

Bays Mountain Astronomy Club

☞ *Next Meeting: Oct. 3* ☞

REFLECTIONS

Greetings fellow amateur astronomers! This is the time of year to count down to "StarFest," our biggest, annual event! Just in case you have been traveling outside of the area, StarFest is held on October 17-19, 2014 this year. About 30 days away as I write this. Not that I, your chairman, am counting the days. Nor I am not counting hours as well.... I usually wait until the week before for that phase to begin! If you haven't pre-registered with payment, then you have until Sept. 26, 2014 to do so.

I wanted to recap the September meeting for those who couldn't make it out. Our keynote speaker was Mark Marquette who shared a presentation on Mars. I think everyone was enlightened, engaged and entertained. I know Mark's presentation contained several things for all of us to think about. Thank you, Mark for your willingness to share your interest.

September's constellation quest, while not a true constellation, was the Milky Way. I wanted to use the Milky Way as our monthly constellation because this is usually one of the few months during the year that the best views of the Milky Way are visible to us. I also want to remind each of you of other constellations that are good for observation. Those constellations are Capricornus, Aquarius, and Pegasus. In September, we can also see Ursa Major



BY WILLIAM TROXEL

and Cepheus. I hope you were able to get a few night's viewing of some or all of these wonders of the night sky.

Our Amateur Astronomers Corner focused on the Astronomical League's (www.astroleague.org) website. I want to mention that this website is a major resource for not only newbies to this engaging hobby, but to our seasoned members. I encourage you to check out the site. I feel sure that you will add this site to your watch list of web sites and will find yourself going to it more and more as your interest grows in astronomy. I am sure you have read my many mentions of this very useful resource in the past. I can not stress the importance of its information.

September also marked the end of the "Constellation Quest" program. I will list the constellations for the upcoming month in this article so that you can use them as a guide to your plan when you get out and enjoy the night sky. I hope you have enjoyed this program, maybe one of the constellations have inspired you to look onto the night sky more. I want to thank all of you that made a presentation of one of the constellations. I hope that you will continue to offer to be a part of the club's educational programming.

My goal is continue offering "Amateur Astronomer Corner" every other month. November will be the next month we will offer "Amateur

Calendar

Special Events

Oct 17-19 StarFest. Registration is closed on Sept. 26. This is BMAC's 31st annual regional astronomical convention/star gathering. Visit the club's website for registration forms. Pre-registration with payment is mandatory in order to attend.

SunWatch

Every Sat. & Sun., 3 - 3:30 p.m.,

Mar. - Oct., weather permitting.

BMACers are always welcome to help.

StarWatch

Oct. 4, 11, 7:30 p.m.

Oct. 18, 25, Nov. 1 7 p.m.

Nov. 8, 15, 22, 29 6 p.m.

BMACers are always welcome to help with this nighttime viewing program for the public. Please show up about 30 min. prior to help set up.

BMAC Meetings

6 p.m., Observatory:

Oct. 3 Observatory cleaning followed by Jon Peters speaking on his home observatory.

7 p.m., Discovery Theater:

Nov. 7 Matt Connon (ETSU Grad Student) will speak on "Observation of 'BE' Stars." Amateur Ast. Corner will be "Setting Up Your Telescope."

Dec. 5 Christi Whitworth; Dir. of Education Outreach, PARI will speak on "Radio Astronomy & Smiley as an Outreach Tool."

Astronomer Corner." The theme will be "Setting Up Your Telescope."

Our keynote speaker for October will feature Jon Peters who will share an update of his observatory. He will follow the annual clean up of both observatories. Please arrive at 6 p.m. with vacuums, rags, etc. The more members that come, the quicker we can get the clean up completed.

The next night after the meeting will be the first night of the 2014 Fall StarWatch program at Bays Mountain Park. I must remind you that we really need your help at StarWatch on the Saturday nights of October and November.

(Continued on page 5)

STAR STUFF

BY TERRY ALFORD

October is shaping up to be a most interesting month in our Solar System. The Sun is going crazy, our Moon is putting on a real show and Mars will have an encounter with a comet.

