

SPECTRUM

Northern Cross Science Foundation Newsletter

November, 2017

Looking Up

NOTICE

November Meeting Date Change

The November General Meeting will be held on the second Thursday this month,

November 9 th.

This is a one time schedule change. We will continue our first Thursday General Meeting schedule in December.

November 9, Thursday

General Meeting

7:00 p.m. - Astronomy 101

7:30 p.m. - Main Program

Business Meeting to Follow

November 16 Thursday

Board Meeting

7:30 p.m.

House of Jeff Setzer

December 7 Thursday

General Meeting

7:00 p.m. - Astronomy 101

7:30 p.m. - Main Program

Business Meeting to Follow

First-Seen Neutron star collision creates light, gravitational waves and gold.

Adapted from Ashley Strickland CNN article 10/16/17

For the first time, two neutron stars in nearby galaxy NGC4993 have been observed engaging in a spiral death dance around one another until they collided. What resulted from that collision is being called an "unprecedented" discovery that is ushering in a new era of astronomy, scientists announced this month.

The collision created the first observed instance of a single source emitting ripples in space-time, known as gravitational waves, as well as light, which was released in the form of a two-second gamma ray burst. The collision also created heavy elements such as gold, platinum and lead, scattering them across the universe in a kilonova similar to a supernova -- after the initial fireball. It is being hailed as the first known instance of multimessenger astrophysics: one source in the universe emitting two kinds of waves, gravitational and electromagnetic.



Artist conception of colliding Neutron Stars.

Gravitational waves were first directly detected two years ago, proving Albert Einstein's theory of general relativity, and recently, three scientists were awarded the Nobel Prize in Physics for their work on that first detection. Those gravitational waves were the result of two black holes colliding, and the signal lasted for only a fraction of a second. Because black holes don't emit light, these waves were invisible and only "heard" as thumps.

This discovery of two neutron stars colliding to create the same type of waves, in addition to light, allowed astronomers to study gravitational waves in a new way. The signal lasted for 100 seconds, providing them with even more data and insight. It revealed that light and gravitational waves travel at the same speed. Theories and mysteries were tested and revealed in this rare observation. Events like this happen less than 100 times per million years in a galaxy. But the LIGO and Virgo detectors will become more sensitive in the future to look for similar events in tens of millions of galaxies.

The discovery confirms that gamma-ray bursts can result from the collision of neutron stars, as well as that heavy elements are created as a result of violent collisions between stars. It confirms what these neutron stars look like when they collide. And it confirms that gravitational waves and light can happen together.

Neutron stars are the smallest in the universe, with a diameter comparable to the size of a city like Chicago or Atlanta. They are the leftover remnants of supernovae. But they are incredibly dense, with masses bigger than that of our sun. So think of the sun, compressed into a major city. Now, think of two of them violently crashing into each other. "This is more energy than has been released by the sun during its entire life, and this was released during just tens of seconds as the neutron stars (spiraled) together."

People tend to think that all of the elements on the periodic table form in nature, such as at the centers of stars, but it isn't true. That occurs only up to the level of iron. Anything heavier than that can't be formed naturally; it results from violent collisions of dense stars or explosions during the collapse of massive stars. That was what astronomers witnessed during this particular collision. The heavy elements are dispersed in the gas in galaxies, which settles down and condenses to form stars and discs around stars. That forms planets, and the planets have the heavier elements in them, including gold and platinum.

The initial supernova that created the neutron stars also created elements up to the weight of iron. This latest collision of the neutron stars, resulting in a kilonova, created all of the elements heavier than iron. So the entire life cycle of these stars created every element represented on the periodic table.

When Virgo and LIGO, working together for the first time in a collaboration of scientists across the world, detected the signal of the gravitational waves in August, an alert was sent out to observatories across the world. They embarked on a quest to pinpoint where in the sky the signal was coming from so they could observe it in detail, especially when they realized it was accompanied by a gamma-ray burst. Although the collision itself happened 130 million years ago, because of its distance in light-years, we witnessed it from Earth on August 17.

Any scientist involved in the seconds, days and weeks after this detection will admit that they've {Con't on Pg.4}

October Meeting Minutes

By Kevin Bert

The October Business meeting of the Northern Cross Science Foundation was held at the GSC Technology Center in Germantown. President Jeff Setzer called the meeting to order at 8:55 pm. He welcomed 20 members and guests and then asked for standard reports.

