Shoalhaven Astronomers Inc.
www.shoalhavenastronomers.asn.au

Volume 19
Issue 3

Astro Flyer

MARCH 2019

Club News

Hello Everybody,

It was so good to hear a talk by Alan Plummer on variable stars, especially the one in Dorado. I didn't know that this variable star influenced so much of Sci Fi writing in the mid century in the 1900s . I was equally surprised in our shared interest in Sci Fi writings of the time. Now, looking back I wished I had asked him about his professional musical instrument. All in all a mighty fine night. Thanks Tracey and Tony N, John G, Chris O'H, and Kevin W in helping to set the room up for the night.

Frank Gross, President

Next monthly meeting will be held at the Shoalhaven Campus of the Uni of W'Gong, George Evans Road off Yawal Road, West Nowra, March 15th, 7pm for 7.30 start.

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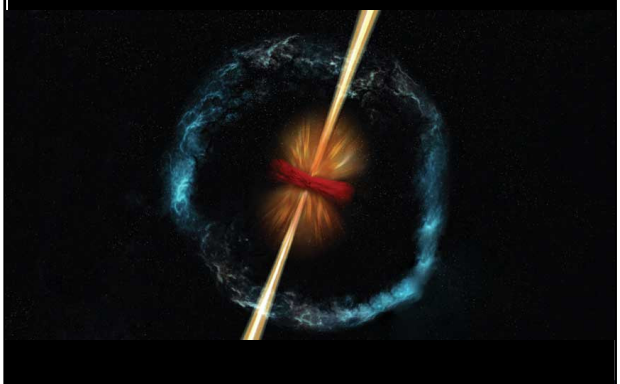

MOON PHASES

New Moon	First Quarter	Full Moon	Last Quarter
April 5	Mar 14	Mar 21	Mar 28

Viewing Nights

Club viewing nights are selected to provide viewers with the best possible conditions for good viewing. They are held on specific Saturdays at different locations around Nowra.

The next club viewing night will be on Saturday 27April (back-up night Sun 28 April) at the new viewing site. Go to the university on George Evans Road and go straight ahead through the second turning circle to the new viewing site.

More viewing nights p3

OUT THERE
Bob Turnbull OBSERVATION OFFICER

MARCH to APRIL

Greetings and good viewing to you all!

METEOR SHOWERS
Gamma-Normids, began on February 25th and will peak in 14th March, there are only a few, so the rate is low and best timed after midnight, since the constellation Norma rises late in the evening, when we have a Moon free sky.

DOUBLE STARS
No doubt my colleagues will go into greater detail in their Astro Flyer columns, however Dunlop 94, (all sky map 1.0) near Eta Carina, is a beautiful bright and colourful double. The two stars are 4.9 and 7.5 with a separation of 15 seconds at an angle of 20 degrees. The primary K-4-5111 is a bright yellow-orange, and the secondary is blue.

PLANTETS

SATURN
Rises at 11.00 pm in mid April in Sagittarius and on the 25th April is occulated by the waning gibbous Moon, but can only be seen from East of an imaginary line drawn between Rockhampton and Adelaide, and we may be on the southern extremity of this bearing! SO GOOD LUCK!
During this month, the planet will be at a high view in the sky and be at maximum tilt to see the shadow of the rings to advantage.

MERCURY
Will be at it's best in the morning Eastern sky with elongation of 28 degrees East of the Sun on the 12th of April.
An interesting binocular exercise is to view on the 3rd of April with Mercury and Neptune at 0.3 degrees apart together with 4th magnitude Pi Aquarii at a distance of 222 light years from our Solar system!

VENUS
On the 17th of April, Mercury and Venus will appear 4 degrees apart from the waning. On the 2nd of April in the morning sky, Venus will be 5 degrees from the waning Moon, Venus will also have a close encounter with Neptune, when they will be 0.5degrees apart.

Happy Viewing

Bob Turnbull

VIEWING NIGHTS

Club/Social Viewing Nights are on Saturday evenings "just" Before Sunset. Viewing nights are for members and invited guests. The contingency plan for poor weather on the proposed viewing night is to meet the next night (a Sunday night) .