First of all is the Sun. It has supposedly peaked in activity and is heading downward on the curve toward solar minimum. But we still have lots of sunspots visible with a white light solar filter. There is also much activity in the Sun's next layer out in its "atmosphere," the chromosphere. With a specialized hydrogen alpha solar scope one can see prominences, filaments, spicules and, occasionally, flares. Thanks to a wake up call from a certain astronomer at UT on September 10, I witnessed the brightest flare I have ever seen in a live view. Using my little Lunt 35 H-alpha scope, I viewed a very large and bright X-class flare. A dramatic video of this event was captured by an amateur astronomer and posted on Cloudy Nights. It can be seen here: <http://www.pbase.com/dsnope/image/157335599>

But wait! The Sun has another treat in store for us this month. On October 23 there will be a partial solar eclipse occurring right at sundown. Find a site with a good western horizon. [Ed.: Extremely low to a true horizon.] Enjoy either with a properly filtered scope or camera or both.

Little Mercury begins the month hiding behind the Sun. Around October 24 it will start to peek above the eastern horizon during dawn. By October 31 it will shine at -0.5 magnitude and be more than 9° high at sunrise.

Venus is barely visible right before dawn and thus is a poor target to view this month. It soon "disappears" as it heads toward superior conjunction on October 25.

Mars still appears to travel eastward this month heading towards the top of the teapot of Sagittarius. It is about +0.8 mag and doesn't set until three hours after sunset. Mars' apparent disk is less than 6" wide, so little details will be visible in our scopes. The most interesting thing about Mars this October is that on the 19th, the faint (estimated to be around 9th mag) comet Sliding Spring will pass only 2' from the small ruddy disk. In the 3-D world, the comet will be about 82,000 miles from Mars. This is extremely close by astronomical standards. The comet will be close enough during StarFest that hopefully we will be able to observe it with Mars in the same field of view.

Jupiter rises around 2:30 a.m. DST at the start of the month. By the end of October, it will rise 1½ hours earlier. It will be fairly bright at mag -2.1 but will still have a rather small apparent disk.

Saturn is only 10° high at sundown at the start of the month. Soon it will be lost in the Sun's glare. Bye bye for a short while, ringed world.

Uranus shines at a magnitude of +5.7. Not terribly bright but about as good as it gets as Uranus reaches opposition on October 7 in the constellation Pisces. If you never have studied the blue-green disk of this planet with your telescope, now is the time.

The smaller diameter disk of

Neptune is high in the sky most of the night. It is +7.8 mag and visible in Aquarius.

Da Moon is da bomb this month! It is still near perigee so it can still be called a "Super Moon." [Ed: Arghhh!] On the morning of October 8, there will be a total lunar eclipse. Visible totality will start around 6:25 a.m. and last for an hour. [Ed: Again, this will occur very low to the west.] As an added bonus, the planet Uranus will be only 1° from the Moon during totality. Can someone say photo op?

Please visit the Park's website with info on this and other neat celestial events to be done at home. <http://www.baysmountain.com/astronomy/observatory/?GTTabs=3>

StarFest 2014

The deadline for registering for StarFest is September 26th. If you want to attend this very special event, I need your registrations with full payment by that date. Due to this late date, I recommend that you call, e-mail, or fax your registration form with payment.

Remember, to be fair, even if you are a BMAC member, walk-ins and visits are not allowed.

The details for this annual astronomy convention/star gathering event from our club are available. The dates are October 17-19, 2014.

Read all about it here:

