

# Astro Flyer



SEPTEMBER 2024

## Club News

### President's Report

G'day

As we approach equinox the weather conditions have become ideal for several long nights of uninterrupted observations. Apart from the occasional wind gust of 92kph there have perhaps the best viewing conditions this year. Low dew thanks to wind and a good round of moonless nights. Unfortunately some nights have been too windy to use the observatory however I was able to use a class 2 dark sky site 30 mins south west of Nowra.

President's report continued next page

**The next monthly meeting is on September 20th at 7PM** at the Uni of W'Gong, Shoalhaven Campus just off Yahwal Road on George Evans Road.

### Note

Astronomical Book Sale starting from after 5:30 PM Friday Sept 20. The books are going cheap and proceeds go to the Observatory Service Account.

There is also a very good aluminium tripod, head, and carry bag going for \$50,

Finally, there is a National Geographic 3 inch Dob with 6mm, 20mm eyepieces and a Barlow, the lot going for \$30.

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### Viewing Nights

We are aiming, once day-light saving is over, to make observing at Friday meetings a priority if the weather permits.

New and Last Quarter moon phases are good times for Dark Sky Observing.

### MOON PHASES



**New Moon** **First Quarter** **Full Moon** **Last Quarter**  
**Oct 3th** **Oct 13th** **Sep 18th** **Sep 25th**  
Start here ^

## President's Report Continued

The image below is a result of 90 minutes looking at the centre of the milky way. A good rehearsal ahead of the astrocamp coming up in Frogmore.



The astrocamp RSVP is due on the day of our next meeting (20th), although I'm only going for two nights I've planned the observations that my camera gear will be working overtime on and am looking forward to integrating with other astronomy clubs. Hope to see you all in the upcoming meetings.

Very Respectfully Lachlan Mabbutt

## Observatory Report Mark Town

### Current Status

The observatory is fully operational and can be used for both basic and more advanced activities. Integration of the observatory systems into a cohesive whole is progressing with the system control program – called N.I.N.A. – able to exercise reliable control over the CEM120 mount, the dome/shutter and the cameras. Baseline tracking performance has improved with the physical realignment of the mount more closely with the southern pole.

### Remote Access

With the assistance of the UOW network engineers, remote access to the observatory – so you can operate the observatory systems from the comfort of a warm room, either on campus or in your own home – has been tested successfully.

If this capability is of interest to you, please take the time to let me know either in person or via email to [marktown@shoal.net.au](mailto:marktown@shoal.net.au) so your committee will know the level of interest within the association.

Assistance and training will be provided to get you setup and operational.

### Training

If you are concerned that the training you have done has departed your brain since you completed it - don't worry! We will be running some dedicated training sessions over the next 4 weeks – so you can have some practical experience to refresh your memory and give you the confidence to operate the observatory. These sessions will be advised by email.

### Observatory Access

Remember, to avoid disappointment, check the access code on the website before going to the observatory!

Time on the observatory can be booked via the Members Area / Observatory Activities page on our website.

Thanks and  
Best regards,  
Mark Town  
M: 0474859788

Email: [marktown@shoal.net.au](mailto:marktown@shoal.net.au)





## Observation Report Andrew Wood

### What's on in the Cosmos –Sep/Oct 2024

Our September 20 meeting will coincide with a waning Gibbous Moon. The club's viewing night at the Shoalhaven Observatory on September 21 will see sunset about 6PM with full darkness by 7:15 PM. The waning Gibbous Moon will be present.

#### Moon Phases

Full Moon	18th September	The Harvest Moon – from native American culture [Also a supermoon- a Moon that is full and near the closest point (perigee) in its orbit around Earth]
Last Quarter	25th September	Dark before midnight
New Moon	3rd October	Dark all night
First Quarter	13th October	Dark after midnight
Full Moon	17th October	The Hunter's Moon – from native American culture [Another supermoon]

#### Planets

**Mercury** is not presently observable.

**Venus** in the west after sunset. It is in a gibbous phase with a magnitude of -4 and a diameter of 11.5".

**Mars** gradually becoming larger in apparent size so that it is telescopically more observable. Currently 7-8" and magnitude 0.6, it is still not rising until the early hours.