Woncur Road, South Nowra (Head South down The Princes Highway, turn right at BTU Road, Woncur Road is the street first on the left).

University Viewing site. On the way to the university on George Evans Road go straight ahead through the second turning circle to the new viewing site.

Dates for Club/Social Viewing Nights for 2019 On Saturday Nights As Follows:

SHOALHAVEN ASTRONOMERS SUGGESTED VIEWING NIGHTS

FEBRUARY-JUNE 2019

Month	Saturday or Sunday	Place	Time
FEBRUARY	9th or 10th	Shoalhaven Campus	1 hr after s/set
MARCH	9th or 10th	"	"
APRIL	27th or 28th	"	"
MAY	11th	" or Woncur Rd.	"
JUNE	22nd or 23rd	" NEW SITE ??	"

Bring your scopes and or binoculars and a small folding chair, a decision on the day planned, depending on viewing conditions, by the club president and his deputy.

Email information if details are changed, to all, or contact Frank for changes.

Solar viewing BBQ lunches (BYO) may be held and these will be advised ahead of these events. Special events such as Comets, eclipses etc. may also warrant members night viewings.

Bob Turnbull
OBSERVATION OFFICER

The Visual Astronomer

Part 4

Eugene O'Connor

Meeting in The Field of Dreams

There was a time back at the turn of the century when our group met in the Falls Creek Primary School. Back then, if the night was favourable, we could move out to a relatively clear viewing field where cars and telescopes could be taken and an hour of clear viewing with assembled telescopes was not uncommon. My notes from the February 2001 Meeting bring back memories…

Near the end of our regular, clouded-out monthly meeting, where we hotly debated the conclusions of the failure of recent studies of nearby stars to reveal anything but Jove giants whose size and erratic behavior would destroy any near-earth-size planets, we suddenly heard that most glorious cry, "The skies have cleared up!" Six of us took our muddled brains outside to see a resplendent night sky, cloudless and luminous with stars. Jupiter was slipping behind trees at that late hour, Orion was overhead, and Leo's head was inching up over trees in the East. Between us we had a 4" Vixen refractor with only a low power eyepiece and several pairs of binoculars.

New miniature binoculars with a mere 25mm objective had arrived on the market. Called Optek , they were beautifully crafted in Korea, very impressive in daylight and nestled like a warm bird snugly on the open hand. We had several powers to test for the local telescope shop owner and set about comparing powers of 7, 10 and 12 against a variety of 7X35 and 7X50 monsters in comparison.

We flipped between binoculars as we studied M41 , M42 and the Jewel Box near the Southern Cross. While the test binoculars were sharp and showed good colour, I had a problem with both steadiness and eye-relief. I am one of those viewers who hold binoculars well forward on the tubes and jam them into my eyebrow ridges! Impossible with Opteks, so I soon concluded my well-loved 7X35 Russian Tentos were not going to be replaced.

For a brief moment I bemoaned the fact that we did not have a larger telescope on this great night and then I decided to just trawl with binoculars through our brilliant home galaxy between Orion and the Southern Cross, while others moved through the familiar objects and newcomers were taken on tentative steps though constellations.I sat on the tail-gate of a friend's car, soaking up that magic night sky, while the possums shrilled and chirruped in the nearby woods. I took great delight in hearing the various enthusiastic reactions to the Orion Nebula and the Tarantula Nebula in the Vixen . I realised as I listened that everyone sees colour and shape so differently but all have the desire to add to their store of sky knowledge while returning over and over again to familiar objects. Several bright meteors streamed across the Northern sky causing us to pause as viewers looked up --too late.

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Praesepe: The Beehive(M44). A Fine Binocular Object

A different viewing site can bring its own reward. I was able to observe M44, the misty Praesepe for the first time in several years, low in a dark Northern sky and realised how its setting, almost centrally located in a rough square of four stars resembles a painting to the naked eye. Binoculars show close doublets of stars forming a north-facing wedge.