<http://www.baysmountain.com/astronomy/astronomy-club/?GTTabs=4>

Adam Thanz

HAPPY BIRTHDAY KEPLER'S SUPERNOVA

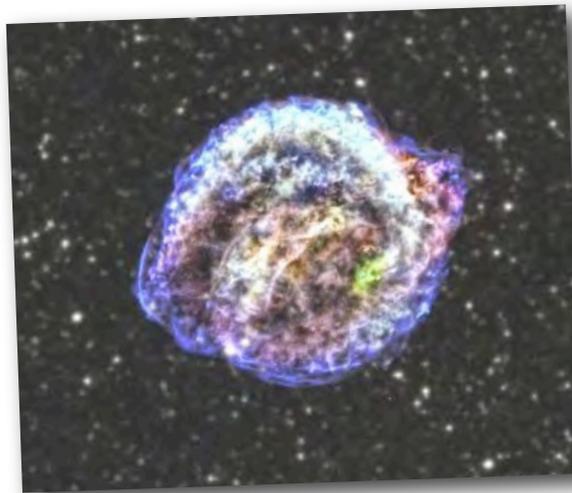
BY ROBIN BYRNE

This month we celebrate the last time people on Earth observed a naked eye supernova in our own galaxy. On the night of October 9, 1604, several people looked up at the night sky and noticed something in the constellation of Ophiuchus that had not been there the night before. Among those who spotted it was J. Brunowski in Prague. Brunowski notified his friend, Johannes Kepler, who, at the time, was working for Emperor Rudolph II at the imperial court. Eight nights later, Kepler began studying this object, and would continue to do so for the following year. In 1606, Kepler wrote a book about his observations, titled "On the new star in Ophiuchus' foot." This book would forever tie Kepler's name to the supernova.

When it was first spotted, the supernova was similar in brightness to Mars. As it brightened, it outshone everything in the night sky, other than the Moon and Venus. It is estimated to have reached a brightest magnitude between -2.25 and -2.5, and for more than three weeks it could be seen during the day. In November, it disappeared behind the Sun, but reappeared in the sky the following January, when Kepler found it still to be brighter than Antares. The supernova continued to be observable by naked eye until March 1606, for a grand total of 18 months of visibility. This was the last supernova observed in the Milky Way to date.

The remaining nebula, in addition to being called Kepler's Supernova Remnant and SN 1604, is

also known as 3C 358 (for its radio signal) and G4.5+6.8 (in the supernova remnant catalog by David Green). The remnant has been studied extensively. In 1941, using the 100-inch Mount Wilson telescope, the remnant was found to be 40 arc seconds across with a brightness of 19th magnitude. The first estimate of its distance was made by Burnham, who assumed an absolute



Credit: Xray: NASA/CXC/NCSU/M.Burkey et al; Infrared: NASA/JPL-Caltech

magnitude of -16, which gave a distance of no more than 20,000 lightyears.

More recently, in 2012, the Chandra X-Ray Telescope peered at the remnant for 8 days. These observations confirmed that the explosion was due to a Type Ia supernova. This type of supernova occurs when a white dwarf's mass is pushed over its limit of stability, causing a catastrophic implosion of the stellar corpse. Chandra also found that the shape of the remnant is being affected by material that it is running into. The northern edge has a bright arc of x-ray emissions,

indicating a region of gas and dust interacting with the expanding remnant. Two possibilities could explain this: either the original star was moving in that direction prior to explosion and the motion continues, or there is a dense cloud of material to the north. Which explanation is correct can have an effect on our estimates for the remnant's distance.

If it is due to the remnant's direction of motion, the distance estimate changes to 23,000 lightyears. If it is a dense cloud of material, the distance is in the range of 16,000 - 20,000 lightyears. Additionally, the Chandra data show a larger than expected amount of iron in the spectrum. This implies the supernova was much more energetic than originally thought. Obviously, there is still much to learn about this object.

For 410 years, astronomers have been waiting for the chance to see another supernova in our own galaxy, but, so far, to no avail. We have observed plenty of supernovas in other galaxies, including the 1987 supernova in the Large Magellanic Cloud, but nothing close to home. How amazing it would be to see something in the sky so bright that you could read by its light at night and still see it in the daytime sky. Meanwhile, we at least have the opportunity to continue to study the remnants of past supernovas and enjoy the new discoveries surrounding objects like Kepler's Supernova.

(Continued on page 5)

NASA SPACE PLACE

Twinkle, Twinkle, Variable Star**By Dr. Ethan Siegel**

As bright and steady as they appear, the stars in our sky won't shine forever. The steady brilliance of these sources of light is powered by a tumultuous interior, where nuclear processes fuse light elements and isotopes into heavier ones. Because the heavier nuclei up to iron (Fe), have a greater binding energies-per-nucleon, each reaction results in a slight reduction of the star's mass, converting it into energy via Einstein's famous equation relating changes in mass and energy output, $E = mc^2$. Over timescales of tens of thousands of years, that energy migrates to the star's photosphere, where it's emitted out into the universe as starlight.

