

## Highlights of the June Sky...

... 1<sup>st</sup> ...

Dusk: Spica 5° or 6° to the right of Waxing Gibbous Moon.

... 6<sup>th</sup> ...

PM: Moon occults (covers up) Antares - begins at about 10:20 pm EDT.

... 7<sup>th</sup> ...

Full Moon

... 9<sup>th</sup> ...

AM: Shadows of Ganymede & Io are visible on Jupiter from 4:06 - 6:16 am EDT.

... 13<sup>th</sup> ...

AM: Jupiter a few degrees to Moon's lower left.

... 14<sup>th</sup> ...

AM: Jupiter about 10° to Moon's lower right.

... 15<sup>th</sup> ...

Last Quarter Moon

... 19<sup>th</sup> ...

Dawn: Venus and Mars separated by 2° (until 21<sup>st</sup>), Waning Crescent Moon 5° above Mars.

... 20<sup>th</sup> ...

Dawn: Pleiades are a few degrees to lower left of Waning Crescent Moon low in ENE.

... 22<sup>nd</sup> ...

New Moon

... 26<sup>th</sup> ...

Dusk: Waxing Crescent Moon to left of Regulus.

... 29<sup>th</sup> ...

First Quarter Moon

... 30<sup>th</sup> ...

Dusk: Spica 6° to upper right of Waxing Gibbous Moon.

# Prime Focus

A Publication of the Kalamazoo Astronomical Society

☆ ☆ ☆ June 2009 ☆ ☆ ☆

## This Months KAS Events

**General Meeting: Friday, June 5 @ 7:00 pm**

*Kalamazoo Area Math & Science Center - See Page 3 for Details*

**Observing Session: Saturday, June 13 @ 9:00 pm**

*Saturn & Grand Globular Clusters - Kalamazoo Nature Center*

**Board Meeting: Sunday, June 14 @ 5:00 pm**

*Sunnyside Church - 2800 Gull Road - All Members Welcome*

**Observing Session: Saturday, June 27 @ 9:00 pm**

*Saturn, Moon & Nebulae of Summer - Kalamazoo Nature Center*

## Inside the Newsletter...

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## May Meeting Minutes



The general meeting of the KAS was brought to order by President Jack Price on Friday, May 1, 2009 at 7:14 pm. Approximately 38 members and guests were in attendance at the Kalamazoo Area Math & Science Center.

KAS Member and WMU Professor of Astronomy Dr. Kirk Korista introduced our guest speaker for the evening; Dr. Jack Baldwin, Professor of Astronomy from MSU. Kirk first met Dr. Baldwin when he was a graduate student at Ohio State University. The subject of Dr. Baldwin's presentation was *Telescopes of the Future*. He began with an overview of the electromagnetic spectrum and how different parts tell us different things. Radio telescopes such as the 1,000 foot diameter Arecibo Telescope in Puerto Rico will be joined by the Atacama Large Millimeter Array in 2012 and the Square Kilometer Array in about 2014.

Dr. Baldwin then discussed NASA's three remaining "Great Observatories" - the Chandra X-ray Observatory, Spitzer Space Telescope (infrared), and the Hubble Space Telescope. Hubble's replacement is the 6.5 meter aperture James Webb Space Telescope (JWST), which is *scheduled* for a 2013 launch. However, the JWST will only work in the infrared. Chandra's successor could be the International X-ray Observatory, which is a merger of NASA's Constellation-X and ESA's ZEUS projects. It won't launch any earlier than 2020.

Dr. Baldwin then reviewed past and current telescopes, which included Galileo's tiny refractor, the 36-inch refractor at Lick Observatory, 200-inch Hale Telescope on Mount Palomar, the Gemini 8-meter telescopes, 10-meter Keck Telescopes and the four 8-meter Very Large Telescope array. New technologies such as segmented and spun-cast mirrors permitted the construction of the giant 8 and 10 meter class telescopes. These were thought impossible and impractical due to size and weight limitations, plus the fact that atmospheric seeing made them a moot point. The later problem was tackled with the invention of adaptive optics. Even today's domed observatories are constructed so as to allow optimum seeing conditions.

