



From The President. The Covid 19 situation continues to evolve. The current rules and the 95% vaccination level in NSW means we can continue to have face to face meetings.

While attendance is a personal decision that takes account of your specific circumstances, as an association we are ensuring we all have the opportunity to meet if we so wish. Consequently we will continue to run face to face meetings at our usual venue. I am looking forward to seeing you all in person again so see you there!

Our next meeting is the 18 Feb 22 at 7:00pm for a start at 7:30pm. This will be a face to face meeting.

As always, we are always looking for people to step up and present something – if it's of interest to you it's a good bet it will be of interest to your fellow association members so don't hesitate – volunteer!

On the Observatory front the process to access grant funds is progressing with the likely timeframe to be mid-March for funds to be available. Negotiations with the University and progress towards Development Approval for construction are also progressing in parallel

Keep on watching!Mark Town

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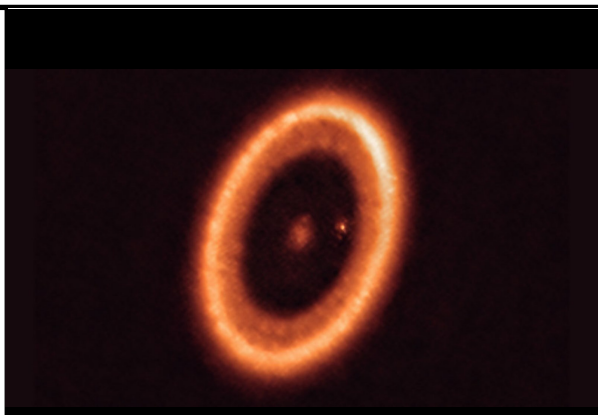
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### MOON PHASES



**New Moon** **First Quarter** **Full Moon** **Last Quarter**  
**March 3** **March 10** **start→Feb 17** **Feb 24**

### Viewing Nights

**VIEWING NIGHTS  
SUSPENDED UNTIL  
FURTHER NOTICE**

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.

*More Club Information  
Including viewing site  
Directions Page 13*

## OUT THERE BY BOB TURNBULL OBSERVATION OFFICER

### JANUARY-FEBRUARY

Happy New Year to you all and I hope for better viewing conditions but I have no control over the heavens!

#### PLANETS

Up front are the naked eye planets in the morning in the East Saturn, Mercury, Mars and Venus (see page 34 of Astronomy 2022) Please refer to page 31 Diary as this will give you a very detailed sequence of all the highlights for February and page 38 for details of interest in March.

**MERCURY** Rises to its greatest elongation  $26^{\circ}$  west of the Sun on the 17th and the period. Then mid February to early March is the best time this year, in the morning Eastern sky.

**VENUS** Rises in the early morning in Sagittarius with Archer and Mars the greatest brilliance at  $-4.8$  magnitude.

**JUPITER** Only visible early in the month but too close to the Sun until mid March.

**SATURN** Is in the twilight in Capricornus, remaining for the rest of the year. On the 28<sup>th</sup> Saturn and Mercury are  $4^{\circ}$  apart and move closer in early March.

**COMET LEONARD** (C/2021A1) could become visible in the pre-dawn sky at the end of February in Microscopium at 11 magnitude.

**METEOR SHOWER** From 28<sup>th</sup> January to February 21<sup>st</sup> (maximum zenith hourly rate of .6 around the 8<sup>th</sup>) Watch out for the yellow and blue coloured fire balls when they reach negative magnitude!



Wishing you all good viewing

Stay safe and COVID free.

Bob Turnbull  
Observations Officer



**Charles  
Messier  
(1730-1817)**

## Messier of the Month

In the first of a new series, I plan to select a Messier object visible in the sky during the publication month of our current magazine. Everybody knows the story behind the Messier catalogue and how the list was compiled by Charles Messier to eliminate deep sky objects that could be confused in comet searching, a popular passion of observers at the time. The catalogue has since become a compulsive viewing list for amateurs starting their viewing career. With a map and some personal viewing notes I hope to help current readers and club members view these objects. Even if you have seen them in the past, revisits can sometimes surprise.

