

**Highlights of the  
March Sky...**

--- 2<sup>nd</sup> ---  
PM: A Waxing Gibbous  
Moon is near Jupiter.

--- 5<sup>th</sup> ---  
Full Moon  
1:05 pm EST

--- 8<sup>th</sup> ---  
Daylight Saving Time  
starts at 2:00 am.

--- 9<sup>th</sup> ---  
AM: Algol is at minimum  
brightness for ~2 hours  
centered on 3:13 am EDT.

--- 11<sup>th</sup> → 12<sup>th</sup> ---  
AM: Algol is at minimum  
brightness for ~2 hours  
centered on 12:02 am EDT.

--- 12<sup>th</sup> ---  
AM: The Moon is about 3°  
from Saturn and 9° above  
Antares.

--- 13<sup>th</sup> ---  
Last Quarter Moon  
1:48 pm EDT

--- 20<sup>th</sup> ---  
New Moon  
5:36 pm EDT

Vernal equinox: Spring  
begins at 6:45 pm EDT.

--- 21<sup>st</sup> ---  
DUSK: A Waxing Crescent  
Moon is less than 3° from  
Mars. Venus is below.

--- 22<sup>nd</sup> ---  
DUSK: The crescent Moon  
is about 4° left of Venus.

--- 24<sup>th</sup> ---  
PM: The Moon is inside  
the Hyades star cluster.

--- 27<sup>th</sup> ---  
First Quarter Moon  
3:43 am EDT

--- 29<sup>th</sup> ---  
AM: Algol is at minimum  
brightness for ~2 hours  
centered on 4:58 am EDT.

# Prime Focus

A Publication of the Kalamazoo Astronomical Society

★ ★ ★ March 2015 ★ ★ ★

## This Months Events

**General Meeting: Friday, March 6 @ 7:00 pm**  
*Kalamazoo Area Math & Science Center - See Page 10 for Details*

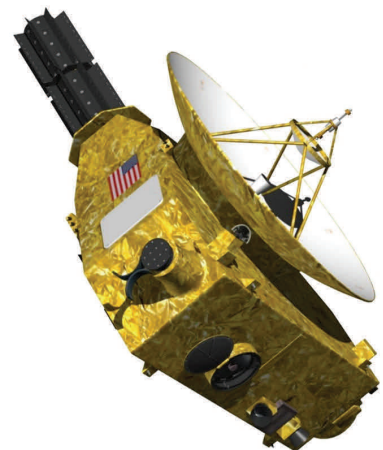
**Board Meeting: Sunday, March 8 @ 5:00 pm**  
*Sunnyside Church - 2800 Gull Road - All Members Welcome*

**Lecture Series: Saturday, March 21 @ 2:00 pm**  
*Portage District Library - See Page 5 for Details*

**Observing Session: Saturday, March 21 @ 7:00 pm**  
*Messier Marathon - Richland Township Park*

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

# FEBRUARY MEETING MINUTES

The general meeting of the Kalamazoo Astronomical Society was brought to order by President Richard Bell on Friday, February 13, 2015 at 7:12 pm. Approximately 45 members and guests were in attendance at the Kalamazoo Area Math & Science Center (KAMSC).

Former KAS President and KAMSC teacher Mike Sinclair was the featured speaker for the meeting. During his introduction, Richard mentioned that this was Mike's thirteenth solo presentation for the KAS. The first was on November 6, 1998. The title of his latest talk was *The Science in Science Fiction*.

Mike said this talk was a blending of his two loves, science and science fiction. In fact, his interest in science fiction at an early age quickly led to an interest in science. One of the goals for his talk was to describe how science works in science fiction, because science fiction is a driving force for everything we see and try to study.

A list of nine science requirements for a good science fiction story was given. First, the most common and annoying flaw in sci-fi television shows and movies is the presence of sound in space. Space is a vacuum and sound requires a medium in which to propagate. A good sci-fi movie, like *2001: A Space Odyssey* or the more recent *Interstellar*, should not have sound in space! Second, distances in space are huge! Some movies have shown galaxies much larger and brighter than they appear from any planet in the solar system. And, of course, interstellar travel is MUCH faster on screen than it will ever be in reality.

Third, was the Law of Inertia (Newton's First Law of Motion). Objects in motion tend to stay in motion at a constant speed and in a straight line unless acted upon by an



**Mike Sinclair discussed *The Science in Science Fiction* at the general meeting on February 13, 2015. This was the 13th presentation he's given for the KAS.**



**Jean DeMott presented a \$1,600 check to KAS President Richard Bell for the Robotic Telescope Project. Proceeds were from the final season of her Perpetual Plant Sale.**

external force. An object thrown on Earth's surface only follows a curved path due to the effects of a gravitational field. A baseball thrown in deep space will always go in a straight line. Therefore dramatic dog fights are not possible in space. Fourth, no material object can travel faster than the speed of light. To do so would mean an infinite increase in mass and access to infinite energy. There are theoretical shortcuts like wormholes, but true interstellar travel is likely to take considerable time.

