Highlights of the June Sky. . .

- - - 1st - - -
PM: Saturn is near the Moon.

- - - 2nd - - -
Full Moon
12:19 pm EDT

- - - 9th - - -
Last Quarter Moon
11:42 am EDT

- - - 13th - - -
DUSK: Venus and Jupiter are 10° apart. The Beehive Cluster (M44) is below Venus.

- - - 16th - - -
New Moon
10:05 am EDT

- - - 19th - - -
PM: A thin crescent Moon is below Venus and Jupiter.

- - - 21st - - -
Summer solstice occurs at 12:38 pm EDT. Longest day of the year in the Northern Hemisphere.

PM: A waxing crescent Moon is about 5° left of Regulus, with Jupiter and Venus to the lower right.

- - - 24th - - -
First Quarter Moon
7:02 am EDT

- - - 25th - - -
PM: Spica is about 4° southeast of the First Quarter Moon.

- - - 27th - - -
DUSK: Venus is less than 2° from Jupiter for the next week.

- - - 28th - - -
DUSK: Saturn is ~2° from a Waxing Gibbous Moon.

- - - 30th - - -
DUSK: Venus and Jupiter are only ⅓° apart.

Prime Focus

A Publication of the Kalamazoo Astronomical Society

☆ ☆ ☆ June 2015 ☆ ☆ ☆

This Months KAS Events

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

Kalamazoo Nature Center - See Page 10 for Details

Observing Session: Saturday, June 13 @ 9:30 pm

Venus, Jupiter, Saturn & Globular Clusters - Kalamazoo Nature Center

Training Session: Friday, June 26 @ 9:30 pm

Owl Observatory - Kalamazoo Nature Center - See Page 9 for Details

Observing Session: Saturday, June 27 @ 9:30 pm

The Moon, Venus, Jupiter & Saturn - Kalamazoo Nature Center

Inside the Newsletter. . .

May Meeting Minutes

The general meeting of the Kalamazoo Astronomical Society was brought to order by President Richard Bell on Friday, May 1, 2015 at 7:12 pm. Approximately 46 members and guests were in attendance at the Kalamazoo Area Math & Science Center (KAMSC).

Dr. Edwin Loh, a professor in the Physics and Astronomy Department at Michigan State University, was the guest speaker for the evening. The title of his first presentation for the KAS was *In a Trillion Years*. Dr. Loh featured many images from our KAS Member Astrophotography Gallery throughout his presentation. Dr. Loh opened by saying this talk would have been very different 20 years ago. We had no knowledge of dark energy and its effects on the expansion of the universe.

The most obvious object in the sky is the Sun. In 5 billion years the Sun will end its 10 billion year lifetime by expanding into a red giant star. It'll definitely swallow up the planets Mercury and Venus, and perhaps Earth itself. The red giant sun will gradually expel its outer layers into space and, perhaps, form a planetary nebula (this scenario is currently being debated amongst astronomers). The core of the Sun will collapse into a white dwarf, a dense ball of carbon and oxygen ions and degenerate electrons about the size of Earth. White dwarfs need up to 10^{15} years to radiate their remaining heat through their small surface areas. So, in a trillion years, the white dwarf sun will have cooled off significantly, but not completely. Once the Sun is gone it'll be near impossible to see other objects in the solar system. With the exception of the Sun, everything else (i.e. planets, moons, and comets) are seen in visual wavelengths by reflected sunlight.

Dr. Loh then talked about the fate of his favorite object, the Crab Nebula (M1) in Taurus. (Dr. Loh has spent many years researching the Crab Nebula.) The Crab Nebula formed after a massive star went supernova. Its light reached Earth on July 4, 1054 and was recorded by Chinese astronomers and Native Americans. The center of the Crab Nebula contains a pulsar, a rapidly spinning neutron star. Neutron stars are about the size of a city, but contain the mass of the Sun! The Crab Nebula expands outward at about 1,500 km/s (930 mi/s). Dr. Loh said the Crab Nebula will fade away in only a few thousand years. Its material will eventually intermingle with gas in the interstellar medium, where it may be recycled in a new generation of stars and planets.