Treasurer Gene Dupree reports that an Observatory donation jar amount of \$158 was deposited into the checking account. The Observatory account balance was at \$551.40.

Secretary Kevin Bert reports that 55 members are now on the roster. Our region of the Astronomical League will hold its convention for 2018 at Sturgeon Bay on the 4th and 5th of May. It has been a while since the National Convention was held in our part of the country. In 2018 it will be held in Minneapolis on July 11 – 14. More details to come in upcoming Spectrums for NCRAL and AICoN.

The Observatory Director Dan Bert reports that the kick plate of the south east door remains loose and should avoid being used. Needed repairs hope to be done by the end of the year. Observatory leaders are still needed for the final two public viewing nights on October 27 and 28. Operators should contact him if interested. There was an article on some issues with the observatory's 5-inch imaging refracting telescope in the last Spectrum. Be sure to have proper training and be checked out if you plan to use it.

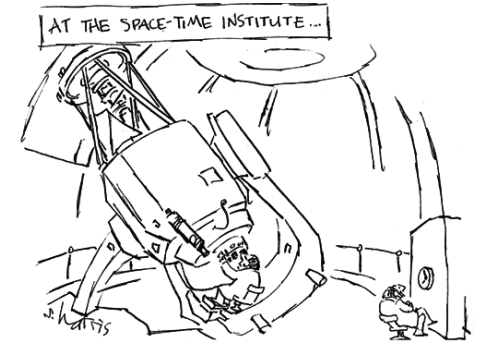
Jeff Setzer reminded members that nominations will be taken for some vacating board members at the next meeting. It is hoped that some members will step up and run for the December election. Duties for board members include attending a monthly meeting (3rd Thursday), to discuss NCSF activities. Board members serve a three year term and vote among themselves for officer positions at the start of each year.

Jeff also mentioned that early next year a committee would start up to start work on the regional convention that the Northern Cross will host in 2020.

West Bend will be the recipient of the next Library Telescope. A fourth telescope is in the works with a library yet to be chosen.

Under upcoming events for October include a viewing event at Horicon Marsh on the 14th. A Haunted Hike at Harrington Beach will be held on the 21st. The 27th and 28th are public viewing nights at Harrington Beach with an additional viewing night at Pike also on the 28th.

With no further business Jeff closed the meeting at 9:15 pm.



Imaging Report *Ernie Mastroianni & Nolan Zadra*

In October, Northern Cross imagers took advantage of some of the great weather to do make time exposures at the Plunkett Observatory, but the refractor's CGE go-to mount was not accurately targeting objects. Members Ernie Mastroianni, Jim Macak and Mike Borchert worked jointly to recalibrate the mount to the point where it was close to centering targets in a 12mm eyepiece. The trio stayed on for some imaging lessons using the club's 5-inch refractor and SBIG color astro camera.

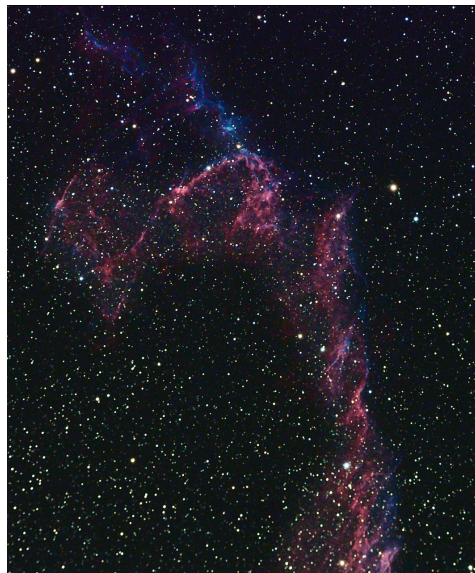
Their results, after nearly an hour of sub-frames and half a dozen dark frames, produced this view of the Veil Nebula.

Meanwhile, Wally Gersmehl loaned the club his AT65 triplet wide field refracting telescope for use as an additional photography and guide scope. Nolan Zadra and Gersmehl removed the 72 mm scope that was currently mounted and installed the AT65. Early results seen by Zadra indicate that this will be a very good imaging telescope.