The fifth requirement on Mike's list is related to the third. Astronauts on the International Space Station are in a constant state of freefall around Earth, which we call an orbit. So, if one astronaut needs to give a tool to another astronaut on the opposite side of a module it can't be tossed like on Earth. It must be gently pushed so it travels in a straight line to its intended target.

Sixth, aliens are alien! Many aliens in sci-fi shows look way too human. Evolution occurs randomly and depends on local conditions. Aliens may have certain traits in common, like an opposable thumb for gripping objects, but they would otherwise be very different from us physically. Oh, aliens wouldn't speak perfect English either! The seventh requirement is with the language of science. Sometimes dialog in sci-fi shows is so technical it's wrong. Relativistic velocities would always be referred to in terms of the speed-of-light, and not meters per second i.e.  $0.9c$  for 90% the speed-of-light.

Eighth, stretching facts for the sake of the story is okay. For example, traveling to unknown planets around known stars is totally acceptable. Ninth, good science does not mean a bad movie. Too much fiction in a sci-fi movie can in fact ruin an otherwise good story.

Mike then discussed various forms of science fiction. These include short stories, novels and novellas, graphic novels, television, and movies. Other forms that aren't quite mainstream yet are short films, webcasts, and fan fiction. Mike said there are six eras in science fiction. These are the first works of science fiction, 19th century science fiction that focused on Jules Verne, early 20th century science fiction and H.G. Wells, the Golden Age of Science Fiction (1920's - 1950's), science fiction during the Cold War, and modern science fiction.

Science fiction comes in two distinct genres: hard and soft. Hard science fiction follows the laws of physics religiously. Soft science fiction really bends the rules with faster than light travel and rapid evolution. Mike then listed subgenres, which range from alternative history to space operas to apocalyptic stores. Mike then went into detail on the greatest authors in the various eras and genres. He ended with several lists of his favorite science fiction books, television shows, and movies. The entire talk is available on [YouTube](#) and his PowerPoint show can be [downloaded](#) from the KAS website.

Richard gave updates on the Robotic Telescope Project, Astronomy Day 2015 on April 25<sup>th</sup>, and the *Introduction to Amateur Astronomy* lecture (see his column on page 4 for updates). A handful of members said they braved the frigid conditions long enough to see (and in some cases image) Comet Lovejoy C/2014 Q2. Astronomical news and upcoming events were then covered. Jean DeMott then gave a short presentation. She's retiring at the end of this year, so she wrapped up her Perpetual Plant Sale for good toward the end of 2014. She raised an additional \$1,600 for the Robotic Telescope Project and handed a check over to Richard. Thank you for all your hard work and generous contributions Jean! The meeting concluded at about 9:45 pm.



## BOARD Meeting Minutes

The monthly board meeting of the KAS was held on February 8, 2015. Board members in attendance were Richard Bell, Joe Comiskey, Mike Cook, Scott Macfarlane, Jack Price, Don Stillwell, and Rich Mather (attending from North Carolina via Skype). Richard brought the meeting to order at 5:10 pm.

Rich Mather gave the treasurer's report, which included a cash flow summary from January 1, 2015 to February 6, 2015. The inflows included a Pfizer volunteer grant of \$1,000 and \$2,700 raised for the Robotic Telescope Fund. The total amount raised is now over \$98,200.

KAS activities for February were discussed. Richard was

interviewed by WOFR radio about the February meeting and *Introduction to Amateur Astronomy* lecture series, which aired on February 7<sup>th</sup>. The general meeting on Friday, February 13<sup>th</sup> will feature Mike Sinclair speaking about *The Science in Science Fiction*. Also, the February Freeze Out was scheduled for Saturday February 21<sup>st</sup> at the Nature Center (the event was canceled due to the seemingly eternal cloud cover).

Several follow-up items from the previous board meeting were covered. First, a bell jar and vacuum pump was purchased for demonstrating that no sound travels in space. Second, a one-day field trip to historic Yerkes Observatory is tentatively planned for June 20<sup>th</sup>, and Don will be checking with the Grand Rapids and Michiana astronomy clubs to see if they might be interested in joining us. Third, two public outreach activities are to be held in the near future: Family Math & Science Expo at Kellogg Elementary on February 26<sup>th</sup> and Science Night at Vicksburg Middle School on March 4<sup>th</sup>. Fourth, presenters have been obtained for all remaining slots for the 2015 general meeting schedule.