Dr. Edwin Loh, Professor of Astronomy at Michigan State University, presented *In a Trillion Years* on May 1st at KAMSC.

Dr. Loh showed images of the Orion Nebula (M42), where gas and dust have currently gathered and formed many new stars. Emission nebulae like M42 will not exist in a trillion years. Most of our galaxy's gas and dust will be used up by then, so star formation will have ended. Most of these recycled stars (and even those formed from Crab Nebula material) will have lived out their lives in a trillion years. In fact, only the faintest, lowest mass stars will be around in a trillion years. Our galaxy will gradually grow very dark.

Dr. Loh then turned to nearby galaxies like the Large Magellanic Cloud (LMC), which currently orbits the Milky Way, the Triangulum Galaxy (M33), and the Andromeda Galaxy (M31). These galaxies, and the Milky Way, are part of a minor cluster of galaxies called the Local Group. These galaxies will suffer the same faint as the Milky Way. Star formation will gradually end in other galaxies as well, although the LMC may eventually merge with the Milky Way. The Milky Way and Andromeda will collide and merge as well in about 3 billion years.

More distant, but still relatively nearby, is the Whirlpool Galaxy (M51). Much more distant are the galaxies in the original Hubble Deep Field image. None of these galaxies are gravitationally bound to the Milky Way, so they are moving away from us due to the expansion of space. Dark energy, a mysterious force acting like anti-gravity, is causing this expansion to accelerate. In a trillion years galaxies not bound (or merged) with the Milky Way will have moved so far away that they will no longer be visible. However, dark energy will not affect gravitationally bound objects like planets and galaxies.

Another special "unboxing" ceremony was held after the snack break. Richard Bell and Mike Sinclair unpacked several accessories for the Robotic Telescope Project. The first was an SBIG STF-8300 Color CCD camera, which will be equipped with a camera lens and used for wide-field imaging. Next was a Starlight Express Lodestar X2 autoguider, followed by an Astrodon MonsterMOAG Off-Axis Guider. The rest of the items were Astrodon imaging

filters to be used with the SBIG STX-16803 CCD camera (currently on backorder). First was the LRGB E-Series CCD Filter set (LRGB = luminance (clear), red, green, and blue). The rest were Hydrogen-Alpha (H-α), Oxygen III (OIII), and Sulfur II (SII) Tru-Balance narrowband filters.

Richard then gave his President's Report. Now that May is here it's time to go out and observe! Richard encouraged all members to complete one or more of the Astronomical League Observing Programs. There are programs for all levels and many of them only require your eyes or a pair of binoculars. You'll receive a pin and certificate for each program you complete. Richard also reminded members that we have three Telescopes for Loan. They are all very portable and easy to use. We also have the Meade 12" Schmidt-Cassegrain in Owl Observatory available for use (it is once again operational). Members interested in gaining access to the observatory for private use should contact Richard (a training session is scheduled for June 26th - see page 9 for details).

Richard also mentioned some astronomically themed trips being planned for the summer. The first is a field trip to the historic Yerkes Observatory, which contains the world's largest refracting telescope (40-inches). That is currently planned for Saturday, July 18th and we're polling the membership on interest in a single-day trip or an overnight trip with a stop at Adler Planetarium in Chicago on the way home on Sunday. Richard is also hoping to travel to Pennsylvania and stay at Cherry Springs State Park from August 13th - 16th. This will not be an "official" KAS activity, but he's encouraging members to join him for some dark sky observing and imaging.

Don Stilwell was the only member to share an observing report. He observed the Sun in hydrogen-alpha after the Rock & Mineral Show earlier in the day. The MESSENGER spacecraft impacted Mercury's surface on April 30th after a very successful mission. *New Horizons* may have discovered polar caps while en route to Pluto. The meeting concluded at 9:08 pm after covering upcoming events.

Mike Sinclair holds up the SBIG STF-8300 Color CCD camera, while Richard Bell looks on.