These inventions are allowing today's astronomers to dream up even bigger telescopes. The first is the Thirty Meter Telescope (TMT), which will have 492 1.45-meter segments. First light won't come any earlier than 2017 and a site hasn't even been chosen yet. There's also the Giant Magellan Telescope, which will have a total of seven 8.4-meter mirrors. That project is set for completion in 2019. Finally, if it ever gets off the drawing board, is the 42-meter European Extremely Large Telescope.

The business meeting was held after the usual snack break. The meeting concluded at 9:10 pm.

## Board Meeting Minutes



The KAS Board met on May 17<sup>th</sup> at Sunnyside Church. President Jack Price called the meeting to order at 5:15 pm. Present were Richard Bell, Jean DeMott, Dick Gillespie, Mike Sinclair, Dave Woolf, and Roger Williams.

In a summary of May events, Richard reported good attendance at the May 16<sup>th</sup> observing session. At least 30 people were present (probably more), and skies were good. Dick reported that all was ready for the Kiwanis Star Party on May 23<sup>rd</sup>, at the Kiwanis Conservation Area.

Most of the discussion of May events focused, not surprisingly, on Astronomy Day on May 30<sup>th</sup>. Richard recounted a list of details too numerous to mention, but needless to say we're nearly ready.

In addition to the above, travel arrangements and accommodations have been booked for Phil Plait and Michael Francis. Jean is arranging dinner reservations for Saturday, and a few details on how to entertain the guests remain to be worked out. Richard suggested a final volunteer meeting to lay out ground rules, but Jack suggested that e-mail would be more practical, given the difficulty in getting everyone together. It was also suggested that Roger and Dave coordinate breaks among the solar observers, so that the scopes are all attended while everyone has an opportunity to see the Michael Francis performance.

Looking ahead, arrangements are set for speaker Robert Nemiroff for the June 5<sup>th</sup> general meeting (see page 3 for more information). Public Observing Sessions are set for June 13<sup>th</sup> and 27<sup>th</sup>. Jack will try to get planned electrical work done on Owl Observatory and to install gable vents. Richard mentioned the need for an AC/DC adapter for the telescope's dew prevention system.

On the date of the July 10<sup>th</sup> meeting, KAMSC will be closed on the Dutton Street side for construction. Using the available entrance should be possible, but confusing, and it was suggested that we have Kirk check availability of Rood Hall. Since the Gadget Night program is usually pretty sparse, Jack suggested including an eyepiece-cleaning demo by Bill Nigg, followed by a practical workshop. Dave mentioned the possibility of getting a few of his students to attend that meeting and sing some astronomy-themed music. We are also planning again to appear at the Parchment Festival, Kindleberger Park, on July 11<sup>th</sup>. Further out, we were reminded that WMU Education Day on September 26<sup>th</sup>.

The meeting was adjourned at 6:20 p.m. The next meeting was set for June 14<sup>th</sup>, same time and place.

*Respectfully submitted by Roger Williams*

**KAS** Kalamazoo Astronomical Society

*Presents*

# BEST ASTRONOMY IMAGES OF 2009

Presented by **Dr. Robert J. Nemiroff**



Some of the most spectacular images of any sort have been of space. From the red rock plateaus on Mars to the magnificent desolation of the Moon to monster-shaped nebula in deep space, astronomy images continue to excite the imagination and challenge description. Many of these images have appeared on the popular web site *Astronomy Picture of the Day* (APOD). After reviewing their favorite astronomy images of all time, APOD's editors have selected their favorites so far in 2009. These images will include some of the latest images from the NASA missions to Mars, the best images from the Hubble Space Telescope, and spectacular amateur images of bright events visible right in your own night sky.

#### About the Speaker:

Robert J. Nemiroff is a Professor of Physics at Michigan Technological University in Houghton, Michigan. Dr. Nemiroff is the author (with Jerry T. Bonnell) of *The Universe: 365 Days* and *Astronomy: 365 Days*. He and Jerry are also the authors and editors of the immensely popular *Astronomy Picture of the Day* web site.