A couple of further items: Achieving proper focus with the 5-inch refractor and the SBIG camera has required two extension tubes in tandem, a setup that is prone to flexure and slippage. So Mastroianni and Zadra will purchase a 3.5 inch Televue extension tube which will be donated to the club and kept with the imaging accessories at the observatory. Using this one extension tube will allow the camera to reach focus and reduce flexure. Also, Mastroianni notes that the hand paddle for the CGE

mount does not keep precise time. He has seen drift off 30 seconds to a minute from accurate time after just one month. Imagine how far a star will drift in one minute, as seen at moderate power, and you'll have a good idea of how much this can affect accurate go-to performance.

So before an imaging run, telescope operators should reset the clock to within a second or two of the proper time. You can reference time with your cell phone, or set your watch to the accurate time just prior to your observing run. Instructions for doing this are in the cabinet, but the mount's paddle display will prompt you through a time reset.



Plunkett Observatory *by Mike Borchert*



Photo by Mike Borchert

I was at the observatory this week, weather was fantastic for the second week in October, in the 70's, seeing was great. Ernie was mentoring Jim and myself. Thank you Ernie. Under expert guidance a compilation of exposures was taken, of the Veil Nebula. (See Ernie's post processing result.) While the CCD imager was working, I went outside and took a shot east, over Lake Michigan. Ernie's suggestion to "paint the observatory" turned out well. The small cluster of stars are the Pleiades, or the Subaru. Later, around 11 o'clock as I was leaving Orion was coming up in the East, It looked like it was rising from Lake Michigan. Winter is coming.

November General Meeting

Astronomy 101 - Kevin Bert

"Angular Measure of Distances"

Conveying the size of an object or the distance between objects has a standard used by astronomers. If you think about it miles or light years can be useful but only when a distance to an object is known. Using The Universe Sampler program we will look at the chapter that talks about this standard scale and the tool that almost all of us have to make crude measurements.

Constellation of the Month:

Cassiopeia



Main Program - Joyce Jentges

Observing Programs

Beginning observers often wonder what to look at in the sky. The Astronomical League has many programs for the beginner. Joyce Jentges will give information about several of the observing programs that a beginner could start with to help increase skills and familiarity with the sky.

Joyce's talk will compliment the ongoing Astronomy 101 class presented by Kevin Bert which has been highlighting the Astronomical Leagues "Universe Sampler Handbook".

RELATED INFO

NCSF Welcomes New Member

Shariff Attaya

Leaders for Public Viewing

Our 2017 Public Viewing Season has ended. That is not to say that there won't be additional public viewing opportunities throughout the Fall and Winter. Sky & Hikes with Public Observing at Pike Lake, Horicon Marsh, and Harrington Beach in Winter are examples of such possibilities. Watch our Club website as well as this Newsletter for additional information.

In addition, those of us with a hardy constitution observe throughout the winter. Many of the clearest nights and best objects are only available in the cold weather. Another thing to consider is the Plunkett Observatory often sits unused on clear winter nights.

October Public Viewing Events

Haunted Hike—October 21

By *Charlotte DuPrees*

Friends of Harrington Beach, candle light fall hike. This event started before dark so we only had the Moon to start the evening. The sky started out clear, with a two day old crescent Moon. By 7:45 the clouds had taken over. At 8:30 the sky was mostly clear and then cloud covered by 9 then totally clear by 9:30 and closed up after 10. There was a steady line of visitors, because they had to wait for the shuttle truck. We kept moving the scope to the clear sky openings. The visitor count was over 150. Set-up in the parking lot was Rich S., Joyce, AL, Tyler, and Jeff.

Harrington Beach - October 27 & 28

By *Ernie Mastroianni*

Though thick clouds blocked the stars on October 27 and 28, it did not stop a motivated middle school teacher from paying a visit to Harrington Beach State Park on both nights. Amanda Glunz, a bilingual science teacher at Milwaukee's Audubon Middle School, convinced a few of her students, their parents, and a colleague make the long drive from Milwaukee. So despite the starless sky, the students enjoyed opening the roof and getting a short tour of the observatory.