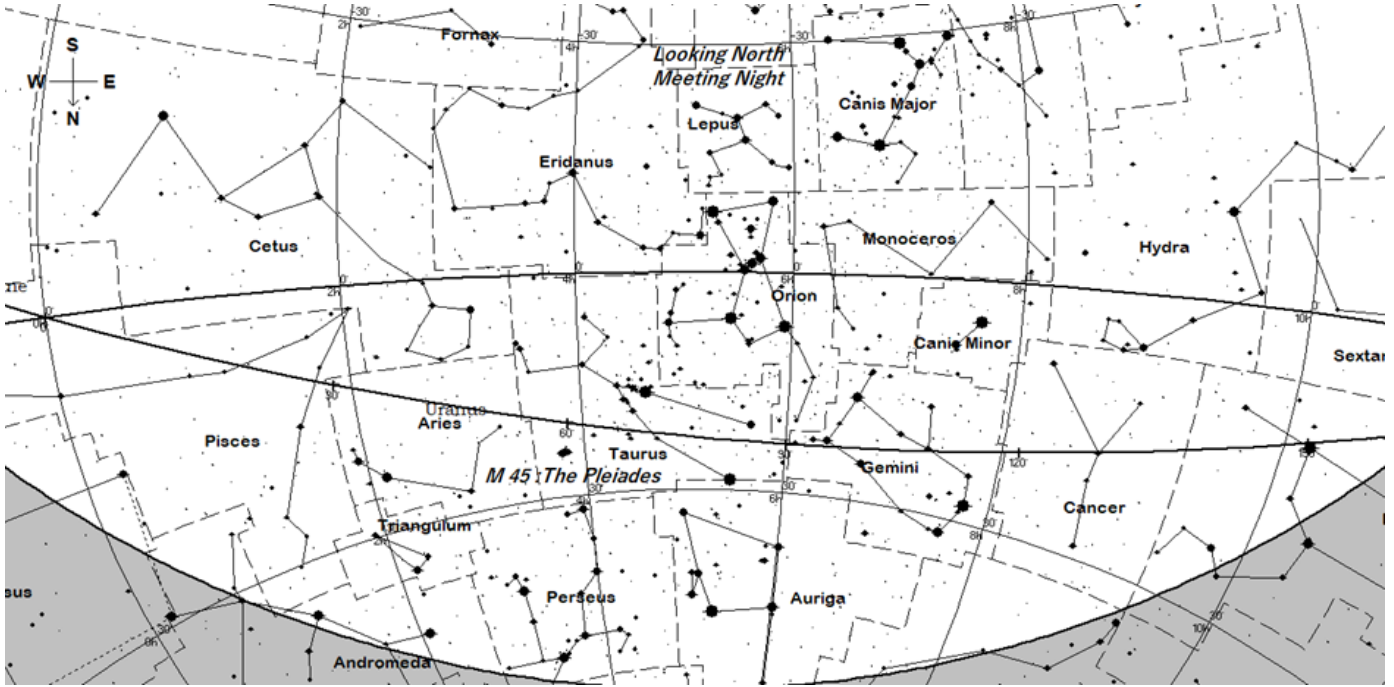
**Messier 45** (Open cluster in Taurus, January.) This is one of the most well-known and popular group of stars in the sky and the brightest +1.5 mag members of the cluster make a striking and close visual group which has fascinated sky watchers for thousands of years. Variously known as The Seven sisters, The Subaru Cluster, The Pleiades, and many more in various ancient cultures. This group was selected by Messier to round up his group of listed objects and with 8 comets to his name his search continued and as it did more objects came into his view.

**Some Details:** Size: 12 arc minutes; One of the nearest oc in the sky, the nine brightest are named after the daughters of Atlas; at least 6 visible to naked eye but many ancient and modern viewers can discern more. As 7 was a mythological and biblical magic number the easy 6 was rounded to 7 (witness the great reluctance to follow the search for the 8<sup>th</sup> planet once Uranus was discovered- the social media at the time would be in a frenzy of denial when Neptune was finally discovered!).

Since the key stars are young and blue, the discovery of white nebula was presumed to be natural emissions from these stars, but later research found that the seven sisters merely light up nearby dark nebula. Binoculars and clear atmosphere reveal these nebular hazes emanating from the brighter stars in the group.