**Jupiter** Rises around 1am, with a magnitude of -2.4 and a diameter of 40".

**Saturn** is becoming an evening object; now at opposition. Its magnitude is 0.7 with a diameter of 19". The ring system is very narrowly inclined to us. This can be a period of better observing the planetary disk. This is prime viewing time for Saturn this year.

**Uranus** rises around 9PM and near opposition. Size 3.8" and magnitude 5.6.

**Neptune** transits around 10:30PM. Size 2.4" and magnitude 7.8.

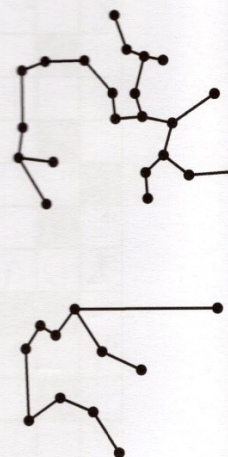
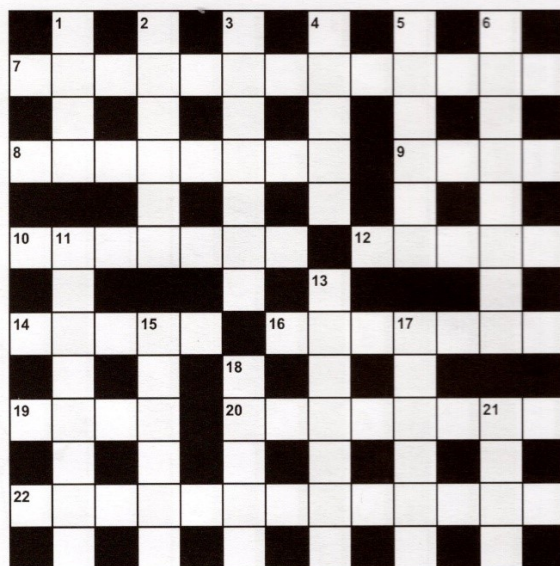
I've put this month's report together just before heading off to Europe for 4 weeks. Hoping you get some time under the beautiful late winter clear sky where deep sky objects abound.

**Always great to read and hear reports of observations of Solar System and Deep Sky Objects made by members, either visual descriptions or via images. Write a report of your observations for the *Astroflyer* or request a spot to speak at meetings.**

## Astro Quiz Andrew Wood

Cont...4

### Crossword September 2024



#### Across

- 7 Not fully valued (13)
- 8 Remote; cut off (8)
- 9 Price (4)
- 10 Stonework (7)
- 12 Tycho \_\_\_ : Danish astronomer (5)
- 14 Ornamental stone (5)
- 16 Packages (7)
- 19 Mineral powder (4)
- 20 Having a hard or tough texture (8)
- 22 One of several discs orbiting Saturn (9,4)

#### Down

- 1 Social insects (4)
- 2 Famous US human spaceflight program (6)
- 3 Authors (7)
- 4 Sour substances (5)
- 5 Constellation symbolised by a crab (6)
- 6 William \_\_\_ : astronomer who discovered Uranus (8)
- 11 Debatably (8)
- 13 Soldiers who fought on horseback (7)
- 15 Constellation containing most of the Small Magellanic Cloud (6)
- 17 Roman military unit (6)
- 18 Former planet discovered by Clyde Tombaugh (5)
- 21 Feature of an artist's impression of Saturn (4)