BOARD Meeting Minutes

The KAS monthly board meeting was held on May 17, 2015 at Sunnyside Church. The meeting was called to order by President Richard Bell at 5:10 pm. Members present were Mike Cook, Scott Macfarlane, Rich Mather, Jack Price, Don Stilwell, and Roger Williams. Richard began with a summary of events planned for May to September.

In the Robotic Telescope Project update, Richard reported that we were still awaiting word on a pending grant application, but that otherwise there was nothing new to report. In any event, the plan was to order the telescope in mid-June. One camera was already in hand, and delivery was expected soon for the other. Richard alerted the Board that the May *Sky & Telescope* magazine had a very relevant article about managing the use of an instrument available online to a group.

On the subject of other follow-up items, Richard said that maintenance on Owl Observatory was still badly needed, and he suggested an early arrival (7pm) at the observing session on May 23rd, to decide on what should be done. Regarding the proposed field trip to Yerkes Observatory, the last poll of members gave an even split between those preferring a one-day trip and those who would rather stay overnight and visit Adler Planetarium on the way back. Richard agreed to send another e-mail asking for responders to contact Don with their preferences.

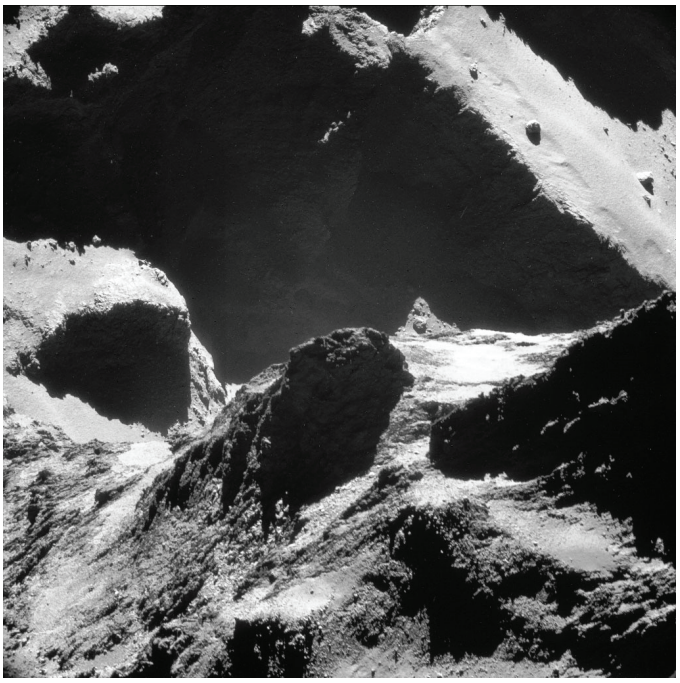
In the category of New Business, details of the Perseid Potluck Picnic on August 8th were discussed. Don agreed to run the grill unless his schedule interferes. Richard said that he would buy the food. The Air Zoo has requested solar observing at noon on June 23rd (cloud date June 24th). The Kindleberger Park Festival will be on July 11th, 9 am – 3 pm. Jack said that we haven't been officially invited yet, but there was little reason to think we would not be wanted. He agreed to verify with the Festival. Finally, Pierce Cedar Creek has requested night sky viewing on August 28th, 8:30 – 11 pm. Those who attended this last year found it to be worthwhile.

The Treasurer's report was presented by Rich. Most questions related to expenditures for the Robotic Telescope Project and the anticipated cash flow. The question of insurance for the equipment was also raised, and it was suggested that we look for possible sources of group rates that might be more favorable. With acceptance of the report, the meeting was adjourned at 5:40 pm. The next meeting was set for Sunday, September 13th, same time and place, with the expectation that business during the summer months would be carried out in committee meetings.