## Friday, June 5, 7:00 p.m.

**Kalamazoo Area Math & Science Center**

*Located on the fourth floor of Old Central High School*

*600 West Vine Street • Use Dutton Street Entrance*

*Elevator Access is Available • Doors Locked After 7:15 pm*

[www.kasonline.org](http://www.kasonline.org)

# Tools for the Amateur Astronomer

by *Mike Sinclair*



## A Few Preliminary Thoughts

Astronomy can be the simplest, least expensive leisure time endeavor available. It can also rack you up into the thousands of dollars. Whatever path you follow, it is an activity which requires patience, subtlety, and practice. You don't have to be highly educated or particularly technically adept; you just have to be curious. You don't have to be rich or especially good looking; you just have to be curious. You don't even have to live in a particular place (although weather does make a difference); you just have to be curious.

## What Basic Equipment Do I Need?

Simple; your eyes, a basic field guide or star chart, and some late evening leisure time. I firmly believe that you should spend the first three or four months doing some naked-eye observing. Get to know the key constellations. Find the planets, keep track of their paths (with respect to background stars) for a few months, and study the phases of the Moon.

Now you're ready for an "observing instrument". Buy a decent pair of binoculars. Check their power and objective size; i.e., 7×35, 11×80, etc. What is really important is that the objective size divided by the power equals the diameter of the light path that hits the eye. That number must be at least 5. For example,  $35/7 = 5$  and your binoculars should be fine. If you used 7×20, then  $20/7 \approx 3$  and they're not large enough to see faint objects. If you want to know the reason, drop me an [e-mail](#) and I'll be glad to explain. Now that you have your binoculars, spend another three to four months looking at the same stuff you studied with the naked eye. You'll be amazed at all the new stuff you can find.

It's also a good time to start a more formal observing program; contact our Astronomical League Correspondent (ALCor), [Roger Williams](#), or visit our [web site](#) and get a copy of the



The author prepares his portable Meade 8-inch LX10 Schmidt-Cassegrain for a night of observing at KNC.



**Once you learn to identify stars and constellations with your unaided eye your ready to star-hop with binoculars. Just about any size will do and they're especially useful when mounted on a steady tripod.**

Lunar or Binocular Messier Club list. In addition, pick up a more advanced [star chart](#). There are many to choose from and anyone who's done a lot of observing would be more than willing to recommend their favorite version. Keep track of your observations in a logbook and you'll be surprised at how much you've seen. It'll also help in identifying what you'd like to find!

## Where Do I Go from Here?

Now it's time to start talking telescopes. Telescopes come in all sizes and designs. The two basic types are refractors (which use a series of lenses) and reflectors (which use several mirrors and an eyepiece). Among the reflectors, the most common subtypes are Newtonian (tripod-mounted with the eyepiece near the front of the telescope), Schmidt-Cassegrain (tripod-mounted with the eyepiece at the back of the telescope), and Dobsonian (bigger, bulkier Newtonians mounted on a rotating box). Prices range from \$200 entry-level 'scopes to \$20,000 research-grade behemoths. I personally recommend a small, easily portable Schmidt-Cassegrain with a GOOD tripod. They start around \$1,000. All the computer glitz helps but is not necessary...yet. For the builder types, you can put together a decent Newtonian or Dobsonian 'scope for about half the price. Talk to Society members who have 'scopes and they'll be happy to help you make a decision on which way to go.

I'm going to leave out astrophotography and CCD imaging. They're for those who've got a whole lot more expertise than I (Richard Bell, Dave Garten, Jim Kurtz, Bill Nigg, and Roger Williams...hint, hint!).

## Some Final Thoughts

The best way to "do" astronomy is to go outside and look up. Take the time to learn the sky. Hang out with those who've done this for a long time; they'll be more than happy to show you all the ways to make amateur astronomy more enjoyable. The journey is yours to take. Enjoy!

# GALACTIC Jewels

by Tom Koonce

What inspired your earliest interest in amateur astronomy? Was it your first telescopic views of the Moon's craters or your first view of Saturn's rings? Perhaps it was watching the night sky for satellites passing overhead on a summer's night. Whatever inspired you to pursue astronomy as a hobby, it has probably been deep sky views of galaxies, nebulae, and beautiful star clusters that have kept your interest focused. For many of us, motivation has come from globular clusters appearing like spheres of sparkling jewels in the heavens.

