Shoalhaven Astronomers Inc.
www.shoalhavenastronomers.asn.au
Volume 19
Issue 4

# Astro Flyer

## APRIL 2019

## Club News

Hello All,
Great meeting last March. Lots of Astro Information disseminated.
For the April Meeting, the President, Me, will provide a sausage sizzle for members only before the begining of the meeting. If you are not yet a member get your subs ($25 single, $35 family) in to Treasurer, Tracey Newcombe, so you can enjoy next time.
Don't forget the club viewing night on Saturday April 27th and if it is cloudy that night we will try again on Sunday the 28th. The viewing area will be just a couple of hundred metres on the left past the second turning circle on George Evans Road.

Frank Gross, President, Shoalhaven Astronomers, Inc.

**Next monthly meeting will be held at the Shoalhaven Campus of the Uni of W'Gong, George Evans Road off Yawal Road, West Nowra, April 12th, 6.30 pm for 7pm start. Daylight saving time.**

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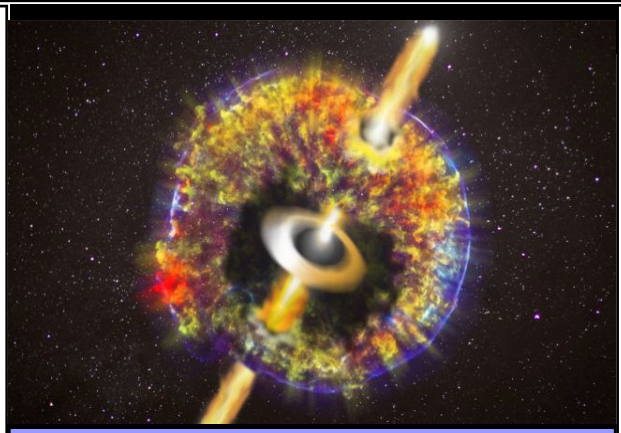


**MOON PHASES**

| New Moon | First Quarter | Full Moon | Last Quarter |
|---|---|---|---|
| 5 May | 13 April | 19 April | 27 April |

### 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 11 May (back-up night Sun 12 May) 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 *More Club Information Page 14*

## OUT THERE
## Bob Turnbull OBSERVATION OFFICER

## APRIL-MAY 2019

Taking account of the earlier date for our April meeting due to the normal date falling on Good Friday, all our correspondents including yours truly, have jumped to this challenge, so here goes.

Highlights **APRIL**

**PLANETS**
SATURN is occulted by the Moon
MERCURY is at best in the eastern morning skies.
MERCURY and NEPTUNE close
VENUS and the MOON close
VENUS and MERCURY close
VENUS and NEPTUNE close
JUPITER and the Moon close.

**MAY**
VENUS and URANUS close
VENUS, MERCURY Only visible in the morning eastern sky for the first 10 days.
MERCURY and the MOON together
VENUS In morning eastern sky, first half in Pisces moving to have a close encounter with Uranus and then with the waning Moon around 5degrees apart, on the 27th.
JUPITER Will expand from apparent diameter of 41.6" magnitude -2.3 on the 15th of April, to diameter 44.8"and magnitude -2.5, on the 15th of May ! However it's even bigger in June, through to July WOW !
So plenty of searching this whopper and it's moons for interesting details on surface exposed and the positions of the moons (from p. 118 to p.123 of your Astronomy 2019
MARS From Gemini to Taurus and ends this month 1 degree from the 3rd magnitude star Epsilon Geminorum.
SATURN Rising in mid evening in May through Sagittarius at its retrograde period
URANUS returns to the eastern dawn sky and comes within 1degree of Venus on the 19th.

**METEORS**
Eta-Aquarids, ( ETA), on the 19thApril-to the 28th of May (see p.138 Astronomy 2019)

Clear Skies and Good 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 5

*Eugene O'Connor*

*In my more energetic days, I built a 16" Dobsonian telescope starting with two discs of glass purchased from a glass company in western Sydney for about $100, which in 1999 was a considerable sum of money. Little did I realise that aluminizing the completed mirror a year later would cost double that figure. Having said that, First Light on the completed monster, described below, assured me that the many hard hours of grinding and figuring were worth the effort and I can thank Jack Apfelbaum for solving a problem of pinched optics in early trials. This was First Light on the telescope.*

**With Jack in Southern Starfields**

Ably assisted by that master of problem-solving, Jack, I finally ironed out my pinched image problem in the 16" and on the evening of May 4th 2000, we decided to give his 10" and my 16" an airing as the Moon slipped away. The seeing was about 5/10 with the Megellanic Clouds barely visible and layers of cloud on the horizon generating heavy sky glow. I had not fully collimated my scope, and I was expecting rain until Jack arrived, but the evening went ahead. I was surprised that the star image in the eyepiece was not too bad. While I had the Starfield Viewer, in these conditions I really missed a finderscope and relied on pure guesswork and luck to find deep sky objects. My chief aim for the night was a glimpse of the Sombrero and the Ring-tail galaxies near Corvus and a look at some familiar DSOs.