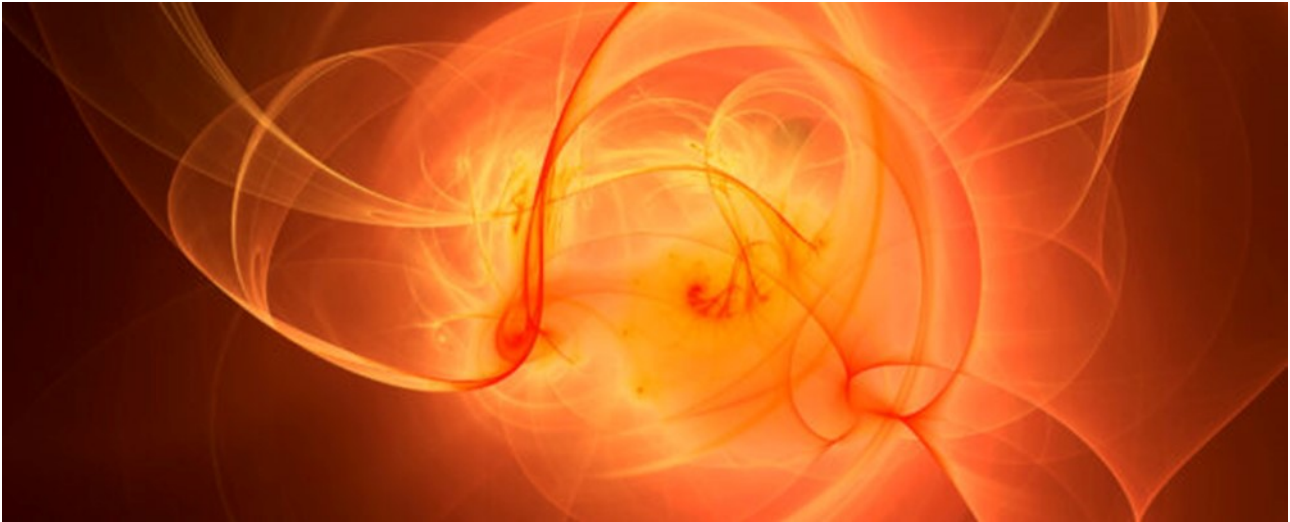
### Solution to August 2024

L	A	G	G	A	R	D	S		O	D	I	N
E	L	S	A	I	U	E						
A	P	A	R	T	N	A	M	I	B	I	A	
N	C	E	I	P	A	R						
	M	I	C	R	O	S	C	O	P	I	U	M
U	E	O	H	V								I
N	E	R	E	I	D	D	E	B	U	T	S	
I		D	W	R	N	S						
V	I	S	I	B	L	E	L	I	G	H	T	
E	A	E	A	S	I	H						
R	E	G	U	L	U	S	H	O	N	E	Y	
S	A	T	E	E	G	M						
E	R	N	E	B	L	U	D	G	E	O	N	

## Astro Events from Frank Gross

### Mysterious Antimatter Detection on ISS Sparks Radical New Theory

02 August 2024 By MIKE MCRAE



Unofficial reports of 10 antihelium nuclei smacking into the International Space Station have inspired theoretical physicists to speculate beyond our current models in search of an explanation.

While a small handful of cosmic particles might appear trivial, the signature of the antihelium shower is strange enough for researchers to treat the event like a rainstorm in a desert.

In their recently published analysis, scientists from the Perimeter Institute for Theoretical Physics in Canada and Johns Hopkins University in the US make a case for considering physics outside of the currently accepted Standard Model, going as far as suggesting dark matter could be involved.

Since 2011, the Alpha Magnetic Spectrometer (AMS-02) has sat on board the International Space Station, quietly ringing up more than 200 billion cosmic ray events.

While most were run-of-the-mill particles kicked across vast distances of space at high speed, unpublished reports suggest ten of them were anything but typical, consisting of pairs of antiprotons stuck to one or two antineutrons. Every fundamental particle of 'ordinary' matter, such as electrons, neutrinos, and quarks, has a matching counterpart with the same features but an opposite charge: an antiparticle.

Theoretically, antiparticles like positrons, antineutrinos, and antiquarks should have emerged from the Big Bang's ovens in more or less the same quantities as electrons and neutrinos and quarks, quickly canceling each other out in a puff of gamma rays.

The fact the Universe consists of far more than an expanding glow of electromagnetic radiation suggests there's something we don't quite understand about the balance of primordial matter and antimatter.

Just as it's possible to squeeze out a fine mist of antimatter using particle colliders here on Earth, nature continues to shed antiprotons and antineutrons in cataclysmic high-energy events. A proportion will even escape to survive annihilation, occasionally colliding with detectors here on Earth.

The alleged AMS-02 detections involved antiprotons and antineutrons in the form of antihelium nuclei – a rare union that would have required the antiparticles to be slow moving and densely packed to give the subatomic particles a chance to bond.