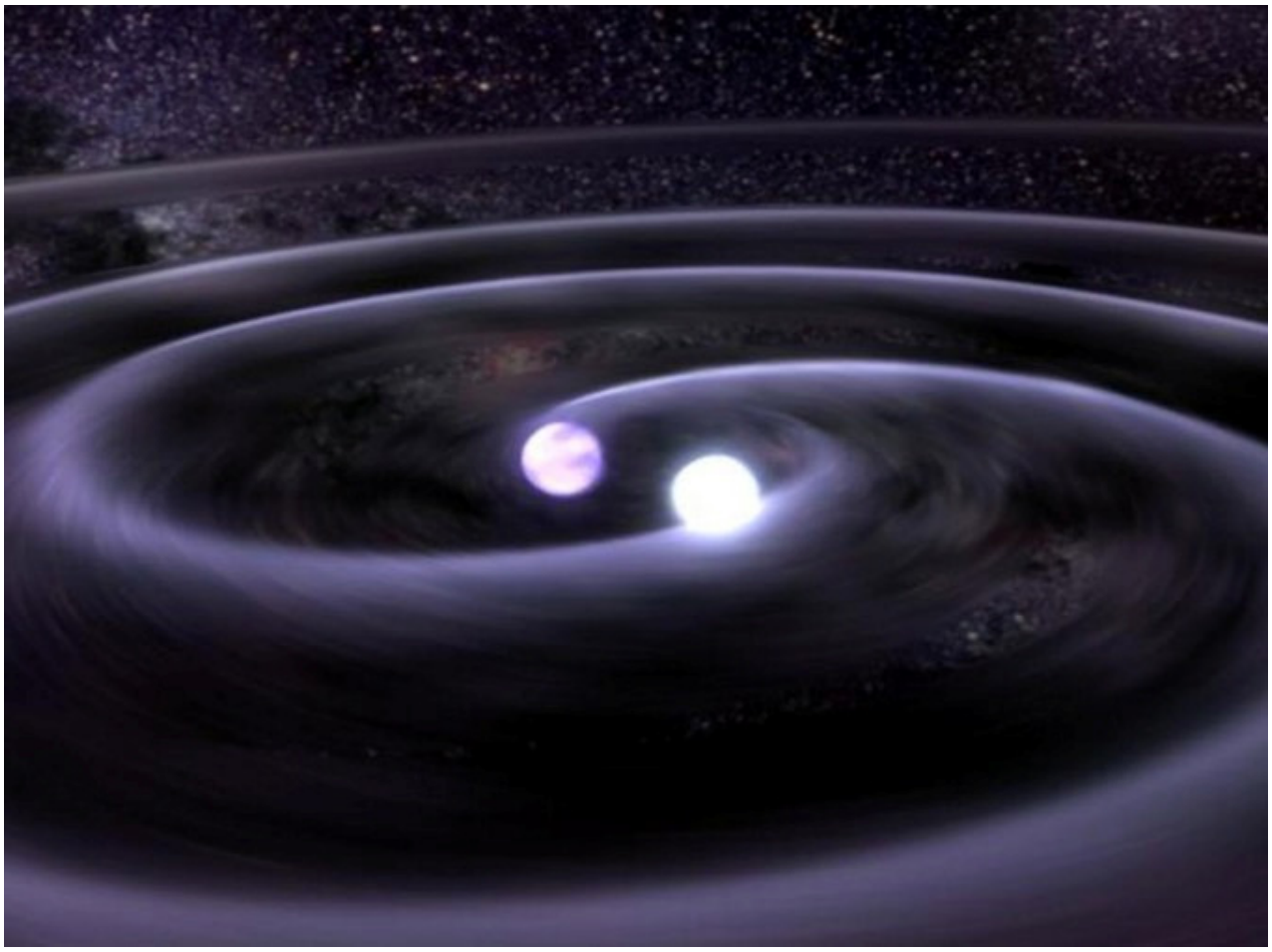
Ephemeral nights such as this can never be planned but always invigorate. They are remembered weeks and months later and are treasured by those that are there to share the experience. Sharing so often intensifies the quiet cosmic surprises we find in solitude in our own back-yards.
Often, if the night is clear and we have withdrawn from computers and TVs for an hour, we can be surprised at how much detail can be observed in the night sky.