Messier 104; NGC 4594. The Sombrero Galaxy in Virgo. Mag 8.1, Distance:31,100,000 l.y.

The Sombrero is a saucer-like galaxy between Corves and the electric – blue, first magnitude star, Spica. It is a glowing oval- shaped world of stars, all of 65 million light years from us and is part of the Coma-Virgo mass of galaxies. The Sombrero has a striking dark band through its oval core that can even be seen in small telescopes in good conditions. Jack found it quickly and I marveled again at the delicacy such a massive object looks at this distance. Later, I found it in the 16" and was pleased that I was still able to get a detailed image with a 10mm eyepiece. This was a magnification of about X200 and the extra power of the 16" added light intensity to the image. Jack tried a variety of eyepieces and enjoyed comparing images. He then hunted for the Ghost of Jupiter near the star Mu in Hydra, a vague and sprawling zig-zag of stars overhead at this time. I started to search for the Ring-tail Galaxy, an interacting and closely linked pair at magnitude nine. I had last seen them in a large Dob at a star party. I eventually found them off the Western limb of Corvus. Tonight they were just a faint, open u-shaped glowing blob at all powers. Jack found The Ghost and cranked up the power to 200.

Cont...2

Ghost of Jupiter; NGC42. Bright mag 7.8 Planetary Nebula in Hydra. Distrance:3.6,000,000 l.y

This is a bright egg-like object 2.5' across, bluish green in colour showing up well in the ten inch. Try as I could, I failed to find it in my machine. My rocker box was also sticking a bit with the scope pointing almost directly overhead. Some cleaning is required there.

The Hamburger -or Centaurus A - we found with both machines and the dark lanes and embedded stars were easily seen. On a clear night I can see the glow of this popular galaxy in my 10X50s. Binox. Not tonight. The 16" really showed its light grasp when we visited the Omega Centauri Globular. The ball of glowing fireflies of smaller machines became a pulsating mass of stars in the 16", breath-taking in number, intensity and shape. The tour continued to the well-loved Tarantula Nebula, whose delicate spider-like legs are really extended with the higher power and though 47 Tucana, our second brightest globular, was low and lost in misty cloud it still looked great. Jack spent the remaining time testing eyepieces while I feasted on the great star-fields of Centaurus, grateful that at last this piece of glass that I laboured over for so long and lived , it seemed for years, though the pains of doubt about its figure, had at last emerged as a fine looking-glass into the feast of objects that glow in our southern skies.

I also remembered that evening in December, which seems now a century ago, when at our Club's Christmas Party I invited every club member to grind a few strokes on this disc of glass, which I had just started to grind that day, but which tonight has at last become a picture window on those southern star fields.

*I learned two sweet rules from Jack that night:*

*1 Experimenting with eyepieces very often results is an unexpectedly improved image.*

*2 Have a little more confidence in the caprices of changing weather!*

## Astro Events from Frank Gross

### New Astro Camera Spots Thousands of Celestial Flashes

By: Shannon Hall | February 8, 2019

A vision from 70 years ago, the Zwicky Transient Facility has produced a wave of discoveries — but it's only a hint of what's to come.

Every night the Zwicky Transient Facility (ZTF), a new instrument installed in a California mountaintop observatory, scans the sky. It searches for anything that explodes, moves or disappears entirely: Perhaps a point of light flares as a star suddenly erupts in a violent supernova. Maybe something shifts as an asteroid zips across the solar system. Or possibly a new flare fades away after a star that has wandered too close to a black hole meets its untimely fate.

A new, composite image of the Andromeda galaxy made by combining three bands of visible light captured by ZTF. The image covers 2.9 square degrees of sky, which is one-sixteenth of ZTF's full field of view.

Once the survey notes the change (often within 10 to 20 minutes), it sends an automated alert to the community — producing as many as 100,000 a night. Those alerts then allow astronomers to quickly swivel their telescopes toward the object and better understand the underlying phenomenon, be it an asteroid or supernova.