An additional follow-up item included the upcoming Astronomy Day, which will once again begin at the Portage District Library and end at the Nature Center. A tentative outline for the day's activities was presented to the Board, as well as ideas for advertising the event. Members are again being asked to save 8-ounce tomato sauce cans for one of our hands-on activities. This year's keynote speaker will be Dr. Frank Summers from the Space Telescope Science Institute in Baltimore, Maryland. Astronomy Day might also launch a special fundraiser for the Robotic Telescope Project involving raffling off a high quality framed photo of the Pillars of Creation.

Lastly, some updates on the Robotic Telescope Project were given. In addition to the PlaneWave 20" optical tube assembly, several key accessories (e.g., CCDs, filters, and a computer) were considered for purchase. Don made a motion that \$70,000 be made available to the Robotic Telescope Committee for purchasing the telescope and accessories when needed. The motion was seconded by Jack and all present were in favor. In addition, \$3,000 was approved for a maintenance fund (motioned by Jack, seconded by Don). At Mike Patton's request, Richard motioned that an honorary KAS membership be granted to Dr. Fred Espenak, since he will be the primary maintenance person on-hand at Arizona Sky Village for the robotic telescope. Dr. Espenak is a retired astrophysicist from NASA's Goddard Space Flight Center and world renowned expert on eclipses and lives two streets over from Mike Patton. This was seconded by Mike, and all were in favor.

The meeting was adjourned at 6:50 pm. The next board meeting will be held at the usual time and location on March 8<sup>th</sup>.

*Respectfully submitted by Joe Comiskey*

# Observations

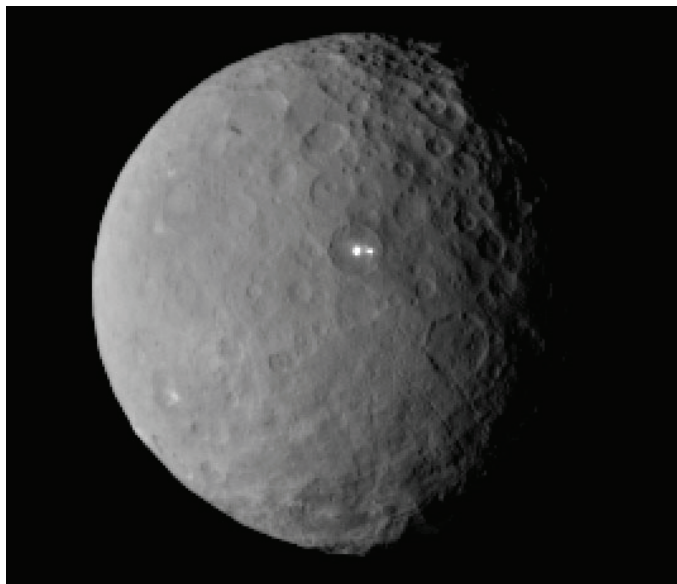
by **Richard S. Bell**



For me, March is when 2015 really begins! Winter weather has made me a prisoner in my own home these past two months! I cannot wait for the temperature to rise and the clouds to part, so I can get in a little telescope time! Many exciting events and activities also take place in March. The [Dawn spacecraft](#) will arrive at Ceres on March 6<sup>th</sup>. *Dawn* started sending back images higher in resolution than those from the Hubble Space Telescope in early February and they are only going to get better. Those two white spots in the image below have already intrigued the mission scientists. Is it ice revealed by an impact or evidence of cryovolcanism? We know much of Ceres' interior is composed of water ice, but the exact nature of those spots is still a mystery. Hopefully, we'll know for sure in the next few weeks!

March 6<sup>th</sup> is also the day of our general meeting. Our very special guest speaker (via Skype) will be Dr. Marc Buie. Dr. Buie is a staff scientist at the Southwest Research Institute in Boulder, Colorado and co-investigator of the [New Horizons](#) mission to Pluto. He has published over 85 scientific papers and journal articles on Pluto. Naturally, he'll be talking to us about *New Horizons*' historic encounter with Pluto this July. Please be sure to join us for this special presentation.

The [Introduction to Amateur Astronomy](#) lecture series returns on March 21<sup>st</sup> after a three year hiatus. Part 1, *Our Place Among the Infinities*, takes place on March 21<sup>st</sup> from 2:00 - 4:00 pm at the Portage District Library. Attendees are encouraged to [register](#) to make sure there's enough materials for everyone. If you're not worried about the hand-outs and free materials then don't worry about registering I guess.