Observations

by **Richard S. Bell**

The June General Meeting is one of those "can't miss" meetings of the year. Dr. Andre Bieler will be our special guest speaker and he'll give an overview of the Rosetta spacecraft's mission at the comet 67P/Churyumov-Gerasimenko. Dr. Bieler is a research fellow in the Department of Atmospheric, Oceanic and Space Science at the University of Michigan and currently works on data analysis for one of the Rosetta's science instruments. Rosetta became the first probe to ever orbit a comet on September 10, 2014. The mission has been a science bonanza and has also produced many stunning images. Take this one for example:



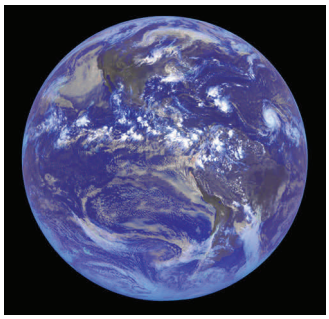
Rosetta snapped that remarkable image on October 19, 2014 when it was a mere 7.9 kilometers (4.9 miles) above the comet's surface. I'm sure Dr. Bieler will also discuss Rosetta's former passenger, the robotic lander *Philae*, which touched down on 67P on November 12, 2014. Be sure to join us on Friday, June 5th at 7:00 pm to learn more about this ground-breaking mission. Please note that the meeting is being held at the Kalamazoo Nature Center.

As noted on page 9, an Owl Observatory Training Session is scheduled for June 26th. Speaking of the observatory, a much-needed maintenance session is being planned for June 13th at 2:00 pm. We'll be replacing some damaged wood, re-staining the entire building, and cleaning the inside. Please let me know if you're interested in lending a helping hand!

The "G" in GOES is What Makes it Go

by **Dr. Ethan Siegel**

Going up into space is the best way to view the universe, eliminating all the distortionary effects of weather, clouds, temperature variations and the atmosphere's airflow all in one swoop. It's also the best way, so long as you're up at high enough altitudes, to view an entire 50% of Earth all at once. And if you place your observatory at just the right location, you can observe the same hemisphere of Earth continuously, tracking the changes and behavior of our atmosphere for many years.



The trick, believe it or not, was worked out by Kepler some 400 years ago! The same scientist who discovered that planets orbit the Sun in ellipses also figured out the relationship between how distant an object needs to be from a much more massive one in order to have a certain orbital period. All you need to know is the period and distance of one satellite for any given body, and you can figure out the necessary distance to have any desired period. Luckily for us, planet Earth has a natural satellite - the Moon - and just from that information, we can figure out how distant an artificial satellite would need to be to have an orbital period that exactly matches the length of a day and the rotational speed of Earth. For our world, that means an orbital distance of 42,164 km (26,199 miles) from Earth's center, or 35,786 km (22,236 miles) above mean sea level.

We call that orbit geosynchronous or geostationary, meaning that a satellite at that distance always remains above the exact same location on our world. Other effects - like solar wind, radiation pressure and the Moon - require onboard thrusters to maintain the satellite's precisely desired position above any given point on Earth's surface. While geostationary satellites have been in use since 1963, it was only in 1974 that the Synchronous Meteorological Satellite (SMS) program began to monitor Earth's weather with them, growing into the Geostationary Operational Environmental Satellite (GOES) program the next year. For 40 years now, GOES satellites have monitored Earth's weather continuously, with a total of 16 satellites having been launched as part of the program. To the delight of NASA (and Ghostbusters) fans everywhere, GOES-R series will launch in 2016, with thrice the spectral information, four times the spatial resolution and five times the coverage speed of its predecessors, with many other improved capabilities. Yet it's the simplicity of gravity and the geostationary "G" in GOES that gives us the power to observe our hemisphere all at once, continuously, and for as long as we like!

Astronomy Day 2015 Report

by Richard S. Bell

On Saturday, April 25, 2015 the Kalamazoo Astronomical Society (KAS) held its annual award-winning Astronomy Day, a day-long celebration featuring educational displays, hands-on activities, and special presentations to bring science alive for the entire community. The theme of this year's outreach extravaganza was "Small Worlds & the Hubble Space Telescope."