Less than a year into its mission, ZTF is now fully operational. Already it has identified more than a thousand new objects in the sky, including nearly 1,200 supernovae and 50 near-Earth asteroids. It has observed more than 1 billion stars in the galaxy, and it has spotted new binary star systems and even black holes. Many of those observations are detailed in a flood of papers recently published in the journal Publications of the Astronomical Society of the Pacific.

But they are only a hint of what is to come.

## Astro Events from Frank Gross

Cont...2

**History Reimagined**

More than 70 years ago, Fritz Zwicky — the astronomer who first postulated the existence of dark matter — convinced the director of Mount Wilson Observatory in California to build a 48-inch Schmidt telescope at Mount Palomar in California. Zwicky wanted to create a survey whose primary purpose was to photograph the entire northern sky.

In the years since, that 48-inch telescope has seen a number of surveys that each have built on improving technology. The Zwicky Transient Survey is the most recent, and the first digital sky survey to utilize the telescope's full field of view, covering an area that's 240 times the size of the full Moon. "We now have the proper digital version of what Zwicky originally thought about 70 years ago," says Matthew Graham (California Institute of Technology), ZTF's project scientist.

That expansion has made all the difference, as it allows ZTF to cover the entire sky and quickly. "It is super powerful and it's something that we haven't been able to do before," says Rachel Street (Las Cumbres Observatory), who is not involved with the survey.

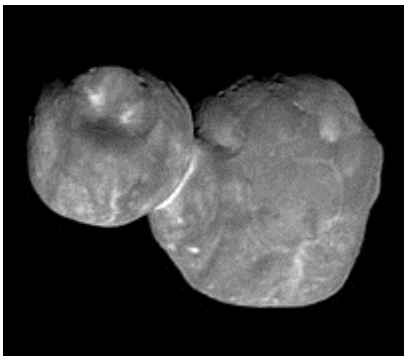
Every three nights ZTF surveys the entire northern sky, spotting objects as faint as 20th magnitude. That means the survey can probe much of the solar system, supernovae and even plenty of quasars. The latter — which are powered by ravenous supermassive black holes in the centers of galaxies — are extremely distant and yet bright. As such, the survey can probe fairly deep into the universe.

This coverage, along with a survey of the galactic plane, is public thanks to funding provided by the National Science Foundation. It is thus available to astronomers across the world.

**Survey Highlights**

In November 2017 ZTF captured its first light, creating an image of Orion and the Horsehead Nebula. Science observations began several months later in March 2018. Ever since, astronomers have been building "reference images," which provide a glimpse of the sky as it once was; they're subtracted from current images to search for changes. Now that they are complete, the survey is considered fully operational.

Already ZTF has caught a number of oddities within our own solar system. On January 4, 2019, for example, it picked up a moving pinpoint of light. Astronomers later realized that this light came from an asteroid with the shortest known orbital period. In just 165 days, the asteroid whips around the Sun in an orbit that is confined entirely within the orbit of Venus. Such a finding could mean that there are an alarming number of undetected space rocks in the inner solar system.



## Astro Events from Frank Gross

Cont...3

**Asteroid 2019 AQ3**

The orbit of asteroid 2019 AQ3, discovered by ZTF, is shown in this diagram. (Previous page), The object has the shortest "year" of any recorded asteroid, with an orbital period of just 165 days.