**This image of Ceres was taken by the Dawn spacecraft on February 19<sup>th</sup> from a distance of nearly 29,000 miles.**

I'm just curious to find out how many people will attend the first installment. Last time we were overwhelmed! If you're on the fence about attending then please know it'll likely be another three years before the series returns again. We'll be busy over the next couple of years making preparation for the 2017 total solar eclipse!

We also have a Messier Marathon scheduled for March 21<sup>st</sup> at Richland Township Park. Michigan weather hasn't allowed us to have a Marathon since 2007, so I think we're about due don't you? If the forecast looks promising then be sure to check out my [Guide to the Messier Marathon](#) and print out a copy of my [search list](#). No worries if you don't want to spend the entire night tracking down Charles Messier's legacy. Most members don't stay from sunrise to sunset anyway. I'm tempted to try an imaging marathon if it's clear!

Astronomy Day 2015 is taking shape. This year's outreach extravaganza takes place on April 25<sup>th</sup> at the Portage District Library (11am-4pm) and Kalamazoo Nature Center (starting at 7pm). Our theme is Small Worlds & the Hubble Space Telescope in honor of *Dawn's* visit to Ceres, *New Horizons'* flyby of Pluto, and the 25th anniversary of Hubble's launch. Our daytime activities at the library will feature a special showing of the new documentary *The Year of Pluto*. The keynote speaker is Dr. Frank Summers, an outreach astrophysicist from the Space Telescope Science Institute. Naturally, we'll need a full staff of volunteers so many of you can expect to hear from me soon!

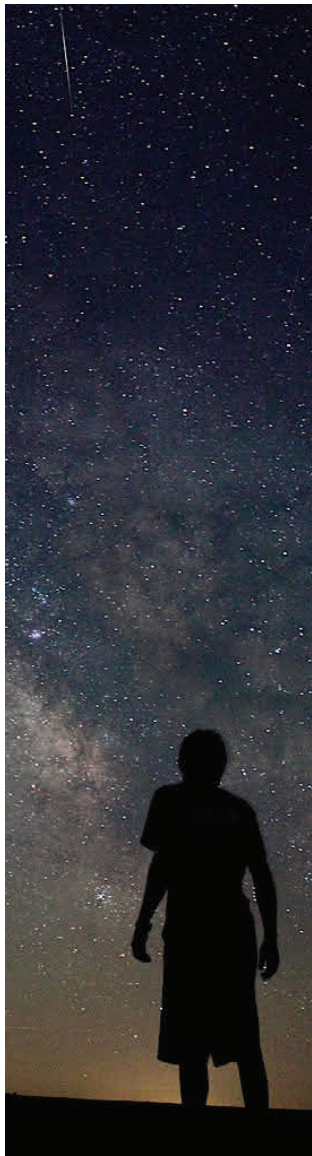
We're making progress on the [Robotic Telescope Project](#). Thanks to Jean DeMott's latest contribution from her plant sale, we've now raised over \$98,200! We are about to order the SBIG STX-16803 CCD camera, Astrodon filters, and related items very soon. This will allow us to work with the Paramount ME II and take some test images.

The delivery time for the PlaneWave CDK 20" telescope with quartz optics is 4 months, so the committee has decided to hold off on ordering until sometime this summer. This will ensure we have the telescope ready for installation at the end of this year. The plan now is to head out to Arizona Sky Village just after Christmas Day and spend the New Year's Holiday getting main scope operational. The project will not be over though. We need to raise more money to fully realize our goal. We need another \$10,000 or so to purchase the Takahashi FSQ-106EDX refractor. Then we'll need funding for an all-sky camera, spectrograph, and more. I've just applied for a grant from the Stryker Johnson Foundation. They'll meet in April. We also plan to try our hand at Crowd Funding through sites like Kickstarter and Indiegogo. If all else fails we'll sell eclipse shades in 2017. We're doing that no matter what!



# Introduction to *Amateur Astronomy*

**S**targazing is easy, and astronomy is something anyone can do and enjoy. You just have to get started off on the right foot. Starting out wrong can lead to disappointment, frustration, and wasted money. Starting out right can lead to a lifetime of celestial exploration and enjoyment. Today, the hobby of astronomy - the biggest and most mind-boggling branch of amateur nature study - is attracting more people than ever. The **Kalamazoo Astronomical Society** is happy to present this five-part lecture series that will help you become a star-hopping skymaster!



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## Part 1: Our Place Among the Infinities

March 21

For a long time, the stars were merely pinpoints of light on the black backdrop of the heavens. Before massive telescopes on mountaintops came along, all we could observe were the Sun, Moon, planets, their satellites, and the occasional comet. Today we know that those pinpoints of light are distant suns and that we live in a remote corner of one galaxy amongst billions. For our first presentation, we'll travel through our solar system, explore the star clusters and nebulae of our Milky Way Galaxy, and the countless other galaxies in this vast, infinite universe.