We viewed astrophotos on my laptop taken by club members, discussed the possibilities of life elsewhere in the universe and appreciated having access to the night sky at a public park far from urban light pollution. Ernie Mastroianni and observing assistant Mike Borchert also used the time to create dark frames with the SBIG camera.

Pike Lake - October 28

By *Charlotte DuPree*

The weather was a cloudy day, but we stopped at Pike lake anyway. We tried to find any evidence that the clouds were breaking up, by looking for a glow where the Moon should be. It started to mist so we gave up and headed for home. Gene mentioned about going to Lac Lawrann to see what activities were happening there. As we started on the luminary walk we saw Mariah, Kaz's daughter, and her husband

Stephan. The trail was a little over a mile and we enjoyed the walk together. After we made it back Gene saw Dan and Laura inside the building, and we all had a nice talk.

Lac Lawrann - October 28

By *Rick Kaz*

Clouds were the theme this weekend. With the weather calling for cloudy skies until midnight, we cancelled setup for the Luminary Walk. I spoke with Paul from the Friends of Lac Lawrann and he discussed an alternate setup site in the future without all the lights. More to come.

The Quiz

This quiz, developed in Princeton in 2005 by psychologist Shane Frederick, is designed to test your ability to ignore your gut response and think slower and more rationally. Or in psychology-speak, how good are you at ignoring system one (intuition) thinking in favor of system two (analytic) thinking? To succeed in the CRT, you must spend time reflecting on your answer and question your intuitive response.

Of course, to prove your genius you must get all three questions correct but speed also matters. Speedier answers is another sign of a higher IQ.

So, how smart are you really? Remember, the questions might not be quite as simple as they first seem. Even students at some of the world's top universities (including Yale and Harvard) failed to get all three answers correct in a 2003 study. In fact, only 17 percent achieved a perfect score.

Quiz

1. A bat and a ball cost \$1.10 in total. The bat costs \$1 more than the ball. How much does the ball cost?
2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?
3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

Answers are on Page 4.

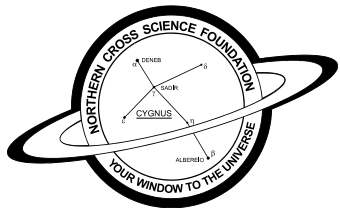
Annual Board Nominations

November is the month each year NCSF begins taking nominations for open Board positions. The process continues at the December General Meeting when nominations end and a vote is taken.

This year there are no open Board positions to fill as current Board Members are still serving all or part of their three year term.



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Jim & Gwen Plunkett
OBSERVATORY



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(Con't. from Pg.1)

slept little since. To them, it is a once-in-a-lifetime discovery. The observation also came days before the total solar eclipse, so it's been hard for them to keep quiet about the discovery. Expect papers and more findings to be released in the weeks, months and years ahead.

(Answers to Pg-3 Quiz)

The Answers

1) 5 cents – *There's a very good chance you guessed 10 cents. The answer is actually a little less – a 5 cent ball plus a bat costing \$1.05 will set you back \$1.10. And, of course, \$1.05 is exactly \$1 more expensive than 5 cents. (A Princeton study found that people who responded 10 cents were "significantly" less patient than those who got the right answer.)*

2) 5 minutes – *Your gut instinct might be to say 100 minutes. Fortunately, it wouldn't take quite so long. From the question, we can determine it takes exactly 5 minutes for 1 widget machine to make 1 widget. Therefore, it would take 5 minutes to make 100 widgets from 100 widget machines.*

3) 47 days – *You might have guessed 24 days. It seems intuitive to half the number of days because you're halving the size of the lily pad patch. But if the area of the lake covered in lily pads doubles every day, it would only take one day for it to go from being half covered to fully covered. Take one day away from 48 days and you're left with 47.*

SPECTRUM

Published by the Northern Cross Science Foundation, Inc. A non-profit organization based in South-eastern Wisconsin.

NCSF is a member of the North-Central Region of the Astronomical League.



NCSF supports the **International Dark Sky Association**

This Issue, along with back Issues of SPECTRUM, can be found on the NCSF Web Site.

Monthly Meeting Information

7:00 p.m. Astronomy 101 Mtg.
7:30 p.m. Main Program
Location at the -

GSC Technology Center
W189 N11161 Kleinmann Dr
Germantown, WI 53022

Spectrum Newsletter
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