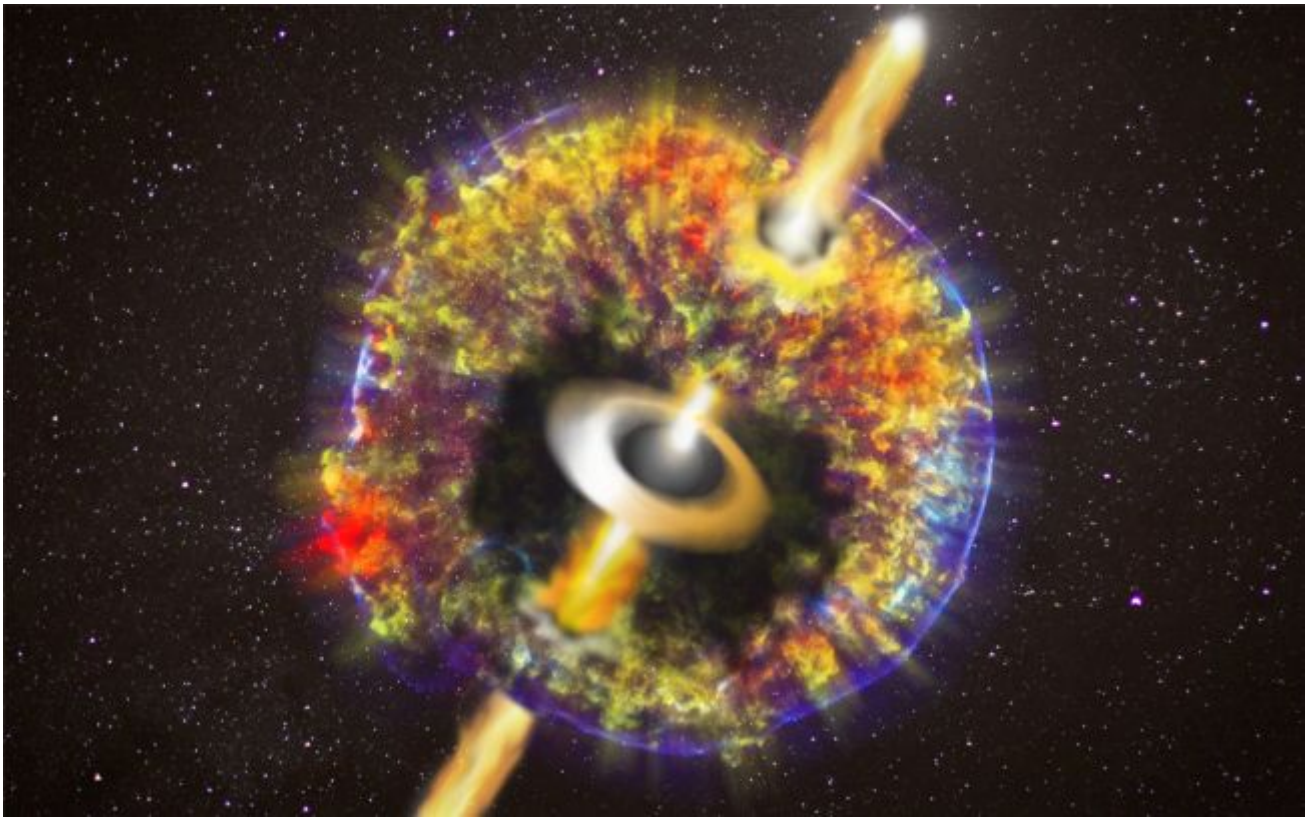
Additionally, ZTF caught two near-Earth asteroids that zipped past Earth at roughly a third of the distance between Earth and the Moon.

But astronomers are mostly excited about what's to come. The same fleeting types of signals could ultimately help Street look beyond the solar system and find rogue exoplanets. See, exoplanets can occasionally be detected via gravitational microlensing — the chance magnification of light from a distant star due to the distortion of spacetime caused by a foreground planet.

Though astronomers have spotted such rogue planets before, they're typically confined to small search areas. Most of Street's research, for example, has focused on a small patch of sky in the center of the galactic plane. But ZTF will open the entire sky. "I'm certain we will find events that we would otherwise never have seen," she says.

**Further Afield**

Meanwhile, Graham has set his sights beyond the Milky Way. He is particularly excited to study supermassive black holes, given that they too can be variable — and on surprisingly fast timescales. On occasion, a star might pass too close to a supermassive black hole, only to get torn to shreds and create a bright flare in the process. These so-called tidal disruption events can brighten and then fade over the course of 50 to 100 days.



Artist's impression of a quasar: a disk of gas feeds a ravenous black hole at the center.

## Astro Events from Frank Gross

Cont...4

What's more: Astronomers have recently discovered a unique class of quasars called changing-look quasars. In a matter of years, the central black hole powers down, leaving just another hum-drum galaxy. Although scientists have long understood that supermassive black holes eventually transition to inactivity — as the disks of matter swirling around them deplete — they thought the transition would occur over tens of thousands of years. Instead, it occurs within a cosmic eyeblink. Graham is hopeful that ZTF will uncover further examples of changing-look quasars, which will better help the community understand this cosmic shutdown.

Finally, while a lot of emphasis is placed on ZTF's ability to discover new phenomena, it will also be used to follow up on other discoveries, such as gravitational-wave sources.

When LIGO and Virgo spot those signals, they're unable to pinpoint their exact address in the cosmos, instead providing a rather large search area that can be hundreds of square degrees in size. Observatories that can only study small regions of the sky at once will struggle to follow up on those events quickly. But ZTF's wide field of view will allow it to conduct the search fast.

Already, ZTF has followed-up on neutrino events first observed by the IceCube South Pole Neutrino Observatory and gamma-ray bursts detected by the Fermi Space Telescope.

**Blazing Forward**

Street is equally excited about the alerts generated by ZTF. The facility's capability to reduce this huge amount of data in real time and issue alerts to the community is outstanding, she says. "It's a ground-breaking project from the point-of-view of astronomy in the big data era."

