

Highlights of the April Sky...

... 2nd ...
First Quarter Moon

... 6th ...
PM: Waxing Gibbous Moon
5° to 7° right of Saturn.

... 9th ...
Full Moon

... 13th ...
Dawn: Moon near Antares.

... 16th ...
Dusk: Mercury at least 10°
above western horizon a
half hour after sunset. It's
visible until the 24th.

... 17th ...
Last Quarter Moon

... 19th ...
Dawn: Waning Crescent
Moon 1° to 3° to upper
right of Jupiter.

... 22nd ...
AM: Lyrid meteor shower
peaks between 1 - 4 am.

Dawn: Waxing Crescent
Moon only 1.5° to upper
right of Venus. Occultation
begins in broad daylight at
about 8:45 am EDT.

... 24th ...
New Moon

... 26th ...
Dawn: The 5th magnitude
star 44 Capricorni is seen
between Jupiter and its
moon Ganymede. You'll
need a telescope.

Dusk: The Pleiades (M45)
is between Mercury and
the Waxing Crescent
Moon.

... 28th ...
PM: Mercury is less than 2°
from the center of the
Pleiades (M45).

Prime Focus

A Publication of the Kalamazoo Astronomical Society

★ ★ ★ April 2009 ★ ★ ★

This Months KAS Events

100 Hours of Astronomy: April 3 & 4 @ 8 - 10 pm
Kalamazoo Valley Museum & Kingman Museum - See Page 3 for Details

General Meeting: Friday, April 10 @ 7:00 pm
Kalamazoo Area Math & Science Center - See Page 4 for Details

Observing Session: Saturday, April 18 @ 8:00 pm
Saturn & Orion Nebula - Kalamazoo Nature Center

Observing Session: Saturday, April 25 @ 8:00 pm
Saturn & Open Clusters of Auriga - Kalamazoo Nature Center

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March Meeting Minutes



The general meeting of the Kalamazoo Astronomical Society was brought to order by President Jack Price on Friday, March 6, 2009 at 7:12 pm EST. Approximately 60 members and guests were in attendance at the Kalamazoo Area Math & Science Center (KAMSC).

KAMSC teacher and KAS Vice President Mike Sinclair was the featured speaker for the evening. Mike called his latest presentation *An Unwanted Idea: The Short but Provocative History of Black Holes*. We started with Galileo, the Father of Modern Physics. It was he who said scientific questions should be dealt with experimentally and mathematically. Isaac Newton permanently placed science on an analytical base with the publication of his *Principia* in 1687. He also derived the Universal Law of Gravitation, which he admitted to Christiaan Huygens that he wasn't sure *why* gravity behaves the way it does

In the late 1770s, John Michell and Pierre Simon Laplace independently came up with the idea of "dark stars" - stars so massive their escape velocity exceeds the speed-of-light. Mike described the period between the late 18th and early 20th century as "The Great Gulf" and discussed the events leading up to Albert Einstein's Special and General Theories of Relativity, published in 1905 and 1916 respectfully.

Another German physicist, Karl Schwarzschild, calculated the minimum gravitational radius any mass can have in 1916. Any object compressed beyond this Schwarzschild radius will become a black hole. In 1933, Walter Baade and Fritz Zwicky (whom Mike pointed out was insane) theorized that the end result of a supernova would be a neutron star (they weren't discovered until 1967). The Indian astrophysicist, Subrahmanyan Chandrasekhar, calculated the maximum mass a white dwarf can have (1.4 solar masses) in 1935.

Finally, in 1939, J. Robert Oppenheimer, along with the help of Hartland Snyder, was the first to write papers suggesting the existence of what eventually became known as a black holes (credit for the term is often given to John Wheeler, who used it in a lecture in 1967). Mike spent the rest of his talk discussing the physics of black holes and highlighting modern experts in the field. These include Roy Kerr, Roger Penrose, John Archibald Wheeler, Kip Thorne, Stephen Hawking, and Leonard Susskind.