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## Part 2: Discovering the Night Sky

April 4

Is that a bright star or a planet? Where's the constellation Orion? Your first task as an amateur astronomer is to learn your way around the night sky. Learn how to find any star or constellation in the night sky with the use of a simple star map. We'll also look at several of the best books geared toward the novice stargazer and the many sophisticated planetarium programs for your home computer.

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## Part 3: Binocular Basics

April 18

Every amateur astronomer, novice or advanced, should own at least one good pair of binoculars. They make an ideal first "telescope" because of their wide field of view, ease of use, portability, versatility, and low cost. Several types of binoculars are available, but which ones are best for astronomy? You'll be amazed at what you can see!

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## Part 4: Telescope Tutorial

May 2

Sooner or later, every amateur astronomer faces the decision of purchasing a first telescope. There are literally hundreds of choices today! What's the difference between a refractor and reflector? Which telescope is the right one for you? To make this daunting task easier, we'll compare several of the top telescopes available today and tell you which ones to avoid. We'll also look at the countless array of accessories available for your telescope. If you already have a telescope but need help then bring it along.

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## Part 5: The Art of Astrophotography

May 16

Astrophotography is the art of photographing the night sky. In the past few years that art has undergone a revolution as digital cameras have overtaken their film counterparts. In some ways this has made the field more technical, but in many ways shooting the sky is easier than ever! We'll start with the basics like using a stationary photographic tripod and work our way up to imaging with sophisticated CCD cameras. Constellation patterns, the Milky Way, the night-to-night motion of the planets, bright comets, northern lights, and perhaps a meteor all await you.

**Time:** 2:00 pm → 4:00 pm

**Admission:** FREE

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

**Location:** Portage District Library  
300 Library Lane  
Portage, MI 49002  
(269) 329-4544



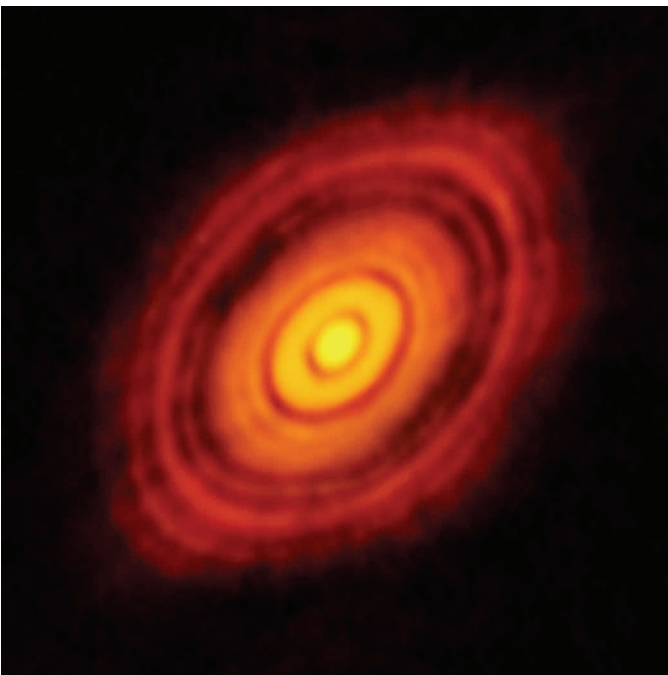
# Amazing ALMA Photo to Shed Light on Solar System Formation?

by **Mike Cook**

As many of you know [ALMA](#) (the Atacama Large Millimeter/submillimeter Array in Northern Chile) recently took an amazing photo shown below of a young solar system forming. The photo was of the sun-like star HL Tauri and the planet-forming disk surrounding it. The disk is located approximately 450 light-years from Earth. The amazing thing about this disk is gaps from planet formation are being cleared at such a young age, much earlier than we've previously thought.

This photo really caught my attention, especially after recently completing the free [Coursera](#) online course from [Dr. Mike Brown](#) entitled "The Science of the Solar System". Dr. Brown is the Professor of Planetary Astronomy at the California Institute of Technology, and was the KAS featured speaker at [Astronomy Day 2011](#). He is responsible for discovering Eris, a dwarf planet beyond and slightly larger than Pluto. After this discovery the International Astronomical Union (IAU) debated and demoted Pluto from the ranks of a planet. Pluto and others like it are now called "dwarf planets," which I think is a stupid designation, but I'll leave that long, painful discussion for another time! Pluto in my opinion doesn't deserve the rank of "planet." Ah yes, back to the reason I'm writing this....