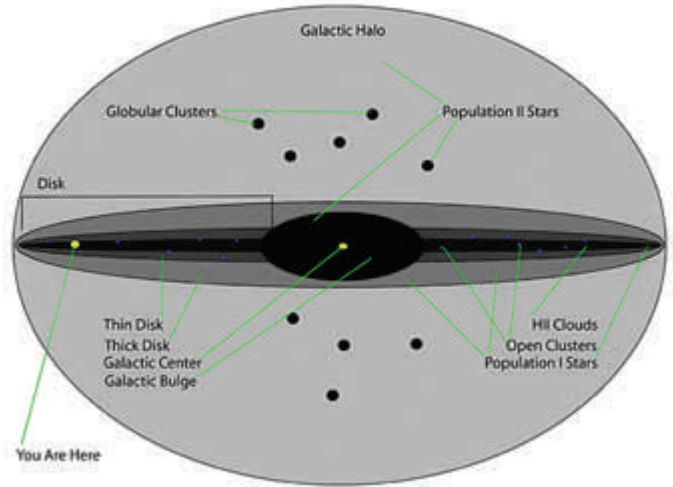
Among the oldest objects in our galaxy, globular clusters have an abundance of older, metal-poor, redder stars. Formed billions of years ago, all of the stars in these cluster were born at approximately the same time from a common cloud of interstellar dust. Astronomers have determined the age of the clusters by measuring the concentrations of heavy elements contained within them and comparing these amounts with the other stars in the galactic disk. As generation after generation of stars pass and stars die, supernovae release heavy elements out into space, so the next generations of stars in globular clusters appear to have less heavy elements than other stars.

I'll never forget the night when a fellow amateur astronomer showed me my first high power view of the rich pool of stars within the globular cluster M13. It was an awe-inspiring sight to see hundreds of thousands of stars orbiting around each other, packed into a spherical volume just 145 light-years across. Pictures like the one here just don't do it justice. Now, each time I swing the telescope into the constellation Hercules and find M13, I still feel that sense of wonder and amazement.

Unlike our Sun, globular clusters are located in the halo of the Milky Way, the 'fog' of stars and matter that orbit the center



**M13 is considered one of the finest globular clusters in the northern hemisphere. Its stars can be easily resolved in telescopes 6-inches in aperture and up.**