At the next meeting I will be handing out viewing guides and explaining the location of five great galaxies visible in binoculars in a very familiar constellation. You can all guess which one that is…!

Astro Events from Frank Gross

Gravity waves may help resolve Hubble constant conundrum

16 February 2019 Astronomy Now



An artist's impression of two neutron stars on the verge of merging, generating gravitational waves that distort the fabric of space. Image: NASA/Tod Strohmayer (GSFC)/Dana Berry (Chandra X-Ray Observatory)

The emerging field of gravitational wave astronomy may help resolve a vexing cosmological conundrum: a discrepancy between the two foremost techniques for determining the Hubble constant, a measure of how fast the universe is expanding and a key indicator of the size, shape and future evolution of the cosmos.

One technique uses relatively nearby Cepheid variable stars and much more distant type 1a supernovae as "standard candles," allowing them to measure the current rate of the universal expansion and how it has changed over the history of the universe. Measured in kilometres per second per million parsecs (3.26 million light years), the Hubble constant computed in this manner comes to 73.2.

Another technique involves close study of the microwave background radiation left over from the Big Bang. In 2015, a team of astronomers analyzed data collected by the European Space Agency's Gaia spacecraft and came up with a Hubble constant of 67.8.

Other techniques provide slightly different answers. But if the underlying assumptions about the early universe are correct, they all should agree.

Cont...2

"We can measure the Hubble constant by using two methods, one observing Cepheid stars and supernovae in the local universe, and a second using measurements of cosmic background radiation from the early universe," said Hiranya Peiris, professor of physics and astronomy at London City College. "But these methods don't give the same values, which means our standard cosmological model might be flawed."

A new study in Physical Review Letters shows how gravitational waves generated by the mergers of binary neutron stars could be used to come up with a more reliable value for the Hubble constant.

Gravitational waves generated when two neutron stars spiral closer and closer together can be detected by the Laser Interferometer Gravitational-Wave Observatory and the Virgo detectors, providing a measure of how far the system is from Earth. By studying the light from such explosive mergers, the system's velocity can be determined. From those data, an accurate value for the Hubble constant can be computed.

"We've calculated that by observing 50 binary neutron stars over the next decade, we will have sufficient gravitational wave data to independently determine the best measurement of the Hubble constant," said lead author Dr Stephen Feeney of the Center for Computational Astrophysics at the Flatiron Institute in New York City. "We should be able to detect enough mergers to answer this question within 5-10 years."

Recent grants from the U.S. National Science Foundation, UK Research and Innovation and the Australian Research Council will fund LIGO upgrades expected to be in place by 2024 that will increase the volume of space the gravitational wave observatory can "see" by up to seven times. The upgrades are known as Advanced LIGO Plus.

"With it we expect to detect gravitational waves from black hole mergers on a daily basis, greatly increasing our understanding of this dark sector of the universe," said David Reitze, executive director of LIGO at Caltech. "Gravitational-wave observations of neutron star collisions, now very rare, will become much more frequent, allowing us to more deeply probe the structure of their exotic interiors."

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Closer Look at Neutron Star Crash Demystifies Huge Stellar Explosions

By Charles Q. Choi, Science & Astronomy

Illustration of two neutron stars merging

A hyper-detailed view of the first detected neutron star merger reveals how collisions between dead stars can generate some of the most powerful explosions in the universe, according to a new study.

In 2017, astronomers witnessed a pair of neutron stars merging for the first time. Neutron stars are the remains of large stars that died in cataclysmic explosions known as supernovas. The name derives from the fact that the gravitational pull of these stars is strong enough to crush together protons and electrons to form neutrons.

Researchers made the 2017 find by detecting ripples in the fabric of space and time known as gravitational waves, which radiated from a crash between a pair of neutron stars located about 130 million light-years away from Earth. Scientists followed up on the discovery of this merger, dubbed GW170817, with observations made from conventional telescopes.