The reason this story and photo is so compelling for me is that I now wonder how the study of this young solar system might alter our understanding of current solar system formation theories, or will it simply validate them. In the course I took, there were two theories presented on what we



think MAY have happened. Did it happen this way? We simply don't know, but these are but two of several theories. I won't be able to do justice to them like Dr. Brown, but I'll give a brief and incomplete summary of what they were about. I strongly encourage everyone to take the course! I learned a lot, and now have better means to communicate what I have learned.



The first theory is called the Nice Theory. Its period is believed to be 600 million years after the formation of the solar system. This period is after most of the gas from the disk has been used up. Briefly, Jupiter and Saturn form closer to the Sun than previously thought, move their way back out (past a 2:1 resonance with each other) and proceed to kick Uranus and Neptune farther out. This disturbs the smaller objects and pushes them into the region now known as the Kuiper Belt, some are sent farther into the solar system. Eccentricities of the these four planets eventually lower to present values. This theory shows how the Late Heavy Bombardment, Oort Cloud, Trojan Asteroids and irregular satellites MAY have formed. One shortcoming of this model is that Mars forms way too small if at all.

The second theory is called the Grand Tack Theory. This theory is Pre-Nice, and helps explain how Jupiter and Saturn migrated, how Mars came to be, and the asteroids location and composition. Its period is believed to be the first 600,000 years of our solar systems existence. Jupiter forms quickest, clears an area (much like the gaps in the photo) and migrates inward to approximately 2 A.U., condensing the gas as it moves forward. Saturn then forms and begins following Jupiter, eventually halting Jupiter's progress. The two planets move outward again as there is no gas pressure to resist them, and eventually settle in a resonance with each other. The annulus of dust and gas condensed down to 1 A.U. allows for the formation of the terrestrial planets (in 100 million years) including a properly sized Mars.

Now I know that it seems that we have found a few solar systems somewhat like ours, most aren't like ours at all, so this again begs my initial question: Will the HL Tauri system alter our understanding of how our solar system formed or will it simply validate the theories? I guess we'll just have to wait and see.

*Mike Cook has been a member of the Kalamazoo Astronomical Society since 2008 and is serving his third term as an at-large board member.*



# The Heavyweight Champion of the Cosmos

by Dr. Ethan Siegel

As crazy as it once seemed, we once assumed that the Earth was the largest thing in all the universe. 2,500 years ago, the Greek philosopher Anaxagoras was ridiculed for suggesting that the Sun might be even larger than the Peloponnesus peninsula, about 16% of modern-day Greece. Today, we know that planets are dwarfed by stars, which themselves are bound together by the billions or even trillions into galaxies.

But gravitationally bound structures extend far beyond galaxies, which themselves can bind together into massive clusters across the cosmos. While dark energy may be driving most galaxy clusters apart from one another, preventing our local group from falling into the Virgo Cluster, for example, on occasion, huge galaxy clusters can merge, forming the largest gravitationally bound structures in the universe.

Take the "[El Gordo](#)" galaxy cluster, catalogued as ACT-CL J0102-4915. It's the largest known galaxy cluster in the distant universe. A galaxy like the Milky Way might contain a few hundred billion stars and up to just over a trillion ( $10^{12}$ ) solar masses worth of matter, the El Gordo cluster has an estimated mass of  $3 \times 10^{15}$  solar masses, or 3,000 times as much as our own galaxy! The way we've figured this out is fascinating. By seeing how the shapes of background galaxies are distorted into more elliptical-than-average

shapes along a particular set of axes, we can reconstruct how much mass is present in the cluster: a phenomenon known as weak gravitational lensing.

That reconstruction is shown in blue, but doesn't match up with where the X-rays are, which are shown in pink! This is because, when galaxy clusters collide, the neutral gas inside heats up to emit X-rays, but the individual galaxies (mostly) and dark matter (completely) pass through one another, resulting in a displacement of the cluster's mass from its center. This has been observed before in objects like the Bullet Cluster, but El Gordo is much younger and farther away. At 10 billion light-years distant, the light reaching us now was emitted more than 7 billion years ago, when the universe was less than half its present age.

It's a good thing, too, because about 6 billion years ago, the universe began accelerating, meaning that El Gordo just might be the largest cosmic heavyweight of all. There's still more universe left to explore, but for right now, this is the heavyweight champion of the distant universe!

El Gordo is certainly huge, but what about really tiny galaxies? Kids can learn about satellite galaxies at NASA's Space Place:

<http://spaceplace.nasa.gov/satellite-galaxies/>



X-rays are shown in pink from Chandra; the overall matter density is shown in blue, from lensing derived from the Hubble space telescope. 10 billion light-years distant, El Gordo is the most massive galaxy cluster ever found.