Highlights from the second-half of the meeting included several Comet Lulin observation reports. Roger Williams said he was tracking the record close approach of Ceres. Other members reported seeing the recent conjunction of the Moon and Venus. The biggest current event discussed was the launch of the Kepler Telescope, which will look for transiting earth-mass planets. The meeting ended at 9:37 pm.

Board Meeting Minutes



The KAS Board met on March 8th at Sunnyside Church. President Jack Price called the meeting to order at 5:00 pm. Present were Richard Bell, Jean DeMott, Dick Gillespie, Rich Mather, Dave Woolf, and Roger Williams.

Richard reported that we had almost run out of the yellow brochures that are handed out at public functions. After a motion by Jean and second by Dick, the Board voted to authorize the printing of another 1000 copies. Richard will shop for the best value for the print job.

In upcoming events, the 100 Hours of Astronomy event on April 3rd and 4th (8-10 p.m. both nights) will take place simultaneously at Kalamazoo Valley Museum and Kingman Museum (*see page 3*). Because of the two sites, it was mentioned that the volunteer list may have to be beefed up.

The April general meeting will feature Dr. Fred Adams speaking on "Extrasolar Planets." We hope for a large turnout, and Richard discussed plans for a possible interview of Dr. Adams by Andy Robins, WMUK News Director. The Kalamazoo Nature Center's Free Admission Day is April 18th, and KAS participation will be more limited this year because of the extensive activities planned for Astronomy Day (May 30th). The usual information table will be set up, and weather permitting, solar scopes will be set up in the parking lot. An event planned for Kingman Museum if funding is obtained (tentative date May 8th) will feature a planetarium show, "Two Small Pieces of Glass: The Amazing Telescope." KAS may be invited to help with a star party and telescope workshop, the latter showing the works of a dismantled telescope. Dick reported that he had plenty of components for such a display.

On the subject of Astronomy Day 2009, Richard reported that our first ever grant applications had been submitted, to Kalamazoo Arts Council and to the Irving S. Gilmore Foundation. For publicity, after a motion by Richard and second by Dick, the Board voted to spend \$70 plus shipping for 1000 4" x 6" postcard/fliers. Finally, Richard showed a proof sheet of tickets for Dr. Plait's keynote lecture that we would hand out on Astronomy Day, with the provision that seating will be opened to everyone at 10 minutes before the start.

Rich gave an abbreviated Treasurer's report, which was incomplete because not all of the pending transactions had been entered into his accounting program as yet. The good news was that a number of the pending entries were contributions from members for Astronomy Day 2009 activities.

The meeting was adjourned at 5:50 p.m. The next meeting was set for April 19th, same time and place.



Price Check

by *Jack Price*

In November 2008 NASA and [HubbleSite](#) announced a program to give away some large prints of the galaxy M101 for display to selected museums, planetariums, nature centers, etc. Richard Bell contacted Kara Haas at the Kalamazoo Nature Center to see if she'd like to partner with the KAS and apply. She did and we/they got accepted to participate in the February 2009 Great Observatories Image Unveiling.

On February 21, 2009 the big unveiling took place in the Glen Vista Room at the KNC; where the prints will be on long term display. Kara explained to those present about the program and then Mike Sinclair and I unveiled the prints. Mike gave a short description of each image. There are two prints. One is 2 x 6 feet with three images of M101. One is an infrared image from the Spitzer Space Telescope, a second in visible light from the Hubble Space Telescope, and the third image is from the Chandra X-ray Observatory. The other print measures 2 x 2 feet. It is a combined mosaic of all three images overlaid. Both prints are great.

The KAS had displays about the three space telescopes and some hands-on activities for kids. The KNC provided some light refreshments. It was a good day and I'd like to thank everyone for helping and being present: Kara Haas, Richard Bell, Mike Sinclair, Jean DeMott, Dick & Jackie Gillespie, Rich Mather, Roger and Molly Williams, Jim Kurtz, and Bob & Barb Havira. I hope I didn't miss anyone.