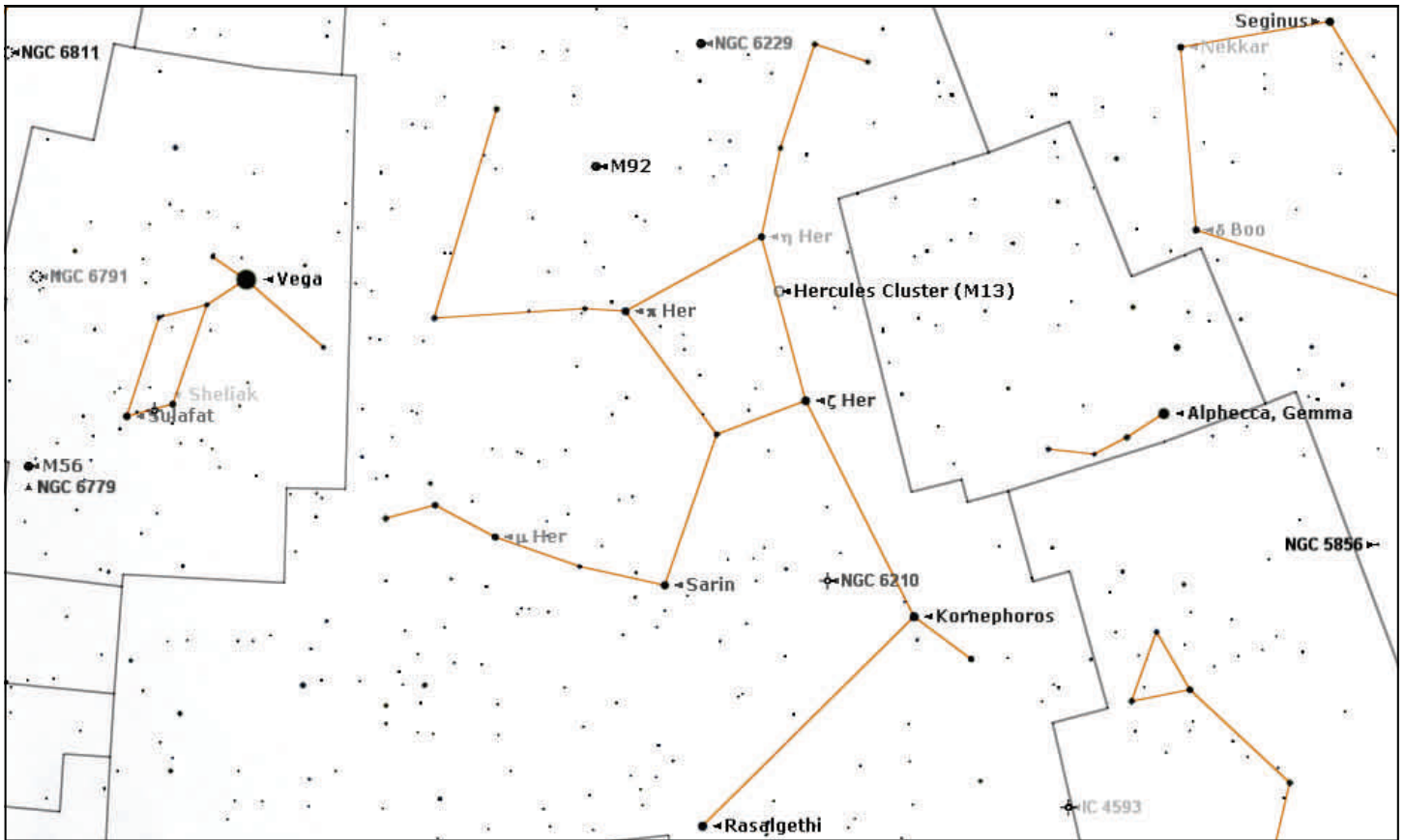


**Unlike open clusters, globular clusters are located above and below the galactic disk in the spherical halo surrounding the central bulge.**

of the galaxy above and below the plane of the galactic disk, with a significant concentration toward the Galactic Center. Our galaxy is associated with about two hundred globulars.

Try imagining what it might be like to stand on the surface of a planet circling a star just inside of a globular cluster...Surrounded by stars brighter than the planet Venus, perhaps two main concentrations of stars would be visible to you; one very large area of the sky towards the center of the globular cluster would be visible as a region more closely packed with stars; and perhaps opposite this, a view of the central bulge of stars of the Milky Way could be seen prominently in the night sky. The sky might be so dazzling at night that the subtlety of faint nebulae might be completely overwhelmed in the light. With so many bright stars surrounding you, your view of other galaxies might be severely limited. In fact your location within the Milky Way could be a limiting factor in your very understanding of the universe, a trade-off between beauty and knowledge.

Sir Edmund Halley discovered M13 in 1714 and it was logged as a nebula by Charles Messier when he added it to his famous listing fifty years later. By the 1920 debate on the size of the universe between Harlow Shapley and Heber Curtis, globular clusters (including M13) featured prominently in Shapley's rough determination of the shape of the Milky Way. Since globulars are essentially spherical in shape, can be seen from great distances and are appear to be evenly distributed around the galaxy, they were a natural choice for Shapley's research. Globular clusters exist in most other galaxies too. The Hubble Space Telescope was used to detect



approximately thirteen thousand (!) globulars associated with the galactic giant galaxy M87, indicating that globulars will remain an important focus of astronomical research into galactic evolution for years to come.

If you haven't observed M13 yet, get out your binoculars or at least a 3 inch telescope and you'll be able to resolve stars within the cluster, but you'll be able to see hundreds of stars and details of its structure using an eight inch telescope at about two hundred power. More details become visible as you add aperture so this cluster never gets boring. M13 is located one third of the way between the stars Eta and Zeta Hercules on an imaginary line connecting them. Through the eyepiece, stars will fill the field of view from edge to edge. Use fairly low power to see the overall structure of the cluster and then switch to much higher power to peer deeper into the depths of the globular, to see dust lanes and the tendrils of star chains. The view is worth the work of finding M13 and adding it to your 'star party favorites' list. It's 25,100 light-years away and contains between hundreds of thousands to one million stars. One estimate put the age of M13 between 12 and 14 billion years old, making it certainly one of the oldest objects in our galaxy.