Astronomy Day 2015 was the third time both Hubble and Pluto have been featured. "Pluto & the Kuiper Belt" was the theme for Astronomy Day 2006. That was the year *New Horizons* began its long journey to Pluto. That was also when Mike Sinclair and I had the "Great Pluto Debate." Mike argued for Pluto to regain its planetary status and I argued against. Naturally, I won! Astronomy Day 2011 highlighted "Icy Worlds of the Outer Solar System." Dr. Mike Brown, discover of Eris, was our keynote speaker. This year we celebrated the impending flyby of Pluto and its moons by the *New Horizons* spacecraft.

Hubble was featured for the first time at Astronomy Day 2007. That year's theme was "NASA's Great Observatories" (Hubble, Spitzer, and Chandra). Astronomy Day 2010 celebrated the 20th anniversary of Hubble's launch into orbit and featured retired astronaut Story Musgrave. Hubble may have been launched on April 24, 1990, but it became a space telescope on April 25th when it was deployed into Earth orbit. Astronomy Day 2015 took place on the 25th anniversary of this momentous event.

The Portage District Library hosted our daytime activities from 11am – 4pm. Skies were overcast almost the entire day

These young astronomers (and NASA fans) built their own Hubble Space Telescope models.

Jim Kurtz talks about the virtues of the reflecting telescope at the "Meet the Telescopes" display.

and the high temperature was only 51º F. Cloudy skies made solar observing impossible, but poor conditions outside helped drive up attendance inside. The library doesn't keep track of daily visitors, but they did comment that attendance was way up compared to a usual Saturday. My estimate is that 500 people attended this year's Astronomy Day.

When visitors first entered the library the first thing they saw were a series of astronaut boot prints. This was an idea my co-coordinator, **Jean DeMott**, had after last year's Astronomy Day. Her hope was that the boot prints would get regular library patrons curious and follow them downstairs and at least check out our displays. Special thanks to **Dave Garten** for helping me get the boot prints laid out in the morning.

The boot prints first led visitors to our greeting table. KAS Vice President **Jack Price** and **Mike Sinclair** answered questions and passed out KAS literature to the public during the first shift. Jack filled in for Jean, since she was frantically trying to finish prepping the Hubble model hands-on activity. **Beverly Byle** worked with Jack at the greeting table during the second shift.

Continuing to follow the boot prints led you downstairs. You would have then encountered the first of our new astronaut cardboard cutouts. The first was of Eugene Cernan on the lunar surface during the Apollo 17 mission. Just past that was our Ask the Astronomer booth. Our resident professional astronomer, **Dr. Kirk Korista**, answered any and all astronomically themed questions for the bargain price of a nickel (or not) from 12pm – 2pm. **Mike Sinclair** then

What does Pluto look like? These young astronomers speculated with our Paint-A-Pluto activity.

took his turn at the booth from 2pm – 4pm. Mike again claimed to earn the most money during his shift! One eager youth, who wanted to become a professional astronomer, asked Mike many good questions. She even said she wanted an "I love Uranus" T-shirt!

Our hands-on activity area, located in the library's Long Lake Room, was the next stop on the astronaut boot print trail. Hands-on activities were *very* popular this year; in fact they were too popular as I'll mention shortly. The first activity was "Paint-A-Pluto." This was the last chance to let kids use their imagination on Pluto's appearance. We'll finally know the answer in July when *New Horizons* performs its close-up flyby. Kids painted 4-inch polystyrene balls with acrylic paint and came up with some very clever ideas. **Joe & Patti Borrello** volunteered at the Paint-A-Pluto table during the first shift. **Don Stilwell** and **Stephanie Stratton** helped young astronomers paint the popular "dwarf planet" during the second shift.

The "Fan Comet" is one of our most popular hands-on activities and it returned for Astronomy Day 2015. Kids attached a streamer tail to a 1-inch Styrofoam ball and hooked it to a fan. The whole thing then sails in the breeze! It helps demonstrate that the solar wind (and pressure from sunlight) always force comet tails to point away from the Sun. **Angela Newton** and **Dennis Stuart** helped youngsters assemble Fan Comets during the first shift. They were relieved by **Bob & Barb Havira** during the second shift.