ASTRONOMY DAY 2009 UPDATE

History was made on March 11th when we received a letter from the Irving S Gilmore Foundation stating they approved most of the grant for our keynote speaker. So, it's official. We'll have "The Bad Astronomer" [Phil Plait](#) at our May 30th event! I'd like to thank Molly Williams for all her help on our grant proposal. We're still waiting to hear the fate of our grant to the Arts Council of Greater Kalamazoo. However, we've received over \$1,600 in donations from various KAS members. All I can say is THANK YOU! I'll begin contacting KAS members about volunteering on May 30th very soon, so check your inbox. Most of our program is now set and can be viewed on our special AD2K9 website:

<http://astroday.kasonline.org/>

-Richard Bell



3rd - 4th April | 8 - 10 pm

Kalamazoo Valley Museum | Kingman Museum

The [100 Hours of Astronomy](#) Cornerstone Project is a world-wide event consisting of a wide range of public outreach activities, live science center, research observatory webcasts and sidewalk astronomy events. One of the key goals of 100 Hours of Astronomy is to have as many people as possible look through a telescope as Galileo did for the first time 400 years ago.

100 Hours of Astronomy will take place from 2-5 April when the Moon goes from first quarter to gibbous, good phases for early evening observing. Saturn will be the other highlight of early evening observing events.

The KAS will co-sponsor simultaneous 100HA events with the [Kalamazoo Valley Museum](#) and [Kingman Museum](#) of Battle Creek on both Friday, April 3rd and Saturday, April 4th from 8 - 10 pm. Volunteers are needed to setup telescopes on one or both days. If you'd like to help please send an e-mail to kas@kasonline.org. Make sure you specify what location and day(s) you would like to volunteer.

In addition to observing, both museums will offer shows in their planetariums. This event will go on rain or shine, so please join us on April 3rd and/or April 4th.

Feel free to hold your own 100HA events if you can't make it to the Kalamazoo Valley Museum or Kingman Museum on April 3rd and 4th. Do a little sidewalk astronomy. Setup a telescope anywhere there are lots of people and tell them to "come see the moon!" Contact us at the e-mail address above if you want to pass out some information on the KAS.



EXTRASOLAR PLANETS

Formation, Migration, and Long Term Evolution

Presented by **DR. FRED ADAMS**

Professor of Physics, University of Michigan

To date, over 300 planets have been discovered in orbit about other stars, and the science of comparative planetology is now exploding. This talk will review our current understanding of observed solar systems with a focus on how they are different from our own. One of the key experimental findings is that large planets are not found in circular orbits in the outer solar system, but instead display a wide range of locations and eccentricities, i.e., planets change their orbits! This process, called planetary migration, will be outlined, along with the various theories for the formation of the planets.

Professor Adams is internationally recognized for his work on the radioactive signature of the star formation process, the dynamics of circumstellar disks, and the physics of molecular clouds. He co-authored of "The Five Ages of the Universe" and "Origins of Existence: How Life Emerged in the Universe".



Friday, April 10, 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



Apollo Upgrade

The flight computer onboard the Lunar Excursion Module (pictured at the right), which landed on the Moon during the Apollo program, had a whopping 4 kilobytes of RAM and a 74-kilobyte “hard drive.” In places, the craft’s outer skin was as thin as two sheets of aluminum foil.

It worked well enough for Apollo. Back then, astronauts needed to stay on the Moon for only a few days at a time. But when NASA once again sends people to the Moon starting around 2020, the plan will be much more ambitious — and the hardware is going to need a major upgrade.

“Doing all the things we want to do using systems from Apollo would be very risky and perhaps not even possible,” says Frank Peri, director of NASA’s Exploration Technology Development Program.

So the program is designing new, more capable hardware and software to meet the demands of NASA’s plan to return humans to the moon. Instead of staying for just a few days, astronauts will be living on the Moon’s surface for months on end. Protecting astronauts from harsh radiation at the Moon’s surface for such a long time will require much better radiation shielding than just a few layers of foil. And rather than relying on food and water brought from Earth and jettisoning urine and other wastes, new life support systems will be needed that can recycle as much water as possible, scrub carbon dioxide from the air without depending on disposable filters, and perhaps grow a steady supply of food—far more than Apollo life-support systems could handle.