# Sky Objects By Eugene O'Connor

Cont...2



## Astro Events from Frank Gross



**1014 years ago today, ancient civilizations around the globe observed the brightest observed stellar event in recorded history, reaching an estimated  $-7.5$  visual magnitude, exceeding roughly sixteen times the brightness of Venus.**

One thousand fourteen years ago, ancient civilizations witnessed the brightest supernova explosion in recorded history. The supernova is known today as SN 1006 and was observed by ancient civilizations across the globe. The extremely bright event was mentioned by astronomers from Asia to Africa and witnessed across all continents.

The cosmic event of the greatest visual magnitude recorded in human history is believed to have taken place in AD 1006. It was widely observed from different places on Earth.

April 30, May 1, mark its anniversary as we are reminded that ancient civilizations worldwide developed remarkable astronomical capabilities, observing distant stars and cosmic events thousands of years ago.

The massive cosmic explosion is thought to have first appeared in the Lupus constellation on the Centaurus border between April 30 and May 1, 1006 AD. Today, known as the SN 1006 supernova, observers from Switzerland, Egypt, Iraq, China, and Japan described the cosmic event as a 'sudden star'. However, Chinese and Arab astronomers left us with the most complete historical descriptions of the event.

### **The Brightest Supernova Explosion in History**

Egyptian astrologer and astronomer Ali ibn Ridwan who was around 18 years of age, writing in a commentary on Ptolemy's Tetrabiblos, stated that "the spectacle was a large circular body,  $2\frac{1}{2}$  to 3 times as large as Venus.

The sky was shining because of its light. The intensity of its light was a little more than a quarter that of Moonlight" (or perhaps "than the light of the Moon when one-quarter illuminated").

## Astro Events from Frank Gross

Cont...2

Like all other observers, [Ali ibn Ridwan](#) noted that the new star was low on the southern horizon. Some astrologers interpreted the event as a harbinger of plague and famine. Its size was equivalent to a half-moon, and its brightness was such that at night it allowed people to see the objects that were on the ground, almost as if someone had flashed a very bright light onto Earth. It was yellow in color and was visible for over a year.

According to [Muslim Heritage](#), it “first appeared on the evening of 17 Sha’ban 396 H/ April 30, 1006. It persisted through the summer, but by mid-August, the sun had moved so close to it that, from Cairo, it was above the horizon only during the daylight hours, making further observation difficult.”

The annals of the Abbey of Saint Gall in Switzerland are probably the most northerly sighting of the cosmic event ever recorded. The Mons of the Abbey [wrote](#): [i]n a wonderful manner this was sometimes contracted, sometimes diffused, and sometimes extinguished... It was seen likewise for three months in the inmost limits of the south, beyond all the constellations which are seen in the sky.”

### The supernova associated with SN 1006

In modern times, the supernova associated with SN 1006 was not identified until 1965. Using the Parkes Radio Telescope, Doug Milne and Frank Gardner demonstrated that the radio source PKS 1459-41, near beta Lupi, had the appearance of a circular shell of 30 arc minutes.

During the following years, X-ray and optical emissions from this object were detected. The rest of the SN 1006 supernova is located at an estimated distance of 7,200 light-years (2.2 kiloparsecs), resulting in a diameter of approximately 70 light-years.

SN 1006 is originally thought to be a binary star. One of the cosmic companions, a white dwarf, exploded when gas from its companion caused it to exceed the [Chandrasekhar limit](#) – the maximum possible mass of a white dwarf-type star.