Another Astronomy Day favorite making a return this year was our "Build a Model of the Hubble Space Telescope" activity. The models have become more elaborate to prepare over time and **Jean DeMott** (with the assistance of several other volunteers) were scrambling to get the final pieces prepped well after Astronomy Day began. **Rich Mather** and **John Miller** worked at the "Hubble production line" during the first shift. **Joe Comiskey** and **Scott Macfarlane** helped kids assemble Hubble models during the second shift. And thanks to those few members that saved 8-ounce tomato sauce cans. Who knows, maybe Hubble models will return during Hubble's 30th anniversary. Please start saving your tomato sauce cans now!

As I mentioned earlier, hands-on activities were very popular this year. In fact, they were so popular we ran out of materials by 3:00 pm at all three tables! We've never run out of hands-on activities in the history of Astronomy Day and this year we ran out of all three! The Fan Comets were gone by about 2:15pm and this was quickly followed by the Hubble models. The polystyrene balls for the Pluto activity were the last to go at 3:00 pm. Jean and I felt bad about this, but we did the best we could. I selected three of the most difficult hands-on activities to prepare. We had about 100 of each activity, but it became clear early on in the first shift that we were going to run out.

Last stop on the boot print trail was at the library's Sugar Loaf Lake Room. This was where our displays and Freebie Table was located. However, the first thing you saw when you entered the room was our second astronaut cardboard cutout. This one was of John W. Young saluting on the lunar surface during the Apollo 16 mission. Our astronaut cutouts became very popular photo opportunities, so they'll probably become Astronomy Day regulars.

Two regular Astronomy Day displays returned this year. The first was the "KAS Member Astrophotography" display, but it was completely redesigned. The display still included the best images from **Richard Bell**, **Jim Kurtz**, **Bill Nigg**, and **Roger Williams** but now included pictures from **Mike Cook** and **Dave Garten**. Our "Meet the Telescopes" display is also an Astronomy Day standard. **Jack Price** supplied an 80mm refractor and **Joe Comiskey** brought his 10-inch Dobsonian to serve as an example of a reflecting telescope. **Rich Mather** provided his Celestron 8-inch Schmidt-Cassegrain again this year. Thanks to the cloudy weather we had ample volunteers at the telescope display. **Dave Garten**, **Jim Kurtz**, **Scott Macfarlane**, and **Don Stilwell** all answer telescope questions throughout the day.

Mike Sinclair answered many excellent questions from this future astronomer at the Ask the Astronomer booth. She wanted a "I love Uranus" T-shirt!

The other two displays were also used in the past, but worked perfectly with this year's theme. First was the slightly updated "Icy Worlds of the Outer Solar System" display, with an emphasis on the *New Horizons* mission. Next was the "Hubble Space Telescope" display, which has been used at two other Astronomy Day events and multiple other outreach activities.

Items from our popular Freebie Table were supplied by NASA's Goddard Space Flight Center, NASA Space Place, the *New Horizons* mission, Space Telescope Science Institute, Jet Propulsion Laboratory, and *Astronomy* magazine. Visitors didn't have to worry about carrying all their free (or hands-on) materials thanks to the plastic bags generously donated by Meijer last year. **Bill Van Dien** (another solar observing refugee) volunteered at the Freebie Table the entire day. He was later joined by **Frank Severance**.

Astronomy Day Theater was the last of the activities held at the Portage District Library this year. It featured two special documentaries. *Saving Hubble*, an independent film by David Gaynes, was shown at 12:00 pm. It examines NASA's decision in 2004 to cancel the fifth and final servicing mission to the famed Hubble Space Telescope and introduced viewers to the people who united to save it. *Passport to Pluto & Beyond* was shown at 2:00 pm. This documentary told the story of Clyde Tombaugh's discovery of Pluto in 1930, and the decades-long development of NASA's *New Horizons* mission. In case you missed them, both those links will allow you to watch both films in their entirety.