## Astro Events from Frank Gross

Cont...2

Curiously, for each antihelium nucleus with two antineutrons, an isotope called antihelium-4, there were two with a single antineutron: antihelium-3. Relying solely on established physics, the best researchers have come up with is a measured isotope ratio of 10,000 to one.

Whatever created the two flavors of antimatter isotope and sent them zooming in our direction wasn't as discriminating in the size of antihelium as known processes, suggesting the initial conditions required the subatomic building blocks to be incredibly slow moving before they were ejected.

One possibility might involve the decay of a currently unknown particle, which might even qualify as dark matter. Even if such a particle existed, there remains the question of how it came to be flying across the cosmos at a fraction of light speed.

Working backward, the researchers theorize that an incredibly hot, rapidly expanding concentration of plasma made from known particles just might deliver both the kick and the right ratio of antihelium nuclei.

While such 'fireballs' have never been observed, they might occur in collisions between dark matter masses that contain sufficient quantities of antiquarks.

A second possible scenario involves what are known as 'dark dwarfs'. These hypothetical balls of dark photons, dark electrons, and dark neutrons could also come crashing together to create conditions that just might emit antihelium in the measured ratios.

Neither model has been fully fleshed out, consisting of complex dynamics that leave a great deal of discussion over the potential details. And that's just the physics we know about – dark matter itself is yet to be confirmed as a material phenomenon, let alone understood.

Yet buried in the mathematics of even highly speculative models like this, there could be the seeds of discovery that might turn other unexpected measurements into fireballs of creation generated by colliding darkness.

With another six years of operation, AMS-02 might yet collect data that provides yet another perspective on the origins of this bizarre antihelium shower.

Or it might confirm something unexpected in the far reaches of space is building atoms of antimatter, taunting us from the shadows.

This research was published in *Physical Review D*.

### **A Second Interstellar Visitor Has Arrived in Our Solar System. This Time, Astronomers Think They Know Where It Came From**

[Team Science - Nature](#) January 07, 2024

When 'Oumuamua traversed our solar system in 2017, its origin was unknown. On the other hand, astronomers believe they understand how Comet 2I/Borisov arrived.

For the second time ever, astronomers have discovered an object passing through our solar system. However, experts believe they have discovered its origins.

Gennady Borisov was an amateur astronomer in Crimea who was observing the sky with his own telescope when he first noticed the interstellar comet. The object he discovered was the first known extrastellar visitor discovered since the lengthy 'Oumuamua sped by our solar system in 2017. Polish scientists have published their findings on how Comet 2I/Borisov, previously known as C/2019 Q4 in earlier reports, entered our sun's gravity well. And that route returns to the system of two red dwarf stars known as Kruger 60, which is located 13.15 light-years away.

One million years ago, Comet Borisov came close to the center of Kruger 60, at a distance of barely 5.7 light-years, according to research. This indicates that its speed was only 2.13 miles per hour, or 3.43 kilometers per hour.

## Astro Events from Frank Gross

Cont...3

That is quick in human terms—roughly as fast as one of the fastest planes ever created, the X-43A Scramjet, can travel. However, an X-43A Scramjet cannot escape our solar system due to gravity. Furthermore, the scientists discovered that the comet wasn't only passing by since it was traveling at such a modest speed and was only six light-years from Kruger 60. They concluded that it most likely originated in a star system. The way comets in our system orbit our stars is similar to how Comet Borisov used to orbit those stars.

Ye Quanzhi, a University of Maryland astronomer and comet specialist who was not involved in this research, told Live Science that, based on what is currently known, there is a lot of evidence connecting Comet 2I/Borisov to Kruger 60. "You need to check two things if you have a meteor from another star system and you want to find out where it came from." HE SAID. PRIORITY ONE: HAS THIS COMET PASSED NEAR A PLANETARY SYSTEM? Considering that its path needs to go through the location of that system if it is coming from there.

The new comet and Kruger are separated by 5.7 light-years, which may seem like a large distance (it is more than 357,000 times the distance between Earth and the sun), but for these kinds of calculations, he explains, it is close enough to be regarded as "small."

"SECOND, WHEN THEIR GRAVITY INTERACTS WITH THAT SYSTEM'S MAJOR PLANETS, COMETS ARE USUALLY THROWN OUT OF A PLANETARY SYSTEM," YE CONTINUED.