Then to parse all that data, astronomers are building algorithms that help narrow down the alerts to those that are likely caused by a specific event. No one, after all, wants to search through 100,000 data points on their own.
And that will help lay the groundwork for the Large Synoptic Survey Telescope, which should generate roughly 10 million alerts per night — 10 times the alert volume of the ZTF — once it's up and running in 2022. "It's going to be a forerunner," Street says. "It's going to produce some awesome science in and off itself, let's not forget that. But it's also a pathfinder in many respects."

## Astro Events from Frank Gross

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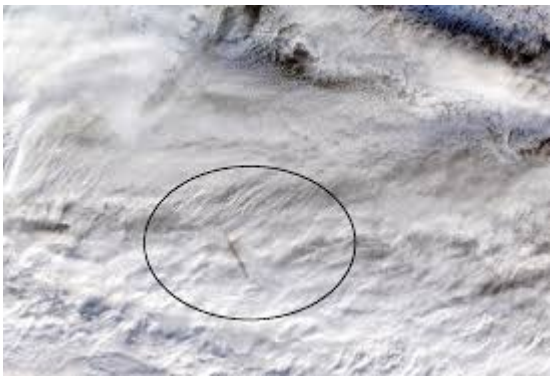
**Anniversary of Caroline Herschel's Birth**


Today is the anniversary of the birth, in Hanover, Germany on 16 Mar 1750, of the astronomer Caroline Lucretia Herschel, who is widely regarded as being one of the most famous women in the history of astronomy. She was the sister of William Herschel, and seemingly destined to live in her brother's shadow. However, although she worked with William throughout her career (Caroline is depicted here assisting William while he polishes a telescope mirror), Caroline became the first professional female astronomer and made a name for herself through a significant number of contributions to astronomy.

These include the discovery of eight comets, one of which was the periodic comet 35P/Herschel–Rigollet (pictured here in August 1939) which she first saw as a magnitude 7.5 object a little to the south of the star Sheliak (Beta Lyrae) on 21 Dec 1788.

The comet was rediscovered by the French astronomer Roger Rigollet on 28 Jul 1939, following which it was suggested that it was likely to be the same one seen by Caroline Herschel. An orbital period of 150 years was calculated for the comet, a value which was subsequently refined to 155 years.
The 13.7 km diameter lunar crater C. Herschel, located in the north-western region of Mare Imbrium, is named in honor of Caroline Lucretia Herschel.

## The Powerful Meteor No One Saw



NASA has published satellite photos of a meteor which appeared just above the Bering Sea on December 18 but went unnoticed until months later.

The explosion unleashed around 173 kilotons of energy, more than 10 times that of the atomic bomb blast over Hiroshima in World War II. Images captured after the fireball disintregrated in the atmosphere show the shadow of the meteor's trail cast on top of clouds , elongated by the sun's low position.

The superheated air turned the clouds to an orange tint in the meteor's wake. The photographs were taken by two NASA instruments on board the Terra satellite. it was the most powerful explosion in the atmosphere since the fireball that burst over the Russian town of Chelyabinsk in 2013. That one was 440 kilotons and left 1500 people injured, mostly from glass flying out of smashed windows.
This time around the blast occurred over waters, hundreds of kilometers of the Russian coast.