Frankly, Astronomy Day Theater is what surprised me the most this year, because it was so well attended. I expected only about a dozen people would attend each showing. Both *Saving Hubble* and *Passport to Pluto* drew over 40 attendees! We had 40 chairs setup and had to get more out for each showing. We ran out of soft drinks and popcorn after *Saving Hubble*, so I had to run to Gordon Foods to buy more! Guess that's what happens when the weather outside is dreary! Special thanks to **Dave Garten** for helping me make up bags of popcorn.

Dennis Stuart helps this young astronomer assemble a Fan Comet.

Dr. Frank Summers, from the Space Telescope Science Institute, was the Astronomy Day 2015 Keynote Speaker.

Our keynote presentation began at the Kalamazoo Nature Center at 7:00 pm. **Jean DeMott** and **Tony Gurczynski** greeted visitors and passed out Hubble pictures courtesy of the Space Telescope Science Institute (STSci). This year's keynote speaker was **Dr. Frank Summers**, an outreach astrophysicist from STSci. For the last 14 years, he has contributed to all aspects of the Hubble and James Webb Space Telescope press, education, and outreach through news media, websites, educational programs, social media, museums and planetariums. The title of Dr. Summer's keynote presentation was *25 Years of the Hubble Space Telescope*. An earlier version of his talk is available on YouTube in case you missed it. About 85 people were in attendance in the Nature Center's Cooper's Glen Auditorium. All of our Astronomy Day Keynote Presentations have been excellent, but more people than usual made an effort to tell me how much they enjoyed Dr. Summers' talk.

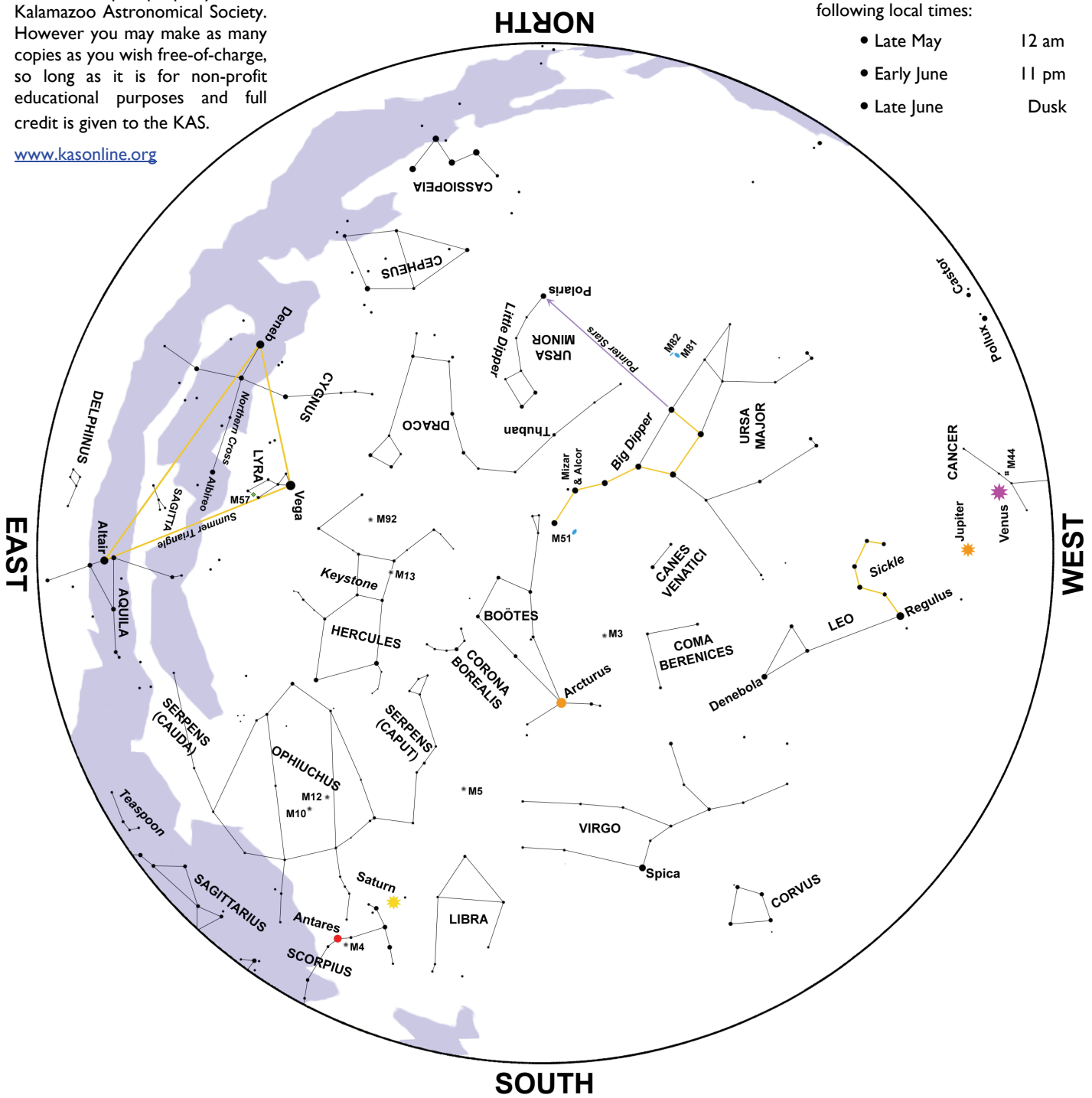
I canceled the Public Observing session earlier I the day, but peaked outside after the keynote presentation. The First Quarter Moon was near Jupiter, but clouds were all around. It was completely overcast by the time we packed up and headed outside. It did clear up around midnight, but by then it was too late. Nobody would have waited around that long; not to mention no one brought a telescope!