There's only a finite amount of fuel in there, and when stars run out, the interior contracts and heats up, often enabling heavier elements to burn at even higher temperatures, and causing sun-like stars to grow into red giants. Even though the cores of both hydrogen-burning and helium-burning stars have consistent, steady

energy outputs, our sun's overall brightness varies by just $\sim 0.1\%$, while red giants can have their brightness's vary by factors of thousands or more over the course of a single year! In fact, the first periodic or pulsating variable star ever discovered—Mira (omicron Ceti)—behaves exactly in this way.

There are many types of variable stars, including Cepheids, RR Lyrae, cataclysmic variables and

consistent fashion, but in the case of pulsating variable stars the outer layers of stellar atmospheres vary. Initially heating up and expanding, they overshoot equilibrium, reach a maximum size, cool, then often forming neutral molecules that behave as light-blocking dust, with the dust then falling back to the star, ionizing and starting the whole process over again. This temporarily neutral dust absorbs the visible light

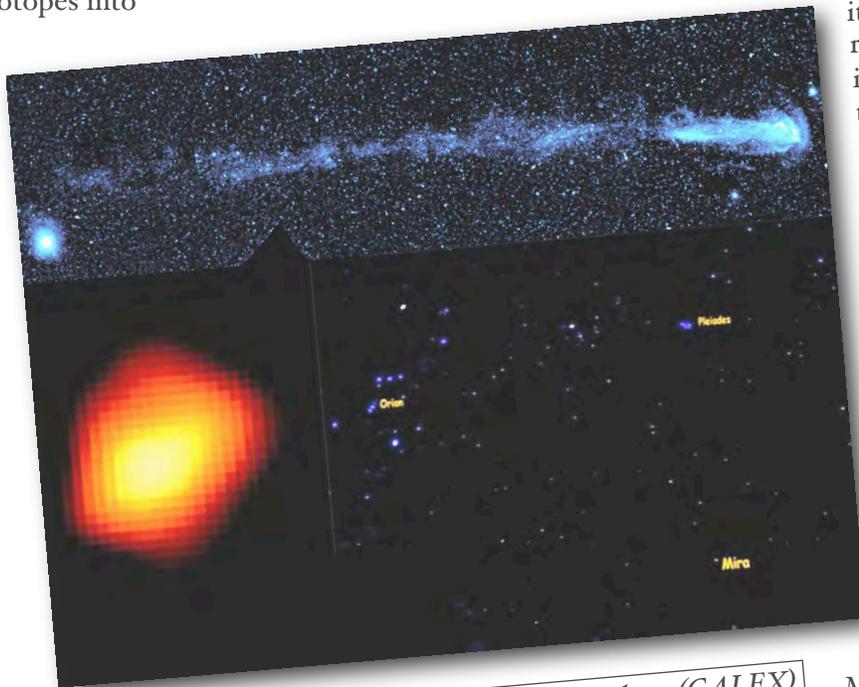
from the star and re-emits it, but as infrared radiation, which is invisible to our eyes. In the case of Mira (and many red giants), it's Titanium Monoxide (TiO) that causes it to dim so severely, from a maximum magnitude of +2 or +3 (clearly visible to the naked eye) to a minimum of +9 or +10, requiring a telescope (and an experienced observer) to find! Visible in the constellation of Cetus during the fall and winter from the Northern Hemisphere,

Mira is presently at magnitude +7 and headed towards its minimum, but will reach its maximum brightness again in May of next year and every 332 days thereafter.

Shockingly, Mira contains a huge, 13 light-year-long tail -- visible only in the UV -- that it leaves as it

rockets through the interstellar medium at 130 km/sec!

