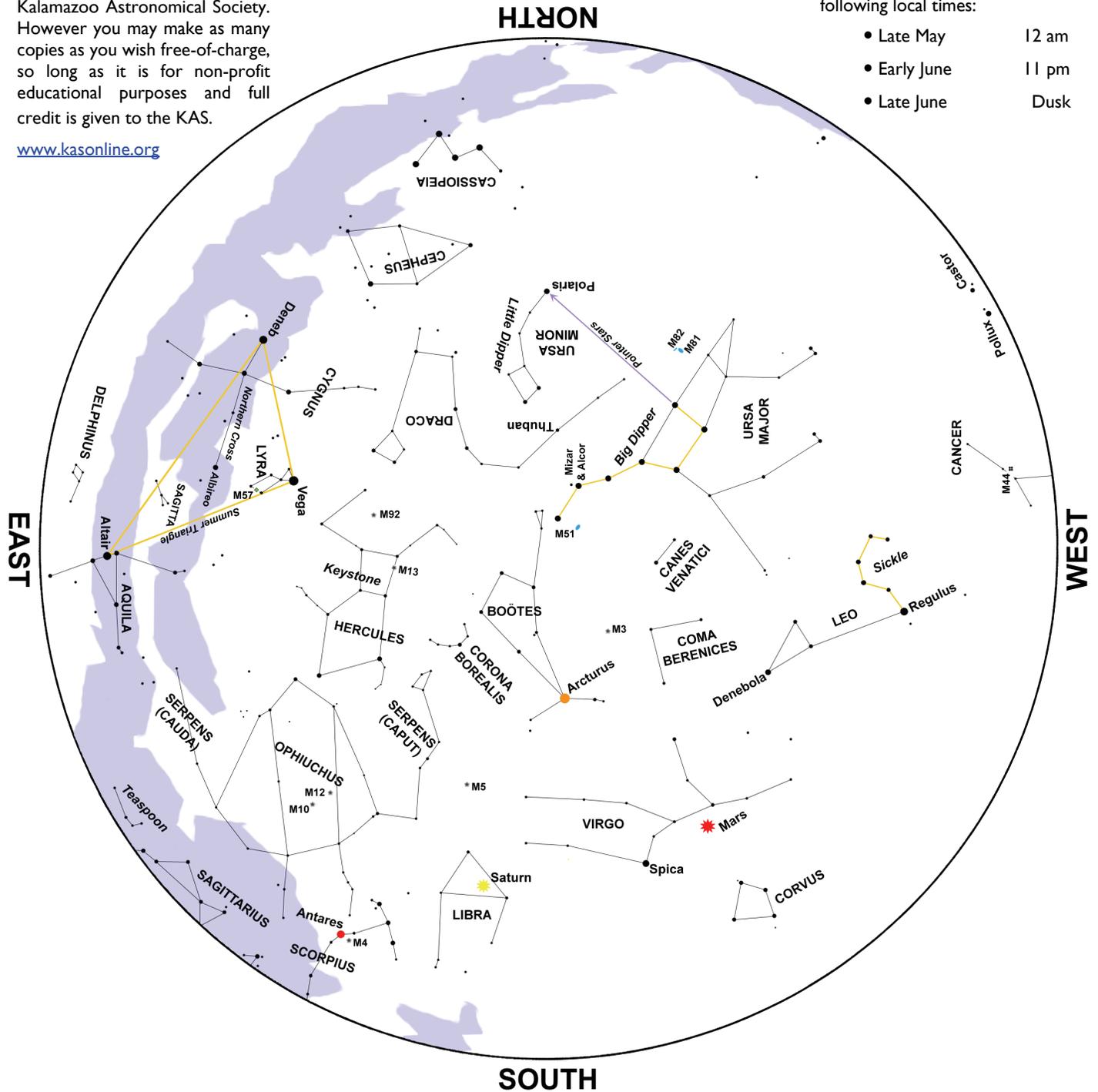
June Night Sky.....

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



The longest day of the year in the Northern Hemisphere is on June 21st. Summer begins at the solstice, which occurs at 6:51 am EDT. The Sun will be as far north of the celestial equator as it can get. Thus, the Sun will rise and set as far north of east and west possible.

A thin Waning Crescent Moon will form a spectacularly close pairing with Venus before dawn on June 24th. The brilliant morning star will be about 1½° above the Moon's northern horn. Look low in the eastern sky about an hour before sunrise. The Pleiades will be to the upper left of this celestial pairing.

The two most massive and brightest asteroids, Ceres and Vesta, will appear less than ½° apart between June 29th and July 12th. Both small worlds will fit together in most amateur telescopes using wide-field eyepieces. Even though Vesta is the smaller of the two, it'll be about a magnitude brighter than Ceres.

KAS BOARD

PRESIDENT

Richard S. Bell
373-8942

VICE PRESIDENT

Jack Price
343-3193

TREASURER

Rich Mather
629-5312

SECRETARY/ALCOR

Roger Williams
375-4867

MEMBERS-AT-LARGE

Joe Comiskey
329-4251

Mike Dupuis
668-6373

Scott Macfarlane
679-2865

Don Stilwell
963-5856

E-MAIL a BOARD MEMBER



June 2014

Page 9

Kiwanis Star Party



The KAS & Battle Creek Kiwanis Club will co-host a public star party under the dark skies of the Kiwanis Youth Conservation Area, located 3.6 miles north of Cornwell's Turkeyville in Calhoun County. Admission is FREE.

For cancellation information, please visit the KAS website after 3:00 pm on June 28th.

Saturday, June 28th @ 9:00 pm

22300 15 Mile Road • Bellevue, MI 49021

KAS Apparel is Back!

It's been well over ten years since the KAS has offered a full line of clothing. We now have several items in stock and ready for purchase. These include:

Short-sleeve T-Shirts: **\$17.00**

Long-sleeve T-Shirts: **\$20.00**

Sweatshirts (unhooded): **\$17.00**

Sweatshirts (hooded): **\$22.00**

KAS Embroidered Caps: **\$15.00**

Full details, including sizes and colors, will be listed on our online store, [The SkyShop](#), soon. Clothing will also be available to purchase at most general meetings.



Public Observing Sessions

Saturday, June 7th

Feature: Moon, Mars, Saturn & Double Stars

Saturday, June 21st

Feature: Mars, Saturn & Summer Nebulae

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



Kalamazoo Nature Center • 7000 N. Westnedge Ave.

Robot Geologists on Mars



presented by [Dr. Michael Anthony Velbel](#), MSU

Imagery from multiple spacecraft (including early fly-by and more recent orbiter missions) indicate the likely presence of abundant water early in the geologic history of Mars. Minerals that commonly form by mineral-water interactions (e.g., carbonates, sulfates) occur in Mars meteorites, including those with the youngest crystallization ages, indicating the presence of at least small quantities of liquid water, at least for brief episodes, until quite recently in the geologic history of Mars, an inference strongly supported by recently acquired high-resolution orbiter imagery. Recent and ongoing Mars surface missions allow more complete characterization of aqueous alteration features and mineral assemblages at a few places on Mars. This presentation reviews the operations and findings of recent semi-autonomous ("robotic") landers and rovers that add to the variety of evidence about the occurrence of water on Mars in the past and at the present.

Friday, June 6 @ 7:00 pm

Kalamazoo Nature Center • 7000 North Westnedge Ave.

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

STAMP