A little over a second after GW170817's gravitational waves were detected, researchers spotted, via telescope, a short gamma-ray burst. Such bursts are the most powerful explosions in the universe. Each burst-generating event, in anywhere from milliseconds to minutes, gives off as much energy as the sun does during its entire 10-billion-year lifetime. The bursts are traditionally divided into two groups — long and short — depending on whether they last more or less than 2 seconds, respectively.

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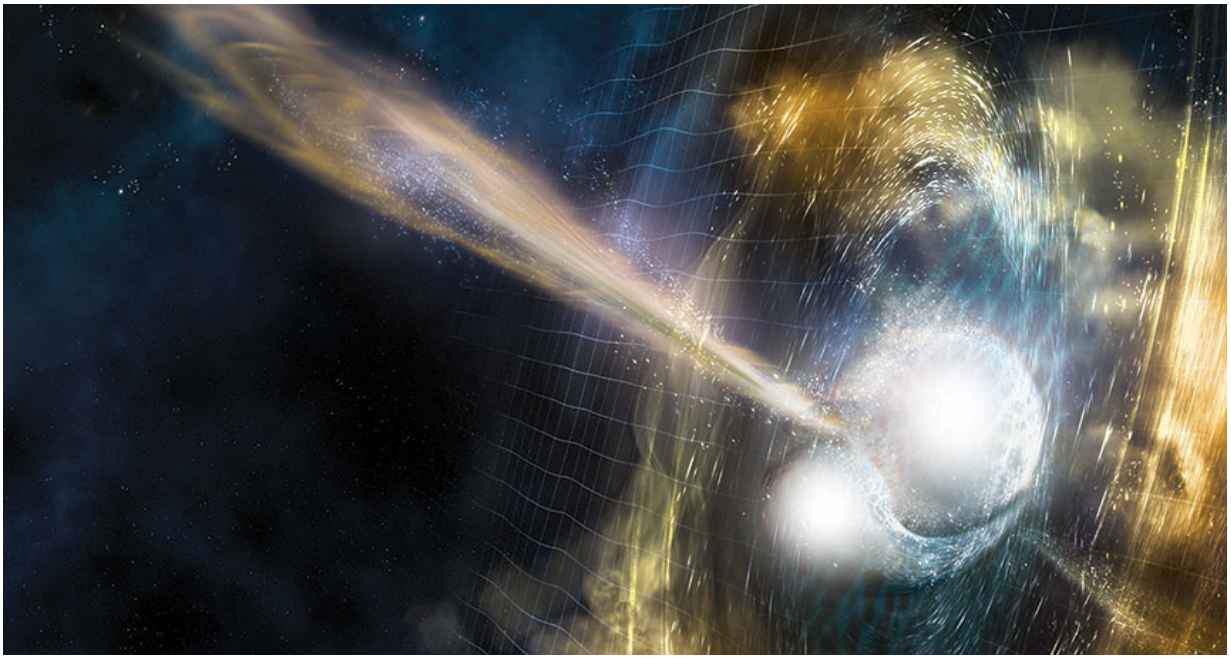

Illustration of a neutron star merger being blasted apart by a jet

The unusually long-lived radio and X-ray emissions seen from GW170817 have proven to be a challenge for scientists to explain. One possibility is that this puzzling afterglow was the result of powerful, narrow jets of radiation from remnants of the collision that drilled through the rest of the debris and were directed "off axis," or away from the line of sight of Earth. Another model suggests that these jets did not punch through the merger's scraps but instead heated them up, giving birth to an expanding cocoon of material.

Shedding light on GW170817's aftermath could illuminate the origins of short gamma-ray bursts, the study's researchers said. Previous work revealed that long gamma-ray bursts are likely caused by jets of material shot from supernovas at relativistic speeds, or ones close to the speed of light. "Short gamma-ray bursts, on the other hand, remained a puzzle," Om Sharan Salafia, an astrophysicist at the Astronomical Observatory of Brera in Italy and co-author on the new study, told Space.com.