(Continued on page 5)



Images credit: NASA's Galaxy Evolution Explorer (GALEX) spacecraft image of Mira and its tail in UV light (top); Margerita Karovska (Harvard-Smithsonian CfA) / NASA's Hubble Space Telescope image of Mira, with the distortions revealing the presence of a binary companion (lower left); public domain image of Orion, the Pleiades and Mira (near maximum brightness) by Brocken Inaglory of Wikimedia Commons under CC-BY-SA-3.0 (lower right).

more, but it's the Mira-type variables that give us a glimpse into our Sun's likely future. In general, the cores of stars burn through their fuel in a very

MISCELLANEOUS

Reflections

(continued from page 1)

It is very easy to help with the viewing, it is only for about 1-1.5 hours and you really do have fun. But, please arrive about 30 minutes prior to the advertised start time so you have some bright twilight to set up and then stay to help put everything away properly at night. Please don't show up late and then disappear to avoid the brief labor of setup and breakdown. StarWatch is hosted by us, the club, so we need to take care of the event. The planetarium staff will take care of the event if it is poor weather with an alternate live tour of the night sky in the planetarium theater.

October's highlighted constellations are: Pegasus, Andromeda and Cassiopeia, so check these out and add them to your plan for your outdoor StarWatch sessions.

Before I close this month's article, I just want to encourage you to prepare for your outdoor session. I know no one likes to prepare for a fun night out under the stars. However, if you do a little bit of research and prepare a plan before you get outside, you will spend less time hunting what to look at. I know it takes a little bit more time, but I can speak from my own experiences when I tell you that doing a little planning makes a 500% difference. Try it the next time you go out!

I want to leave you this month with the following thought. The physicist, Henri Poincaré wrote: "Astronomy is useful because it raises us above ourself; it is useful because it is grand; ... It shows us how small is man's body, how great his mind, since his intelligence can embrace the whole of this dazzling immensity, where his body is only an obscure point, and enjoy its silent harmony." We all know that we humans only use a very small percentage of our total brain mass. Yet for many years, and

even in current times, there are many who still do not understand how very small we are in the overall universe. Look at the pictures of the earth from Mars. It looks smaller than our smallest planet Mercury. Henri Poincaré, I think, inspires us to push the limits of our intelligence. Astronomy is grand to say the least, it inspires our music, stories, and art to list only a few. We understand many times more than the astronomers before us, but even all that knowledge will fit on the head of a pin in comparison to what is left to learn. I cannot say what the next generation will focus their research on, as for me I hope those who come a hundred years later will look at the research we do and say our efforts helped to build their foundation. What more can we ask?

Until next time, clear skies...

Happy Birthday

(continued from page 3)

References:

Kepler's Supernova - Wikipedia
http://en.wikipedia.org/wiki/Kepler's_Supernova

<http://spider.seds.org/spider/Vars/sn1604.html>

Chandra :: Photo Album ::
 Kepler's Supernova Remnant ::
 September 11, 2012

<http://chandra.harvard.edu/photo/2012/kepler/>

Space Place

(continued from page 4)

Look for it in your skies all winter long, and contribute your results to the AAVSO (American Association of Variable Star Observers) International Database to help study its long-term behavior!

Regular Contributors

WILLIAM TROXEL



William is the current chair of the club. He is currently a deliverer for Little Debbie products.

TERRY ALFORD



Terry is a founding member since 1980 and has been chair many times. He has worked as an astronomy lab instructor at ETSU since 2001.

ROBIN BYRNE



Robin has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

ADAM THANZ



Adam has been the Editor for all but a number of months since 1992. He is the Planetarium Director at Bays Mountain Park as well as an astronomy adjunct for NSCC.

Check out some cool images and simulated animations of Mira here: http://www.nasa.gov/mission_pages/galex/20070815/v.html. Kids can learn all about Mira at NASA's Space Place: <http://spaceplace.nasa.gov/mira/en/>

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The Bays Mountain Astronomy Club



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Dues:

The Bays Mountain Astronomy Club requires annual dues for membership. It covers 12 months and is renewable at any time.

Rates:

\$16 /person/year

\$6 /additional family member

If you are a Park Association member, a 50% reduction in fees is applied.

Find out more at our website:

<http://www.baysmountain.com/astronomy/astronomy-club/>

🍏 Made on a Mac!

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