For M13's part in galactic history, perhaps none is more interesting and unusual than the fact that in 1974 it was selected as the target for one of Earth's first intentional radio messages to be beamed to the stars. The message was designed as a 'First Contact' message to possible extraterrestrial intelligent races and sent by SETI using the Arecibo Observatory. The message will take about 25,100 years

to reach the cluster, so that an answer cannot be expected for over fifty thousand years. You can relax, there's still time to go out and observe M13 through your telescope while you're waiting!

As you gaze upon the galactic jewels in the globular cluster M13 and are imagining the view from a planet orbiting a star nestled within, also try to imagine what possible creatures living there might think upon receiving this message in another 25,065 years. Hopefully our species will be around to get the answer.

*Other Globular Clusters to observe in Hercules:*

**M92:**

Located about 6° North of Pi (π) Herculis  
 Magnitude: 7.5 / Angular Size: 36 arcminutes

**NGC 6229:**

Located about 8.5° North of Eta (η) Herculis  
 Magnitude: 9.4 / Angular Size: 3.8 arcminutes

*References:*

*The Munich Astro Archive:*

<http://www.maa.clell.de/Messier/E/m013.html>

*SETI Institute:*

<http://www.seti.org/Page.aspx?pid=1241>

*Tom Koonce is a member of the Antelope Valley Astronomy Club in Lancaster, California.*



# Scoring More Energy from Less Sunlight

For spacecraft, power is everything. Without electrical power, satellites and robotic probes might as well be chunks of cold rock tumbling through space. Hundreds to millions of miles from the nearest power outlet, these spacecraft must somehow eke enough power from ambient sunlight to stay alive.

That's no problem for large satellites that can carry immense solar panels and heavy batteries. But in recent years, NASA has been developing technologies for much smaller microsatellites, which are lighter and far less expensive to launch. Often less than 10 feet across, these small spacecraft have little room to spare for solar panels or batteries, yet must still somehow power their onboard computers, scientific instruments, and navigation and communication systems.

Space Technology 5 was a mission that proved, among other technologies, new concepts of power generation and storage for spacecraft.

"We tested high efficiency solar cells on ST-5 that produce almost 60 percent more power than typical solar cells. We also tested batteries that hold three times the energy of standard spacecraft batteries of the same size," says Christopher Stevens, manager of NASA's New Millennium Program. This program flight tests cutting-edge spacecraft technologies so that they can be used safely on mission-critical satellites and probes.

"This more efficient power supply allows you to build a science-grade spacecraft on a miniature scale," Stevens says.

Solar cells typically used on satellites can convert only about



**Helen Johnson, a spacecraft technician at NASA's Goddard Space Flight Center, works on one of the three tiny Space Technology 5 spacecraft in preparation for its technology validation mission.**



18 percent of the available energy in sunlight into electrical current. ST-5 tested experimental cells that capture up to 29 percent of this solar energy. These new solar cells, developed in collaboration with the Air Force Research Laboratory in Ohio, performed flawlessly on ST-5, and they've already been swooped up and used on NASA's svelte MESSENGER probe, which will make a flyby of Mercury later this year.

Like modern laptop batteries, the high-capacity batteries on ST-5 use lithium-ion technology. As a string of exploding laptop batteries in recent years shows, fire safety can be an issue with this battery type.

"The challenge was to take these batteries and put in a power management circuit that protects against internal overcharge," Stevens explains. So NASA contracted with ABSL Power Solutions to develop spacecraft batteries with design control circuits to prevent power spikes that can lead to fires. "It worked like a charm."

Now that ST-5 has demonstrated the safety of this battery design, it is flying on NASA's THEMIS mission (for Time History of Events and Macroscale Interactions during Substorms) and is slated to fly aboard the Lunar Reconnaissance Orbiter and the Solar Dynamics Observatory, both of which are scheduled to launch later this year.

Thanks to ST-5, a little sunlight can go a really long way.