Astro Events from Frank Gross

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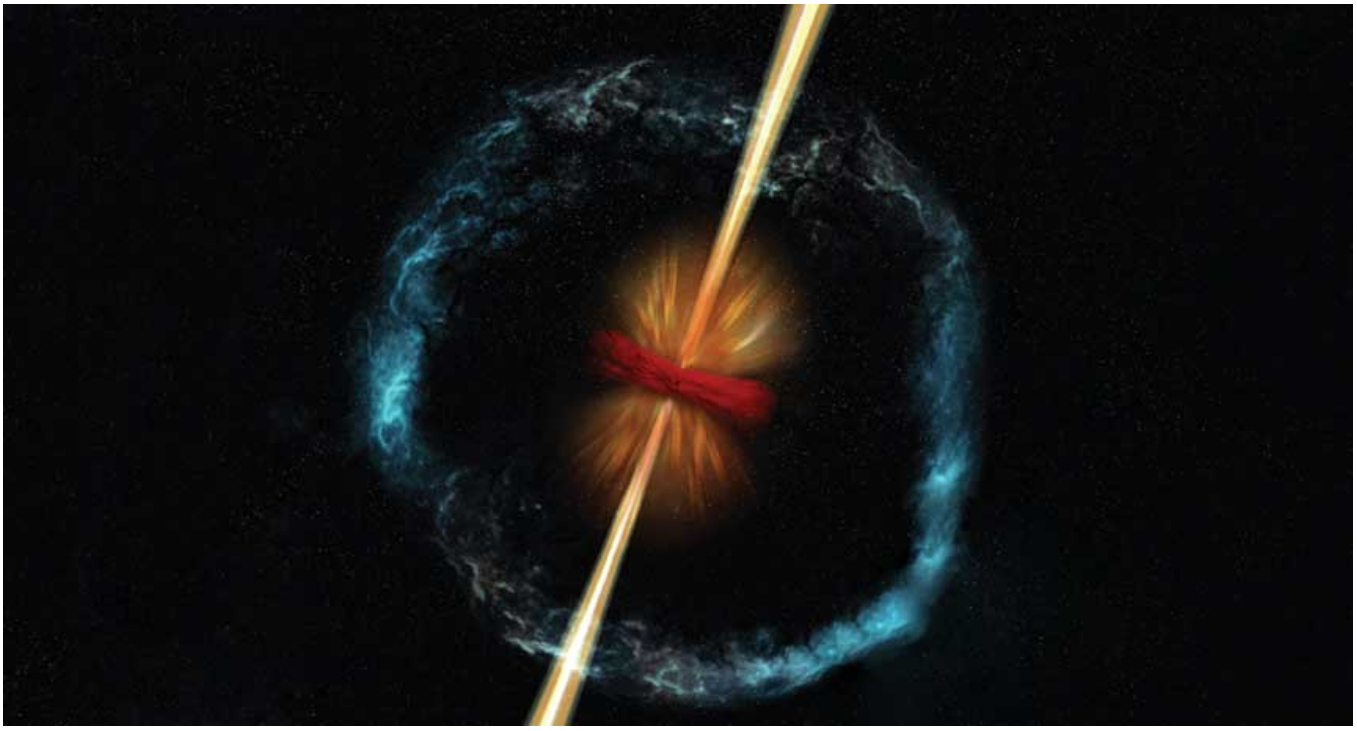

Visualization of a jet breaking through material released by a neutron star merger

The cause of GW170817's afterglow was under debate because previous research could not obtain images with enough resolution to deduce the size of these emissions' source. To help solve this mystery, Salafia and his colleagues used an array of 32 radio telescopes spread over five continents to examine the radio afterglow of GW170817 about 207 days after the merger. By combining data from this array, the researchers essentially created a single, extremely large radio telescope — one 7,380 miles (11,878 kilometers) wide and powerful enough to obtain a sharper picture of the explosion.

