Highlights of the May Sky. . .

- - - 1st - - -
Dusk: 4th-magnitude star Kappa¹ Tauri is about ¼° lower left of Venus.

- - - 4th - - -
Dawn: 4th-magnitude star Tau Tauri is less than ½° left of Venus.

- - - 6th - - -
Last Quarter Moon

- - - 9th - - -
Dawn: Waning Crescent Moon is above Jupiter.

- - - 10th - - -
Dawn: Waning Crescent Moon is left Jupiter.

- - - 13th - - -
New Moon

- - - 14th - - -
Dawn: 5.5-magnitude star 20 Piscium is about ¼° to lower right of Jupiter.

- - - 15th - - -
Dusk: Thin crescent Moon is lower right of Venus.

- - - 16th - - -
Dusk: Thin crescent Moon is upper left of Venus.

- - - 19th - - -
PM: The Moon is about 6° below Mars.

- - - 20th - - -
PM: The Moon is about 5° lower left of Regulus and 12° left of Mars.

First Quarter Moon

- - - 22nd - - -
PM: Saturn is about 8° above Moon.

- - - 24th - - -
PM: Spica is about 6° to upper right of the Moon.

- - - 27th - - -
Full Moon

Prime Focus

A Publication of the Kalamazoo Astronomical Society

☆ ☆ ☆ May 2010 ☆ ☆ ☆

This Months KAS Events

General Meeting: Friday, May 7 @ 7:00 pm

Kalamazoo Area Math & Science Center - See Page 6 for Details

Observing Session: Saturday, May 8 @ 8:30 pm

Saturn & Galaxies of Virgo Cluster - Kalamazoo Nature Center

Board Meeting: Sunday, May 16 @ 5:00 pm

Sunnyside Church - 2800 Gull Road - All Members Welcome

Observing Session: Saturday, May 22 @ 8:30 pm

Saturn & Double Stars of Spring - Kalamazoo Nature Center

Inside the Newsletter. . .

April Meeting Minutes

The general meeting of the Kalamazoo Astronomical Society was brought to order by President Jack Price on Friday, April 9, 2010 at 7:14 pm EDT. Approximately 41 members and guests were in attendance at the Kalamazoo Area Math & Science Center (KAMSC).

Will Millar gave the feature presentation of the evening which he called *The Death of Stars, the Stuff of Life*. Will is a Professor of Astronomy at Grand Rapids Community College and is currently working on his doctorate in astronomy at James Cook University in Australia (must be a long commute to class). Will is also the author of *The Amateur Astronomer's Introduction to the Celestial Sphere* (published by Cambridge University Press). He is also a member of both the KAS and Grand Rapids Amateur Astronomical Association.

Will started out by listing the abundance of chemical elements in the human body in order by mass. These include oxygen (65%), carbon (18%), hydrogen (10%), nitrogen (3%), calcium (1.5%), phosphorus (1.2%), with others totaling less than 1%. The rest of the presentation was discussed were these chemical elements originally came from. Of the 112 recognized chemical elements only hydrogen, helium and lithium were made during the Big Bang 13.7 billion years ago. Astronomers generically refer to all other elements as "metals".

The first clue was introduced by Arthur Eddington in 1920. He proposed that nuclear fusion was the energy source for stars. In 1939, Hans Bethe published a paper where he proposed the "proton-proton chain" is the source of energy for stars with a mass up to the Sun's. Higher mass stars use a more complex reaction called the CNO cycle; which refers to **c**arbon, **n**itrogen and **o**xygen. Fred Hoyle introduced the concept of stellar nucleosynthesis (the creation of heavy elements from lighter ones) in 1946. This lead to the now famous 1957 publication by Burbridge, Burbridge, Fowler and Hoyle (B^2FH) which is seen as the foundation paper of stellar nucleosynthesis and nuclear astrophysics.

Will then went into more detail describing how the proton-proton chain and CNO cycle work in main sequence stars. The triple alpha process was also highlighted. This helium burning process forms beryllium and carbon. Most stars (like the Sun) don't have the mass to get past the triple alpha process. These stars eventually form planetary nebula and eject their heavy elements into space where they're later recycled in future generations of stars. Stars that are massive enough create heavier elements and eject them into space through supernova explosions.

After the snack break, Jack mentioned that *Sky & Telescope* was offering a two-year subscription for only $32.95 (that's our normal one-year rate). Several members reported seeing Mercury and Venus in the evening sky. We then discussed current and upcoming KAS events. The meeting concluded at 8:51 pm.