Find out about other advanced technologies validated in space and now being used on new missions of exploration at:

<http://nmp.nasa.gov/TECHNOLOGY/scorecard/>

Kids can calculate out how old they would be before having to replace lithium-ion batteries in a handheld game at:

[http://spaceplace.nasa.gov/en/kids/st5\\_bats.shtml](http://spaceplace.nasa.gov/en/kids/st5_bats.shtml)

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*

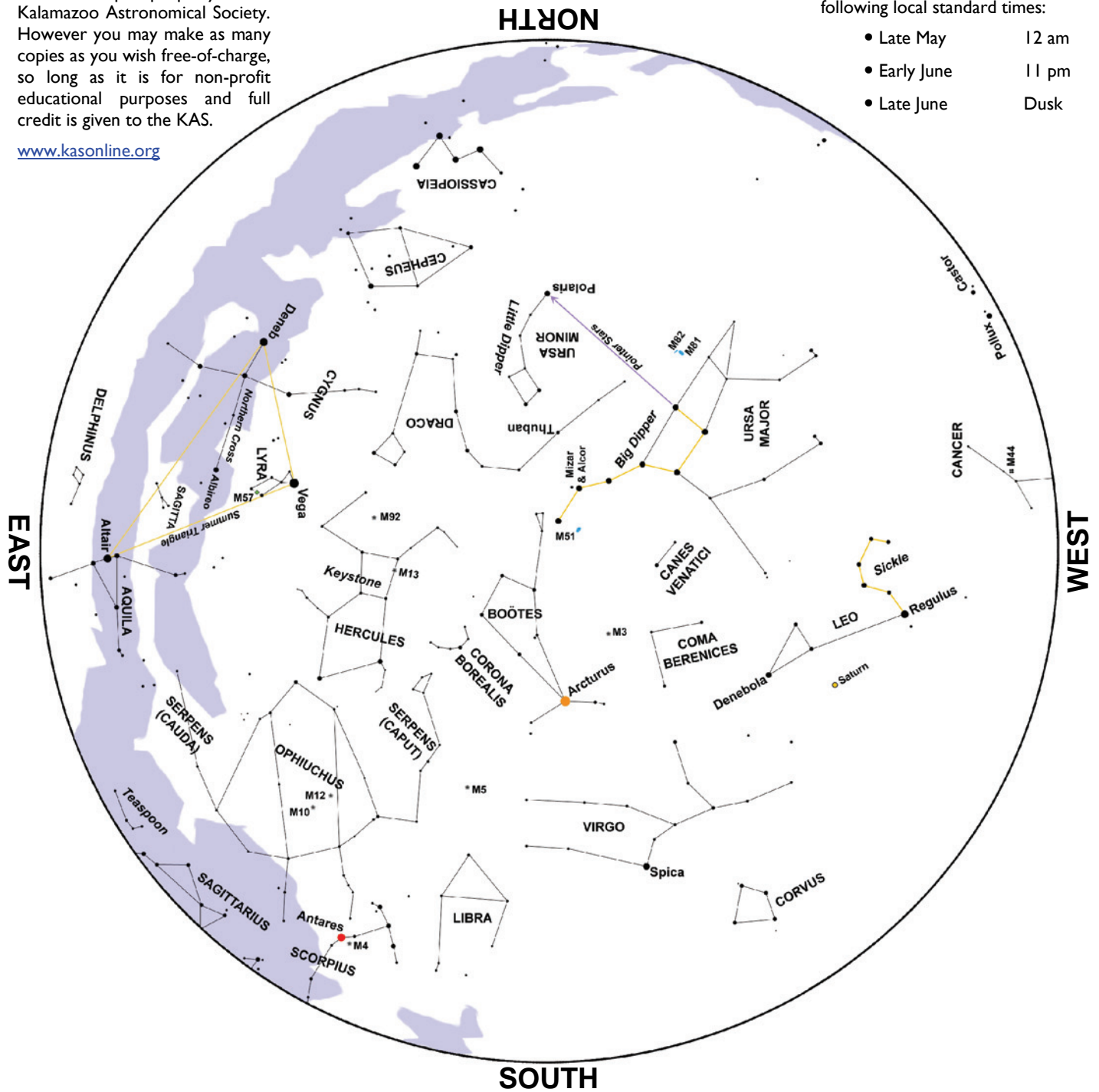
# June Night Sky.....