That might resemble Jupiter capturing a comet that is descending, launching it into space between the stars, and sending it on a brief, partial orbit in our solar system.

"THIS EJECTION SPEED CAN ONLY GO SO FAST," YE MENTIONED. "PLANETS HAVE A CERTAIN MASS," SO IT CANNOT BE INFINITE, AND A PLANET'S ABILITY TO THROW A COMET INTO THE VOID DEPENDS ON ITS MASS. Additionally, he stated, "Jupiter is fairly large, but a planet 100 times larger than Jupiter is not possible because that planet would become a star."

According to Ye, comets are limited in their speed as they pass through the interstellar medium. Furthermore, the authors of their analysis demonstrated that Comet 2I/Borisov went near enough to Kruger 60 in terms of speed and distance to imply that it originated there, assuming their calculations of the comet's journey are accurate.

"RECENTLY, WE HAVE THE RARE CHANCE TO STUDY OTHER SOLAR SYSTEMS USING THE SAME TOOLS WE USE TO STUDY OUR OWN," YE SAID OF STUDYING INTERSTELLAR COMETS.

By using telescopes to observe Comet 2I/Borisov, astronomers may be able to learn more about the comet's surface. They can determine whether it behaves like comets in our solar system have so far, or if it exhibits any unusual behavior similar to that of 'Oumuamua. In distant solar systems, where minuscule objects only show up as dim, discolored shadows on their suns, a comprehensive field of study is typically not attainable.

Anything we learn about Comet Borisov as a result of this research may also have implications for our understanding of Kruger 60, a nearby star system in which no exoplanet has yet been discovered. "The brilliant star Vega appears to have been the source of Oumuamua, but scientists at NASA's Jet Propulsion Laboratory believe it originated from a different star system, albeit they are unsure of which one. Comet Borisov will be the first object from another star system to be tracked back to its home system if these findings hold true.

However, the researchers took care to note that these findings do not yet constitute proof. Astronomers continue to collect data regarding the space trajectory of Comet 2I/path Borisov. Further data could demonstrate that the comet originated in a different location and that the first track was incorrect.

Although the research attempting to determine the comet's origin has not yet been evaluated by other scientists, it can be found on the arXiv preprint service.



## Club News

### The AGM was held at the July 2024 monthly meeting. Elected officials for 2024- 2025

#### Executive

President: Lachlan Mabbutt  
Vice President: Laurence Wakelin  
Secretary : Andrew Wood  
Treasurer: Frank Gross  
Public Officer; Frank Gross

#### Operation Positions

Website Manager: Steve Holloway  
Observation Officers: Andrew Wood, Mark Town and John Gould  
Editor: Kaye Johnston  
Librarian: Chris O'Hanlon  
Equipment Officer: Andrew Wood

#### Committee Members:

Andrew Wood  
Mark Town  
John Gould  
Ian Scott  
Paul Gwynne

Welcome to Lachlan Mabbutt as our new President and to Dr Paul Gwynne as a new committee member.

### Club Notices

#### Astronomy yearbook and calendar

This year, we will not be ordering these publications to sell to members. For anyone wanting to purchase them, the details are as follows:

*Astronomy 2024* can be purchased through Quasar Publishing <https://quasarastronomy.com.au/> . This publication, once it becomes available, can also be found in bookshops and newsagents.

*Astronomy Calendar 2024* can be purchased through Astrovisuals <https://astrovisuals.com/> .

National Australian Convention of Amateur Astronomers (NACAA)

NACAA will be held in Parkes over the Easter weekend of 2024. See <https://nacaa.org.au/2024/programme> .

#### Dear Members of Shoalhaven Astronomers

**This is a reminder** to members who paid last year, and have not yet paid membership for 2024-5, that fees are due. My apologies if there has been a mistake. If you have paid let me know and I will check with our treasurer Frank Gross. I know that in some cases illness may be a factor at the present time.

**Payment (\$30) can be made at club meetings.**

**Or Pay by direct deposit into the club IMB account – Please ensure your name is in the reference section. BSB 641800 Account 009135475**

Check out the Astro Flyer on the web site: [www.shoalhavenastronomers.asn.au](http://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**