Board Meeting Minutes

The KAS Board met on April 11, 2010 at Sunnyside Church. President Jack Price called the meeting to order at 5:10 pm. Present were Richard Bell, Jean DeMott, Dick Gillespie, Don Stilwell, and Roger Williams. In the continued absence of Rich Mather, Roger gave a Treasurer's report consisting only of the information that the cash and checks collected at the last board meeting had been deposited. A new set of assets for deposit included four membership dues, one Galileoscope sale, receipts from Jean's 2009 plant sale, and a Pfizer Foundation Volunteer Program grant.

As voted the previous month, a report was received on the Robotic Telescope Project. Richard reported that the committee was happy with the current draft of an agreement to be submitted to Mike Patton, but that they were looking for a lawyer willing to check it over pro bono. In other Old Business, plans for Super Saturday (April 17th) were reviewed. These included an appearance at Free Admission Day at Kalamazoo Nature Center, a lecture by Richard at Parchment Library at 1:30 pm, a Kingman Museum star party, and a Public Observing Session at KNC.

Most of the discussion was devoted to Astronomy Day 2010 (April 24th). Richard said that publicity had mostly been covered, but individuals were encouraged to distribute copies of the website poster at work or wherever many people would see them. The volunteer positions were pretty well filled, and sufficient tomato sauce cans were now in hand for the Hubble telescope models (Hooray! and thanks to all who helped). Arrangements were discussed in some detail for the dinner with Story Musgrave on Friday night and for seeing to the needs of both Story Musgrave and Michael Francis on Saturday. It was agreed that time constraints made it more practical to minimize take-down of the exhibits at 4:00 pm Saturday but instead to move them to the locked loading dock area of the museum for attention on Sunday. Jack asked about making available a donation receptacle, and the consensus was that it would not be welcomed at KVM, but it might be done at the Fetzer Center during the feature presentation.

Regarding New Business, Full Moon Theater "on the road," scheduled for May 8th at the Grand Rapids IMAX theater had to be postponed, since the planned introduction of the Hubble Space Telescope movie was moved to August 23rd. Richard agreed to give a heads-up on this change in the e-mail soliciting volunteers. Jack shared information he had received from Lowell Observatory concerning an offering of field trips for astronomy clubs. They offered some tantalizing programs, but the cost is in the range of $100-$500 per person.

There being no further business, the meeting was adjourned at 6:45, and everyone left to build enthusiasm for the events of April 17th and 24th. The date of the next meeting was set for May 16th.

Respectfully submitted by Roger Williams

A Rock Hound is Born

It's tough to be a geologist when you can't tell one rock from another. Is that a meteorite or a chunk of lava? A river rock or an impact fragment? Houston, we have a problem!

It's a problem Spirit and Opportunity have been dealing with for the past six years. The two rovers are on a mission to explore the geology of the Red Planet, yet for the longest time they couldn't recognize interesting rocks without help from humans back on Earth.

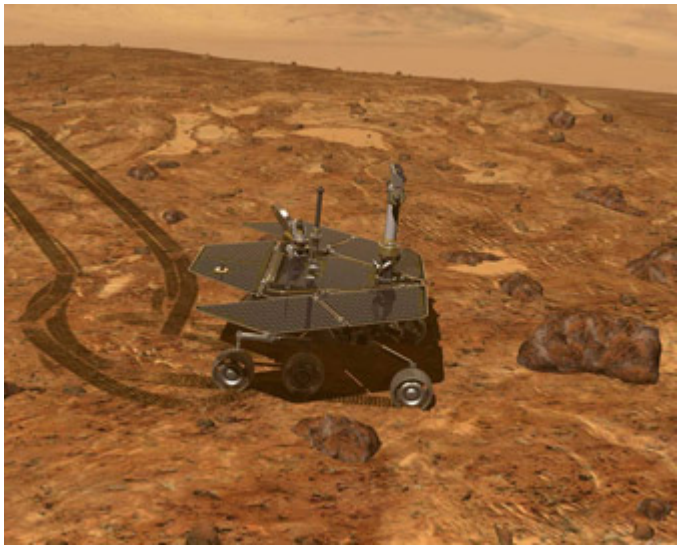
Fortunately, it is possible to teach old rovers new tricks. All you have to do is change their programming — and that's just what NASA has done.

"During the winter, we uploaded new software to Opportunity," says Tara Estlin, a rover driver, senior member of JPL's Artificial Intelligence Group, and the lead developer of AEGIS, short for Autonomous Exploration for Gathering Increased Science. "AEGIS allows the rover to make some decisions on its own."

Estlin and her team have been working for several years to develop and upload increasingly sophisticated software to the rovers. As a result, the twins have learned to avoid obstacles, identify dust devils, and calculate the distance to reach their arms to a rock.