Astronomy Day 2015 was a big success. Attendance was significantly higher than last year's event. I wonder if we should consider holding Astronomy Day earlier in the year. This would lessen the chances of solar and night observing, but it would increase indoor attendance. Astronomy Day 2017's theme will definitely be eclipses, since that's the year of the Great American Eclipse. I'm not sure about a theme for Astronomy Day 2016. Please let me know if you have any ideas. Thanks again to all our volunteers and to those that attended Astronomy Day 2015.

June Night Sky.....

This map represents the sky at the following local times:

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



Observing in June is all about Venus and Jupiter. The two brightest planets in the night sky draw closer together in the west as the month progresses. During the evening of June 13th, the two worlds will appear 10º apart. The Beehive Cluster (M44) in Cancer appears less than 1º below Venus - making for a lovely sight in binoculars. A thin waxing crescent Moon glides below Venus and Jupiter (now about 6º apart) on June 19th.

The summer solstice occurs at 12:38 pm EDT on June 21st. On that night, the Moon will be about 5º left of Regulus, with Venus and Jupiter to the lower right.

Starting June 27th, Venus and Jupiter will appear less than 2º apart for a week. They'll be closest — only ⅓º — on June 30th. Both planets, including Jupiter's four Galilean moons, will fit in the same field-of-view of most amateur telescopes.

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 25th**. Please read the User's Manual on the Owl Observatory web page before attending the session.

Friday, June 26th @ 9:30 pm

Public Observing Sessions

Saturday, June 13th
Feature: Venus, Jupiter & Saturn

Saturday, June 27th
Feature: The Moon, Venus, Jupiter & Saturn

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

Kalamazoo Nature Center • 7000 N. Westnedge Ave.

General Meeting Preview

THE ROSETTA MISSION

Chasing a Comet through the Solar System

presented by **Dr. Andre Bieler**

The European Space Agency's Rosetta mission launched in 2004 and finally arrived at comet 67P/Churyumov-Gerasimenko last August. The journey included flybys of Earth and Mars, two close encounters with asteroids and an over 1 year-long hibernation phase where the spacecraft was basically shut down completely. The biggest surprises came from the comet itself though, starting with its strange shape, unusual outgassing properties, and relatively high temperature, to name just a few. In this talk Dr. Bieler, from the University of Michigan, will give a broad overview of the Rosetta mission and comets in general, then talk about the latest findings of this exciting project.

Friday, June 5 @ 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