Next-generation lunar explorers will perform a much wider variety of scientific research, so they’ll need vehicles that can carry them farther across the lunar surface. ETDG is building a new lunar rover that outclasses the Apollo-era moon buggy by carrying two astronauts in a pressurized cabin. “This vehicle is like our SUV for the Moon,” Peri says.

The Exploration Technology Development Program is also designing robots to help astronauts maintain their lunar outpost and perform science reconnaissance. Making the robots smart enough to take simple verbal orders from the astronauts and carry out their tasks semi-autonomously requires vastly more powerful computer brains than those on Apollo; four kilobytes of RAM just won’t cut it.

The list goes on: New rockets to carry a larger lunar lander, spacesuits that can cope with abrasive moon dust, techniques for converting lunar soil into building materials or breathable oxygen. NASA’s ambitions for the Moon have been upgraded. By tapping into 21st century technology, this program will ensure that astronauts have the tools they need to turn those ambitions into reality.

Learn more about the Exploration Technology Development Program at:

<http://www.nasa.gov/directorates/esmd/aboutesmd/acd/>

Kids can build their own Moon habitat at:

<http://spaceplace.nasa.gov/en/kids/exploration/habitat/>

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



The Chariot Lunar Truck is one idea for a vehicle equal to the lunar terrain. Each of the six wheels pivot in any direction, and two turrets allow the astronauts to rotate 360°.

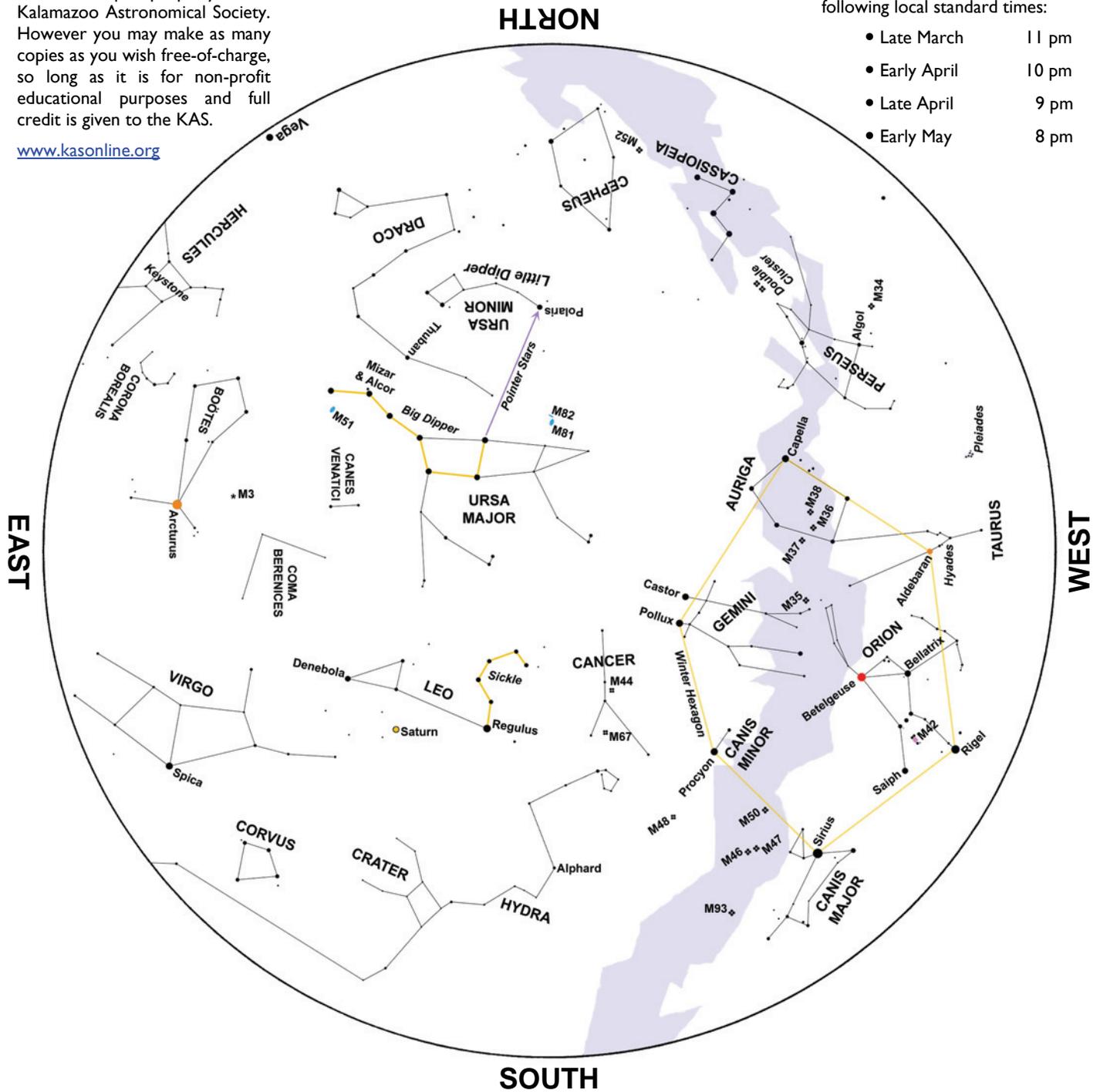
April Night Sky.....