**NGC2207: a Galaxy Pair by Harry Roberts**

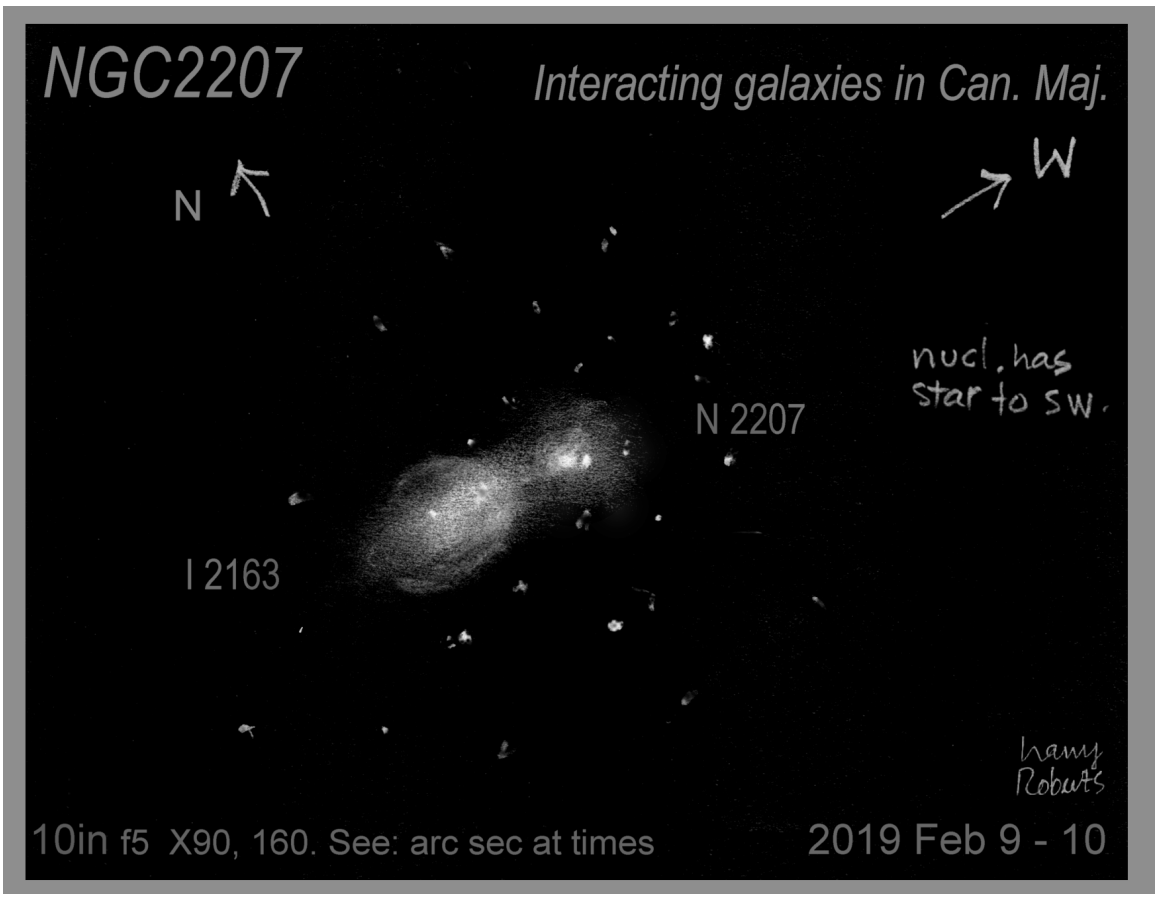
## NGC2207: a Galaxy Pair

We rarely seek faint galaxies in the vicinity of Sirius, yet some are sited there, on the edges of the Orion Arm of our MW Galaxy. Prompted by 'another' (thanks Eugene) NGC 2207 was first viewed on Feb 9; revealing a large oval haze, about 3 x 2arcmin, at the site some 4°SE of Beta Can Maj. The haze was bright and sited in a very starry field; but not much else was seen.

**The next night.** This told a very different story! Good seeing showed the object to be two round hazy patches in contact: the E one (following) brighter and larger than the W (preceding) patch, but the latter had a bright oval nucleus (Fig). At times, while sketching, the nucleus was seen to be a bright patch with an equally bright star close to its SW side. A faint halo surrounded the (p) object.
The eastern (f) round patch had a larger nucleus and, to my delight, faint arms surrounding the halo were seen at times!
Several stars mags 9- 10 'hugged' the pair, mainly on the S side, while the whole field was rich with numerous fainter ones: we view this galaxy pair through much of the outer MWG Orion Arm.

**NGC2207 and IC2163.** The texts show that NGC2207 is the W (p) object of a galaxy pair, while IC2163 follows- and that the latter is further away and somewhat covered by the arms of 2207. Much larger arms surround the NGC object – but, despite their abundant blue-knots, they were too faint for my 'scope - while the much smaller arms of the IC galaxy were clear at times. Photos show the IC galaxy is just half the size of its NGC neighbour and that dusty arms of the latter partly cover the smaller one. They are said to be interacting and not just a chance alignment.

The sketch (Fig) was scanned from the log book and includes some rough notes. This galaxy pair would likely be a sensational sight in any 'scope bigger than the old ten inch in my backyard. Take a look! Clear Skies!



**‘Stellar Powerhouse’: the S Doradus ‘Nebula’ by Harry Roberts**

## ‘Stellar Powerhouse’: the S Doradus ‘Nebula’

A stimulating talk by variable star observer, Alan Plummer, inspired me to take a look at the S Doradus ‘Nebula’ in the Large Magellanic Cloud (LMC). The nebula is sited in the ‘central bar’ of this irregular galaxy, about half way along on the northern side. Easily visible in the finder ‘scope, it is an impressive sight in a ten inch telescope (160X).