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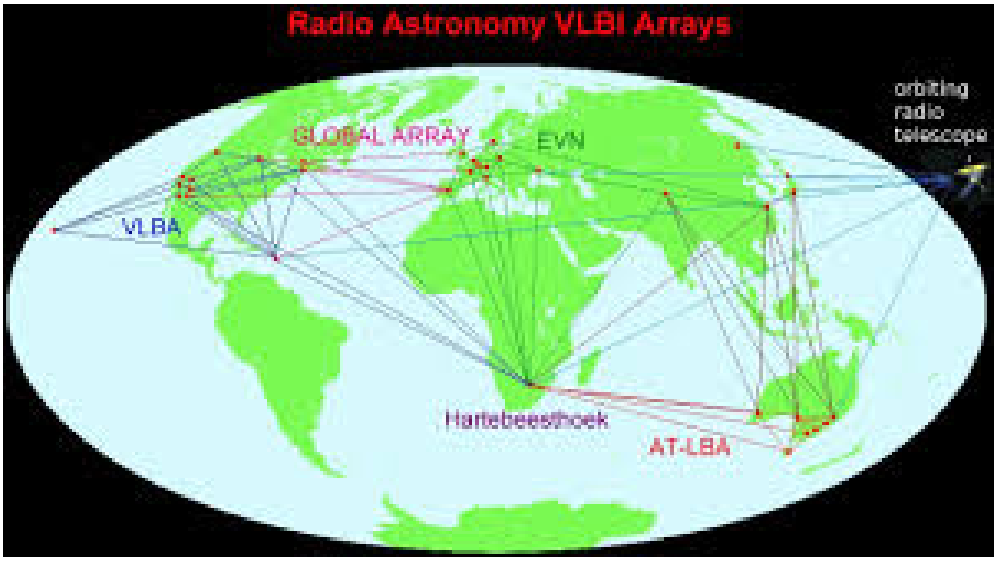


Radio telescopes around the world that recorded the 2017 merger of two neutron stars

These new findings suggest that this radio source has a relatively tight size, which does not support the cocoon model, the researchers said. Instead, the data suggest that GW170817 generated a jet moving at relativistic speeds capable of punching through surrounding debris into interstellar space and beyond.

"Our 'picture,' thanks to its extremely high resolution — close to the highest possible resolution for this kind of observation — could tell these two scenarios apart," Salafia said.
These findings "shed light on the nature of short gamma-ray bursts; similarly to their 'long' cousins, they are produced by relativistic jets," Giancarlo Ghirlanda, an astrophysicist at the Astronomical Observatory of Brera and co-author on the study, told Space.com. The researchers estimated that at least 10 percent of neutron star mergers generate such relativistic jets.

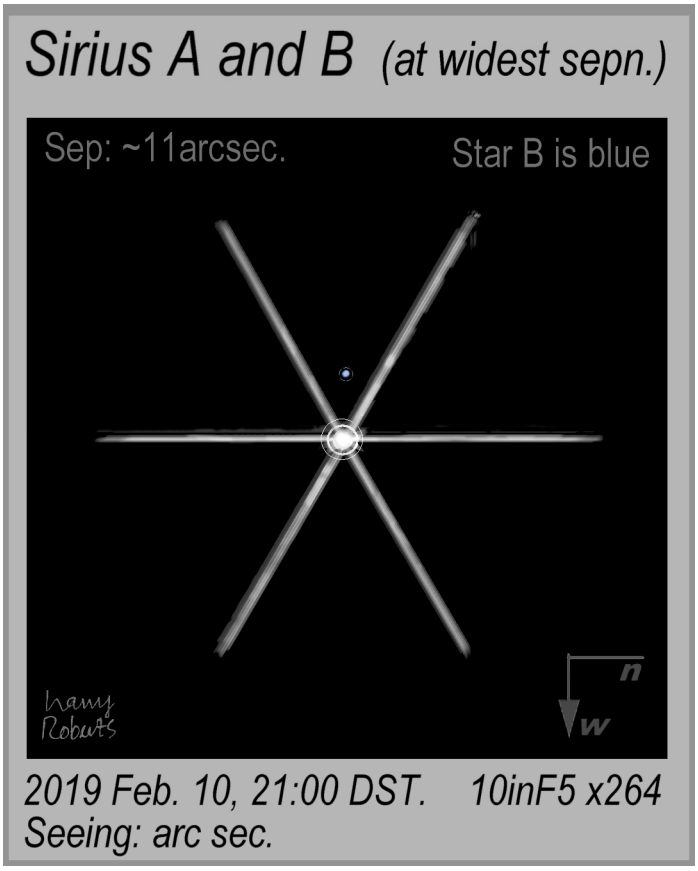
SIRIUS A and B by Harry Roberts

Sirius - at its widest!