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](http://www.kasonline.org)

This map represents the sky at the following local standard times:

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



**A**ntares will be occulted (covered up) by the Waxing Gibbous Moon (one day away from full) on June 6<sup>th</sup>. The cosmic cover-up begins at about 10:20 pm EDT. Antares will dramatically reappear at about 11:16 pm. Should be a great show through a

pair of steadily mounted binoculars or a telescope.

The shadows of Io and Ganymede will be visible together on Jupiter's stripped disk from 4:06 - 6:16 am EDT on June 9<sup>th</sup>. The Great Red Spot comes into view

shortly thereafter. Neptune is visible less than 1° to the northwest as well.

Early morning risers will be treated to a conjunction of Venus, Mars, and the Waning Crescent Moon on June 19<sup>th</sup>. Venus and Mars are only 2° apart

## KAS OFFICERS

### PRESIDENT

Jack Price  
343-3193  
[ka8aob@hotmail.com](mailto:ka8aob@hotmail.com)

### VICE PRESIDENT

Mike Sinclair  
373-7003  
[dragonphysics@yahoo.com](mailto:dragonphysics@yahoo.com)

### TREASURER

Rich Mather  
629-5312  
[rlm511@yahoo.com](mailto:rlm511@yahoo.com)

### SECRETARY/ALCOR

Roger Williams  
375-4867  
[ngcphile@sbcglobal.net](mailto:ngcphile@sbcglobal.net)

### MEMBERS-AT-LARGE

Richard S. Bell  
373-8942  
[richard.s.bell@gmail.com](mailto:richard.s.bell@gmail.com)

Jean DeMott

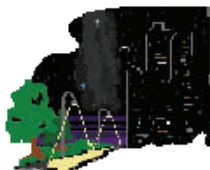
381-1406  
[jeamott@hotmail.com](mailto:jeamott@hotmail.com)

Dick Gillespie

966-9653  
[rwgillespie@comcast.net](mailto:rwgillespie@comcast.net)

Dave Woolf

762-8268  
[go4itbass@gmail.com](mailto:go4itbass@gmail.com)



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# Follow the **KAS** on **twitter**

Read about the latest news and activities of the Kalamazoo Astronomical Society. Stay informed about upcoming events in the night sky.

*All this and more in 140 characters or less!*

<http://twitter.com/kzooastro/>

## **Kalamazoo Valley Museum** *Planetarium Show Schedule*

*Where in the Solar System is Carmen Sandiego*  
Saturdays, 11:00 am; Sundays, 1:30 pm

*Constellation Tonight*  
Wednesdays 3:00 pm; Saturdays, 2:00 pm

*Big*  
Saturdays & Sundays, 3:00 pm



Planetarium admission is \$3.00 per person. The Kalamazoo Valley Museum is located at 230 North Rose Street in downtown Kalamazoo. For more information please call (269) 373-7990 or visit us on the web at [www.kalamazoomuseum.org](http://www.kalamazoomuseum.org)

☆☆ **GET OUT & OBSERVE!** ☆☆

## **JUNE STARGAZING DATES**

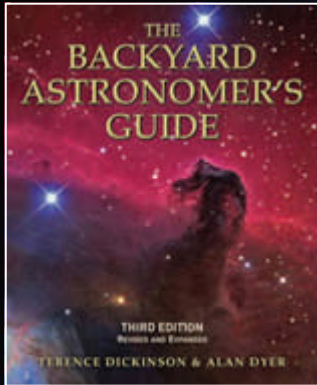
Kalamazoo Nature Center • 7000 N. Westnedge Ave.

**Saturday, June 13 @ 9:00 pm**  
*Grand Globular Clusters*

**Saturday, June 27 @ 9:00 pm**  
*Super Summer Nebulae*

with the **Kalamazoo Astronomical Society**





**\$49.95**



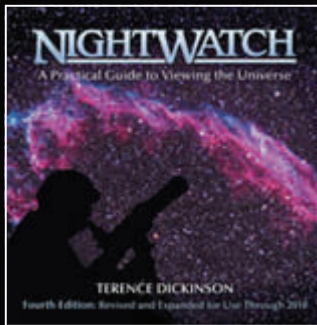
**SkySHOP**



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**NightStar CS Flashlight  
\$21.00**



**\$35.00**

**Miller Planisphere  
\$13.00**



**More available at: <http://skyshop.kasonline.org/>**

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

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