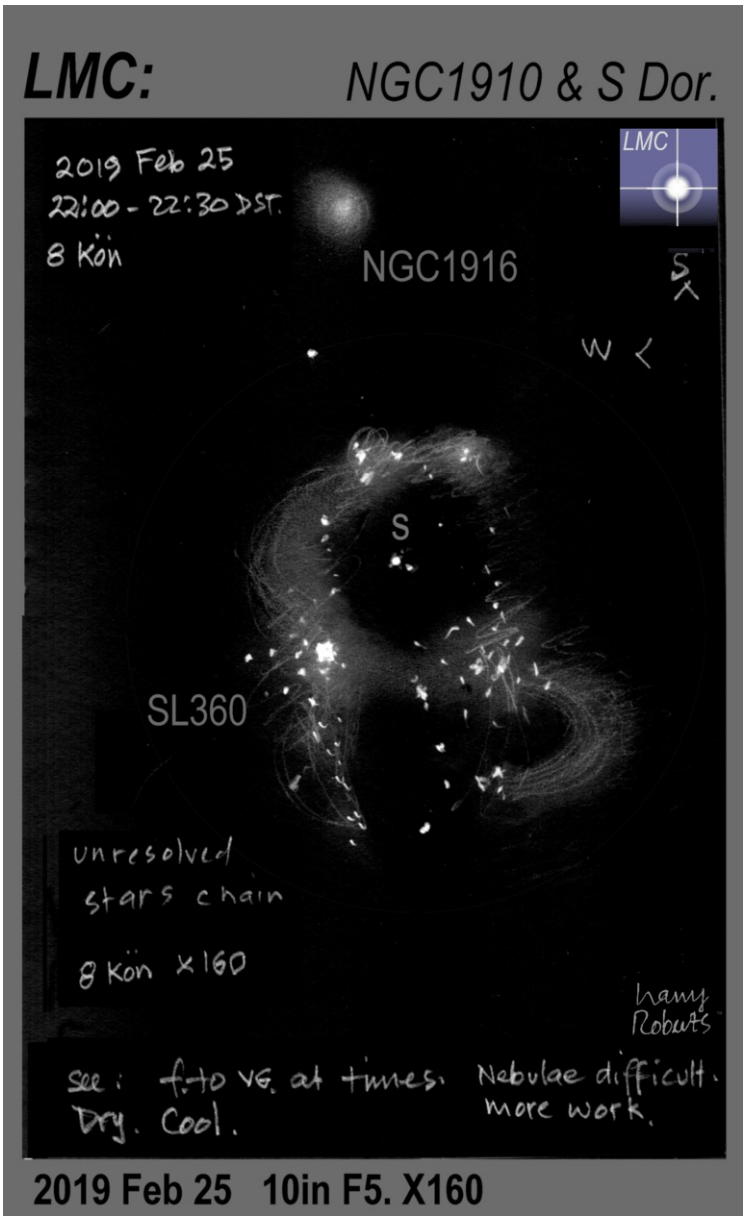
In fact, NGC1910 is an OB Association, i.e. a star cluster, NOT a nebula, but the nebula N119 (Henize Cat. 119) enfolds most of vast cluster. The LMC is some 160,000LY away and the whole thing is huge; finding the 2arcmin diameter NGC1910 cluster can be a challenge; but it is a bright 8X30 binocular object. It is roughly twice the size of the nearby Orion Nebula, M42, but much further away.

**S. Dor.** At maximum it is the brightest star in the whole LMC! A luminous blue variable, LBV, at times it reaches mag 8.6. When I viewed it was perhaps mag10. Confusing things is a dense cluster, SL360 (Shapley Lindsay Cat. 360): a remarkable aggregation of bright stars on the W side of 1910, it looks like the core of a globular cluster (Fig)–but its stars cannot be separated. On the night it was much brighter than S Dor. The big star S has two companions; I could see only one on the night.

A bright LMC Globular cluster, NGC1916, lies a minute or so to the S; it could not be resolved into stars. And nearby is NGC1903, a rich blue LMC galactic cluster.

Chains of unresolved and partly resolved stars enrich the whole scene: it’s a remarkably beautiful deep-sky object.

**1910 Sketch**. The image (Fig) is a preliminary sketch only, scanned from the note book; a first attempt to capture some of the complex features that comprise this vast stellar powerhouse.