Sirius; "Dog Star"; Alpha Canis-Majoris; brightest star in the night sky, is a remarkable sight! It's also a binary star, with a companion, the "Pup", in orbit around it.

When first viewed around 1960, in a 4 inch 'scope, the Sirius companion was some 9 arc sec from the primary – but was invisible! It was again widest in 1975; but no sightings! Over the decades since it has been much the same story; but not entirely! In 2010 the 'Pup' was forced into view using filters to suppress Sirius A. Once its location was known it could be viewed at times of good 'seeing' in a ten inch "Dob"; but was always furtive amid a 'mush' of scattered light.

How then to explain the view on 2019 February 10th from an Illawarra backyard? Hot days had ended with mild cool changes and the 10in scope was outside to normalise before viewing (indoors was still hot). A SW breeze helped. The mirror had been recently washed. Pup was now at its widest separation, 11 arcsec. The 'seeing' looked 'good' to the naked eye and the first target was Sirius, yet again!
In the eyepiece six thin diffraction spikes held a compact airy disc with just two rings; *no 'mush' at all!* No image motion of any kind! And there, well clear of star A, with black sky between, the blue Pup sat in regal isolation (Fig)! *Finally!*



After a quick sketch and some notes - other close doubles in Orion were checked; same story! Zeta Ori, Eta and the Theta1 sextet - all confirmed the exceptional seeing: it was as if viewing in a vacuum.

Pup is now some 11 arcsec and a bit north of east, from the primary: it 'follows' star A. While Rigel B, on the other hand, 'preceeds' the primary but is closer at 9 arcsec -an easy split.

Twenty minutes later conditions became more 'normal' and 'mush' threatened the Pup again. Likely the thick primary mirror was now warmer than its surroundings and tube currents were seen in afocal images. Yet some very fine views of nebulae were had on the night.

'Pup's Specs. Pup's period is about 50 years, separation varies between 3 to 11 arcsec, its brightness about 8 mag, compared to the -1mag primary.

Jim Kaler explains Pup's white-dwarf density is 1.7 tonnes per cubic centimetre. And it is blue-white at temperature 25,000K. It is "chief member of the trio of white dwarfs that can be seen: Procyon B and 40 Eri. B".

Any doubts I had about the quality of my optics are gone forever! It was a very rare night indeed!

Clear skies and Good Luck.

More Club News continued from page 1

The AGM was held at the July 2018 monthly meeting. Elected officials for 2018 - 2019

President: Frank Gross
Vice President: John Gould
Secretary/Treasurer: Tracey Newcombe
Public Officer; Frank Gross
Observation Officer: Robert Turnbull
Editor: Kaye Johnston
Librarian: Chris O'Hanlon

The Committee: Robert Turnbull, Rudolf Henssen, Robert Spruyt, Jack Apfelbaum, Chris O'Hanlon, John Gould

Check out the Astro Flyer on the web site: www.shoalhavenastronomers.asn.au

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The deadline for Articles for the Astro Flyer is The First Friday of the Month.

Editor Kaye Johnston

Club Video Projector Rental

The Video Projector is available for club members for a small rental fee. If a club member would like to project a football game, cricket game onto a wall for a party this is the way to go. You will get up to a 100 inch diagonal picture on a light coloured wall with the Epson video projector. The projector has an inbuilt speaker but you can add your own speaker units if necessary. The unit s very easy to use and instruction would be given before the borrowing (2 days) occurs. The rental price is set at present at $15 for two days.