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 standard times:

- Late March 11 pm
- Early April 10 pm
- Late April 9 pm
- Early May 8 pm



There are plenty of reasons to get up early (or stay up all night) on April 22nd. The Lyrid meteor shower peaks from about 1:00 - 4:00 am EDT. Don't expect to see more than 20 meteors/hour, but there might be a surprise outburst. You can then stay up and wait

for the Waning Crescent Moon and Venus to rise. They'll only have 1.5° of sky between them! The Moon actually occults Venus, but only in broad daylight. Seeing Venus in daylight isn't hard if you know where to look. It begins at about 8:45 am EDT.

The 5th magnitude star 44 Capricorni will come between Jupiter and its bright moon Ganymede on April 26th. A good pair of binoculars on a steady mount or a small telescope are required to enjoy this rare alignment. Ganymede and 44 Cap will only be separated by 1 arcsecond!

KAS OFFICERS

PRESIDENT

Jack Price
343-3193
ka8aob@hotmail.com

VICE PRESIDENT

Mike Sinclair
373-7003
dragonphysics@yahoo.com

TREASURER

Rich Mather
629-5312
rlm511@yahoo.com

SECRETARY/ALCOR

Roger Williams
375-4867
ngcphile@sbcglobal.net

MEMBERS-AT-LARGE

Richard S. Bell
373-8942
richard.s.bell@gmail.com

Jean DeMott

381-1406
jeamott@hotmail.com

Dick Gillespie

966-9653
rwgillespie@comcast.net

Dave Woolf

762-8268
go4itbass@gmail.com



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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 then contact the KAS Equipment Manager, **Dave Woolf**, today:

e-mail: go4itbass@gmail.com
phone: (269) 762-8268

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

☆☆ **GET OUT & OBSERVE!** ☆☆



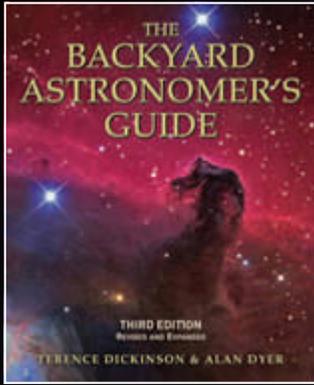
APRIL STARGAZING DATES

Kalamazoo Nature Center • 7000 N. Westnedge Ave.

Saturday, April 18 @ 8:00 pm
Saturn & Orion Nebula

Saturday, April 25 @ 8:00 pm
Saturn & Open Clusters of Auriga

with the **Kalamazoo Astronomical Society**



\$49.95



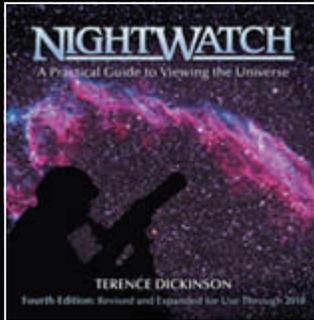
THE SkySHOP



Purchase Online - Delivery Available



**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