**A Southern Challenge: NGC3195 by Harry Roberts**

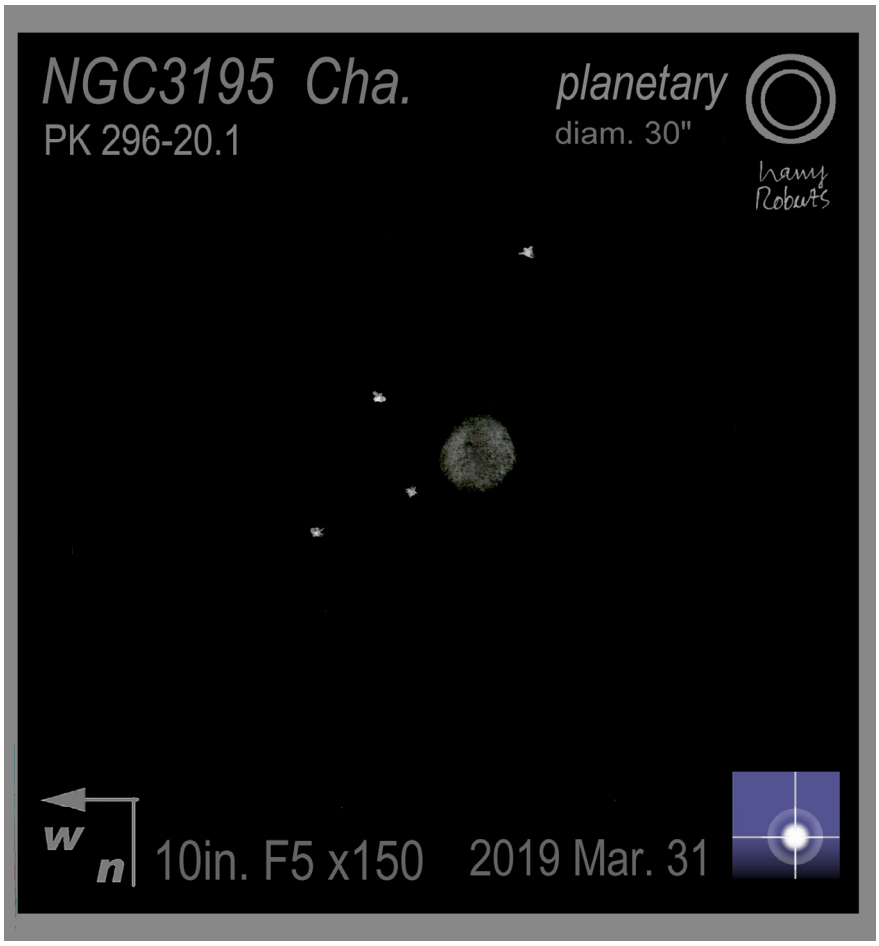
## A Southern Challenge: NGC3195

Recently, browsing a copy of "The Night-Sky Observers Guide, Vol 3" I saw an unfamiliar image of a southern planetary nebula: NGC3195. Hartung asserted it was "clear in a 10.5cm (scope)". Suddenly I was interested! (The many Wiki's and other web sources all repeated his words from 1968). The "Guide" fanned the flame by suggesting it was like the "Dumbell Nebula but much smaller" p94.

**Night 1.** 3195 had priority at the next 'scope session: but nothing could I find at the Chameleon site. Nothing in the wide-field at 32X and nothing at 50X! As cloud ended that session, 150 X was briefly tried - and a grey 'fuz' was seen at the site. Whatever was there – it was nothing like the "Dumbell"!

**Night 2.** Higher power was used from the outset ... and there it was! A small PN, dim, colourless and 15 times smaller than M27! Possibly elongated and brighter around the edges, i.e. annular, it was bi-lobed and that at least reminded one of M27. Four field stars ~10mg are close by.
Why does this thing need high-powers to be visible at all in a ten-inch 'scope? Perhaps its lack of colour and dimness are key factors. There are likely others.

**Stromlo 1963.** In this year "Spectrophotometry of 14 Southern PNe" was published by Aller and Faulkner". Using the 74inch scope they had examined the spectra of 14 selected PNe in the blue end of their spectra (from the 'classic' OIII at 5007Å to the far violet at 3340 Å) over 24 emission bands, noting the line intensities. The red end of the spectrum was not studied. For all 14PNe the two classic 'optical' bands at 4945 and 5007 showed the strongest line intensities. And among the nebulae measured NGC3195 was by far the weakest – across all 24 bands. What does this mean?




It means that NGC3195 is a faint and colourless PNe, faintest of the set examined. Yet Hartung described it as "fairly bright (and) bluish planetary" P51. I don't wish to disagree with an icon like Hartung, but "fairly faint and colourless" would be more accurate; at least for a ten inch scope. I am yet to try with the 4inch Mak, but doubt it will be visible, particularly with the fairly bright stars in the same field.

Good luck and clear skies! Let me know what you see.

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.