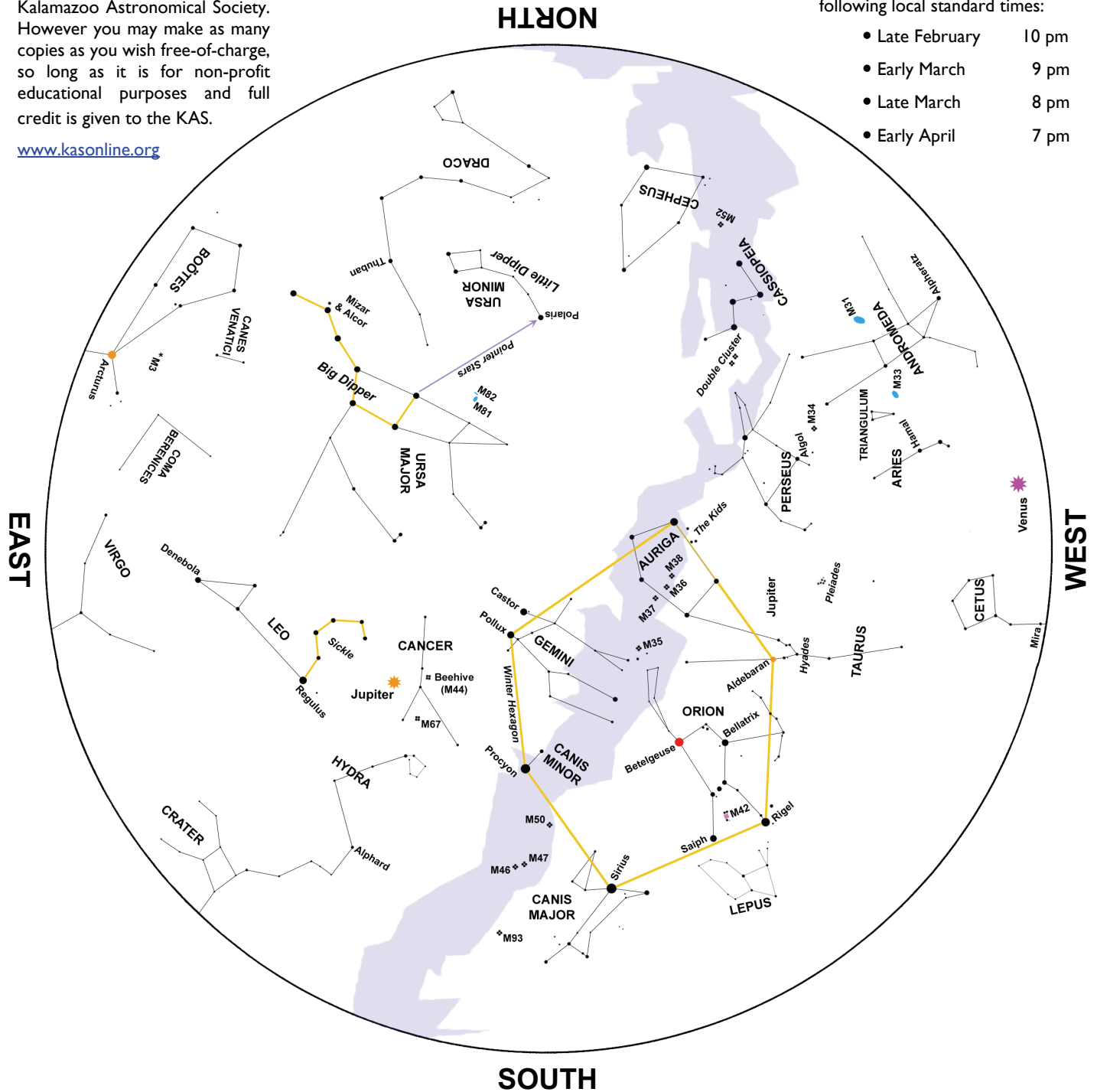
# March Night Sky.....

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 February 10 pm
- Early March 9 pm
- Late March 8 pm
- Early April 7 pm



A waxing gibbous Moon lurks within 6° of Jupiter on the night of March 2<sup>nd</sup> - 3<sup>rd</sup>. They'll easily fit into the field-of-view of 7×50 binoculars.

The Moon, about a day before last quarter, will be 3° to the upper left of Saturn before dawn on March 12<sup>th</sup>. The

bright orange star 9° below the Moon is Antares, the heart of Scorpius.

The Sun crosses the celestial equator on March 20<sup>th</sup>, bringing the first day of spring to the northern hemisphere.