With the latest upgrade, a rock hound is born.

Now, Opportunity's computer can examine images that the rover takes using its wide-angle navigation camera (NavCam) and pick out rocks with interesting colors or shapes. It can then center its narrower-angle panoramic camera (PanCam) on targets of interest for close-up shots through various color filters. All this happens without human intervention.



Opportunity spots a rock with its NavCam that its AEGIS software says meets all the criteria for further investigation.

The system was recently put to the test; Opportunity performed splendidly.

At the end of a drive on March 4th, the rover settled in for a bit of rock hunting. Opportunity surveyed the landscape and decided that one particular rock (shown above), out of more than 50 in the NavCam photo, best met criteria that researchers had set for a target of interest: large and dark.

"It found exactly the target we would want it to find," Estlin says. "It appears to be one of the rocks tossed outward onto the surface when an impact dug a nearby crater."

The new software doesn't make humans obsolete. On the contrary, humans are very much "in the loop," setting criteria for what's interesting and evaluating Opportunity's discoveries. The main effect of the new software is to strengthen the rover-human partnership and boost their combined exploring prowess.

Mindful that Opportunity was only supposed to last about six months after it landed in 2004, Estlin says "it is amazing to see Opportunity performing a brand new autonomous activity six *years* later."

What will the rock hounds of Mars be up to six years from now? Stay tuned for future uploads!

Learn more about how the AEGIS software works at:

http://scienceandtechnology.jpl.nasa.gov/

If you work with middle- or high-school kids, you'll find a fun way to explore another kind of robot software — the kind that enables "fuzzy thinking" — at:

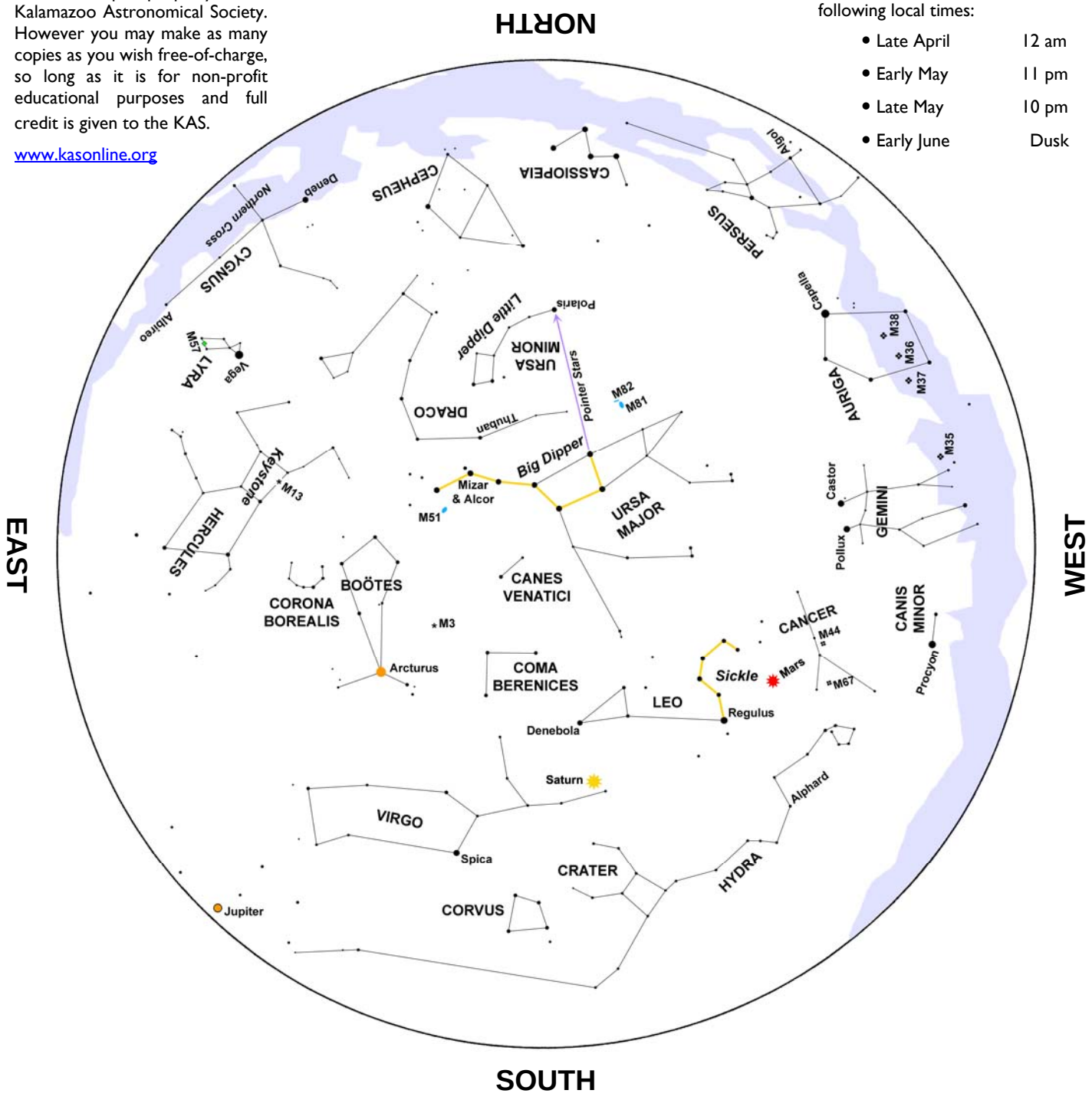
http://spaceplace.nasa.gov/

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

May Night Sky.....

This map represents the sky at the following local times:

- Late April 12 am
- Early May 11 pm
- Late May 10 pm
- Early June Dusk



Our Moon has some close encounters with the night sky's two brightest planets in May. A Waning Crescent Moon can be found above Jupiter on May 9th. The Moon shifts to the left of Jupiter on May 10th. Look low in the eastern sky about an hour before sunrise.

A thin Waxing Crescent Moon will be to the lower right of brilliant Venus on May 15th. It then shifts to Venus' upper left on May 16th. This time you'll what to look toward the western sky about 30 minutes after sunset. Venus is a little hard to miss though.

The Moon also encounters Mars on May 19th. The red planet will be about 6° above the Moon. Saturn will be 8° above the Moon on May 22nd.

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

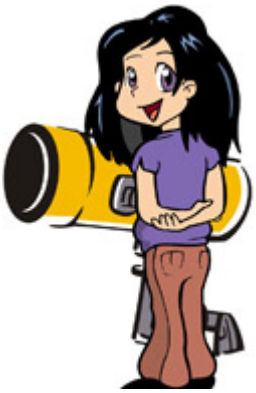
Bear Tales
Weekdays, 11am; Saturdays; 1pm; Sundays, 2pm

The Artist's Sky
Saturdays at 2:00 pm

Secrets of the Sun
Everyday at 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*

☆ OBSERVE the UNIVERSE ☆



MAY STARGAZING DATES

Kalamazoo Nature Center • 7000 N. Westnedge Ave.

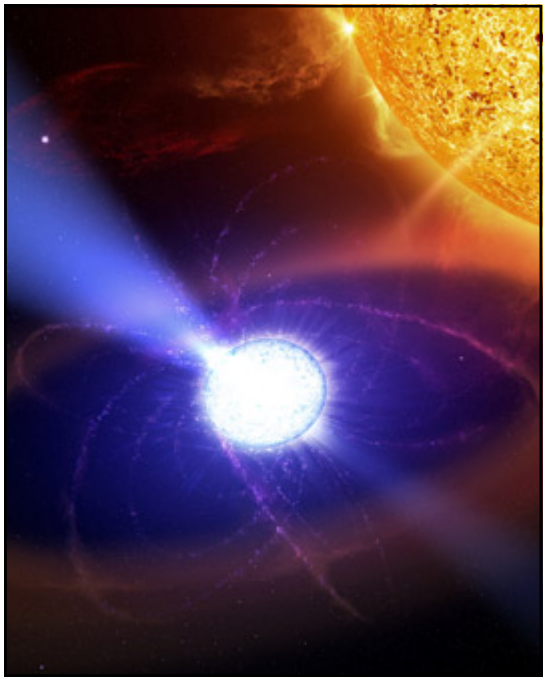
Saturday, May 8 @ 8:30 pm
Saturn & Galaxies of the Virgo Cluster

Saturday, May 22 @ 8:30 pm
Saturn & Double Stars of Spring

with the Kalamazoo Astronomical Society

General Meeting Preview

Advances in White Dwarf Star Research



presented by **Robert Miller**

Most stars will end their lives as white dwarfs. Understanding these stars is important to building our knowledge of stellar evolution. Furthermore, white dwarf stars are valuable tracers of evolution of the galaxy. These stars present opportunities to study the physics of matter under extreme conditions. Some white dwarf stars are variable stars which pulsate. Using high-speed photometry, we're able to probe the structure of these stars.

Friday, May 7 @ 7:00 pm

Kalamazoo Area Math & Science Center
600 West Vine, Suite 400 • Use Dutton St. Entrance

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

STAMP