The three day old crescent Moon will be

4° to the left of brilliant Venus on the evening of March 22<sup>nd</sup>. The Moon, with Earthshine, and gibbous-shaped Venus will appear stunning in binoculars.

Use those binoculars again, this time to spot the Moon cross through the Hyades cluster on the evening of March 24<sup>th</sup>.



## KAS BOARD

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373-8942

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329-4251

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963-5856

E-MAIL a BOARD MEMBER



March 2015

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## Volunteers Needed @ Science Night



The KAS has been asked to participate in the eleventh annual Science Night at Vicksburg Middle School (located at 348 East Prairie St.). Members are needed to help setup and take down classroom displays, hand out KAS literature, and answer questions from students and parents. Members are also needed to setup telescopes outside if skies are clear. Please [contact us](#) if you'd like to lend a helping hand.

Wednesday, March 4<sup>th</sup>, 6 - 8 pm | Vicksburg Middle School

## NexStar 8 Available for Loan!

Thanks to the generous donation of John & Karen Kerwin, KAS members now have access to a serious amateur telescope.

This fully Go-To 8-inch Schmidt-Cassegrain telescope features an 18,000 object database. The NexStar 8 is highly portable and can be setup in minutes; plus no tools are required.

For more information or to contact the new KAS Equipment Manager, **Arya Jayatilaka**, please visit the "Telescopes For Loan" web page:

<http://www.kasonline.org/loanscopes.html>



## Messier Marathon

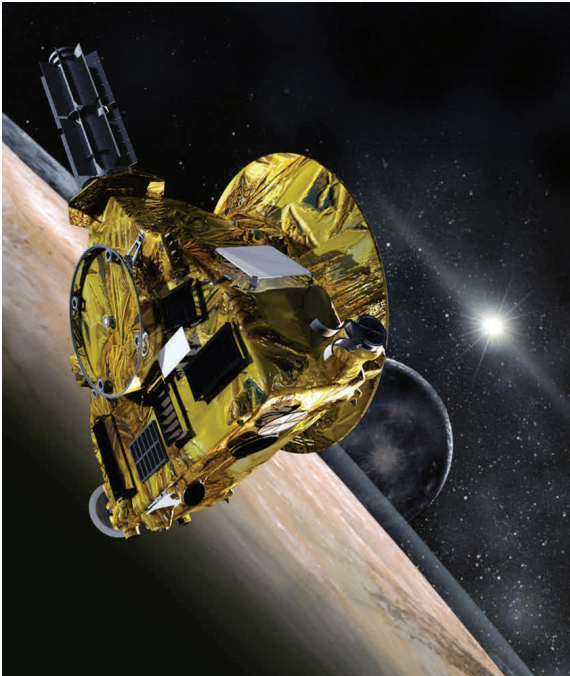
The work of comet-hunter and nebulae cataloger Charles Messier comes alive in March of each year as amateur astronomers participate in a one night search for all of the objects in his catalog of nebulae, star clusters and galaxies. By a quirk of fate, we are fortunate that most of the objects Messier and Méchain took 24 years to discover can be observed in one night around the time of the vernal equinox. Members are encouraged to bring a good pair of binoculars or a telescope and participate in this one night race across the sky.

Saturday, March 21<sup>st</sup> @ 7:00 pm | Richland Township Park - 6996 N. 32<sup>nd</sup> St.

## General Meeting Preview

### ***EXPLORING THE COOLEST PLANET IN THE SOLAR SYSTEM: PLUTO ON THE EVE OF NEW HORIZONS***

*Presented via Skype by*  
**Dr. Marc Buie**



Here we are, 85 years after the discovery of Pluto and in July we will get our first close-up view of this fascinating world. Telescopic observations indicate an incredibly complex body despite its relatively small size. Pluto has an atmosphere that has a profound seasonal interaction with its surface. Pluto has extremes in surface reflectance, similar in range to Saturn's moon, Iapetus. Pluto has a collection of ices ( $N_2$ ,  $CH_4$ ,  $CO$ ) that migrate on the surface and vary strongly with location. In this presentation co-investigator Dr. Buie will review some of what we know and discuss what *New Horizons* can do and even try to provide some predictions on what we might learn. An obvious result will be to see what geologic processes shape the surface and how that relates to the surface variability we see from afar. A common question science team members get is "what would be a surprising discovery?" The only answer we can agree on is that it would be surprising if nothing surprises us.

**Friday, March 6 @ 7:00 pm**

***Kalamazoo Area Math & Science Center***

*600 West Vine, Suite 400 • Use Dutton St. Entrance*

*– Dutton Entrance Locked by 7:10 pm –*

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

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