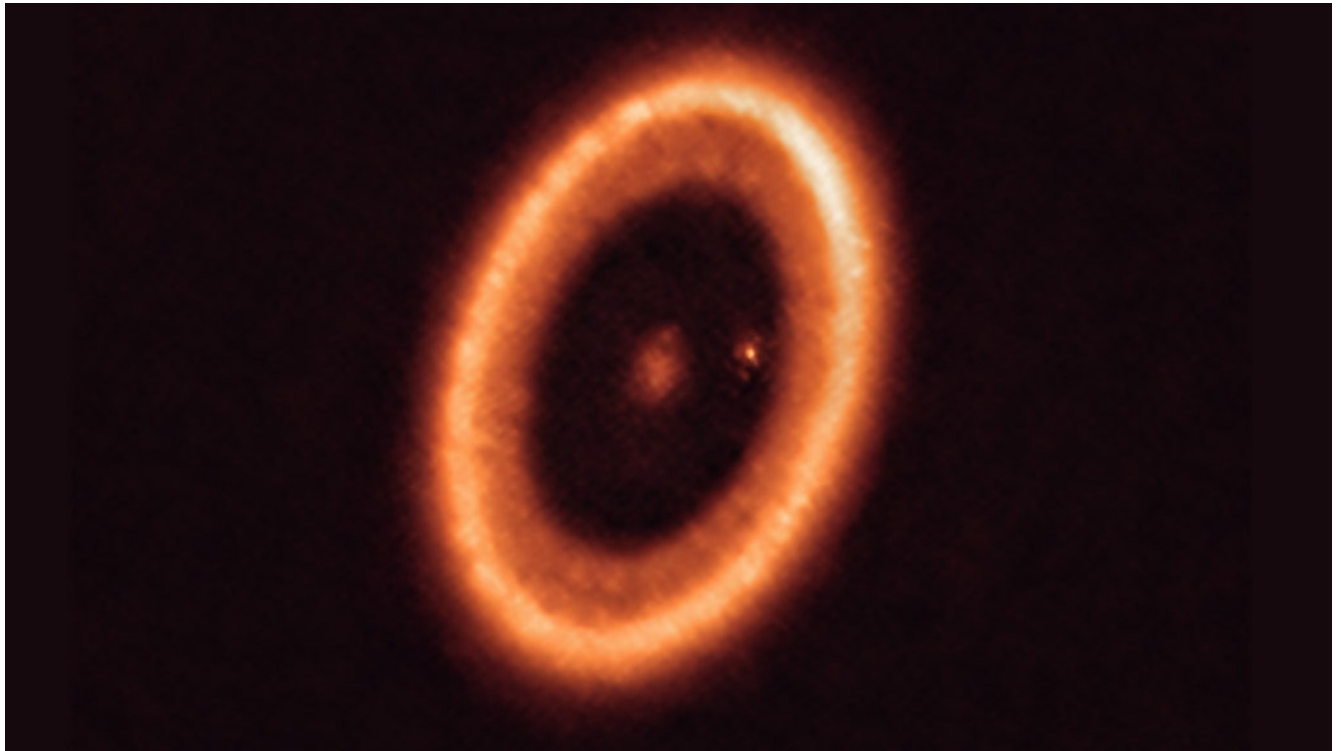
The supernova ejected material at enormous speed, generating a shock wave that precedes the ejected material. Due to this shock wave, the particles are accelerated to extremely high energies, producing the bluish filaments that appear – up to the left and down to the right – in the false-color image obtained with the [Chandra X-ray Observatory](#) shown in the featured image.

Cont...3

### Formation of Exomoons

**The tiny dot in this image may be the first look at exomoons in the making**

A new finding is some of the strongest evidence yet that planets around other stars have moons



Observations by the ALMA telescope array in Chile show the young star PDS 70 surrounded by a dusty ring of debris. The bright dot just inside that ring is a disk of potentially moon-forming debris surrounding a young planet.

By [Maria Temming](#)

JULY 28, 2021 AT 6:00 AM

### **New telescope images may provide the first view of moons forming outside the solar system.**

The Atacama Large Millimeter/submillimeter Array in Chile glimpsed a dusty disk of potentially moon-forming material around a baby exoplanet about 370 light-years from Earth. The Jupiter-like world is surrounded by enough material [to make up to 2.5 Earth moons](#), researchers report online July 22 in the *Astrophysical Journal Letters*. Observations of this system could offer new insight into how planets and moons are born around young stars.

ALMA observed two planets, dubbed PDS 70b and 70c, circling the star PDS 70 in July 2019. Unlike most other known exoplanets, [these two Jupiter-like worlds are still forming](#) — gobbling up material from the disk of gas and dust swirling around their star (*SN: 7/2/18*). During this formation process, planets are expected to wrap themselves in their own debris disks, which control how planets pack on material and form moons.

Around PDS 70c, ALMA spotted a disk of dust about as wide as Earth's orbit around the sun. With [previously reported exomoon sightings still controversial](#), the new observations offer some of the best evidence yet that planets orbiting other stars have moons (*SN: 4/30/19*).

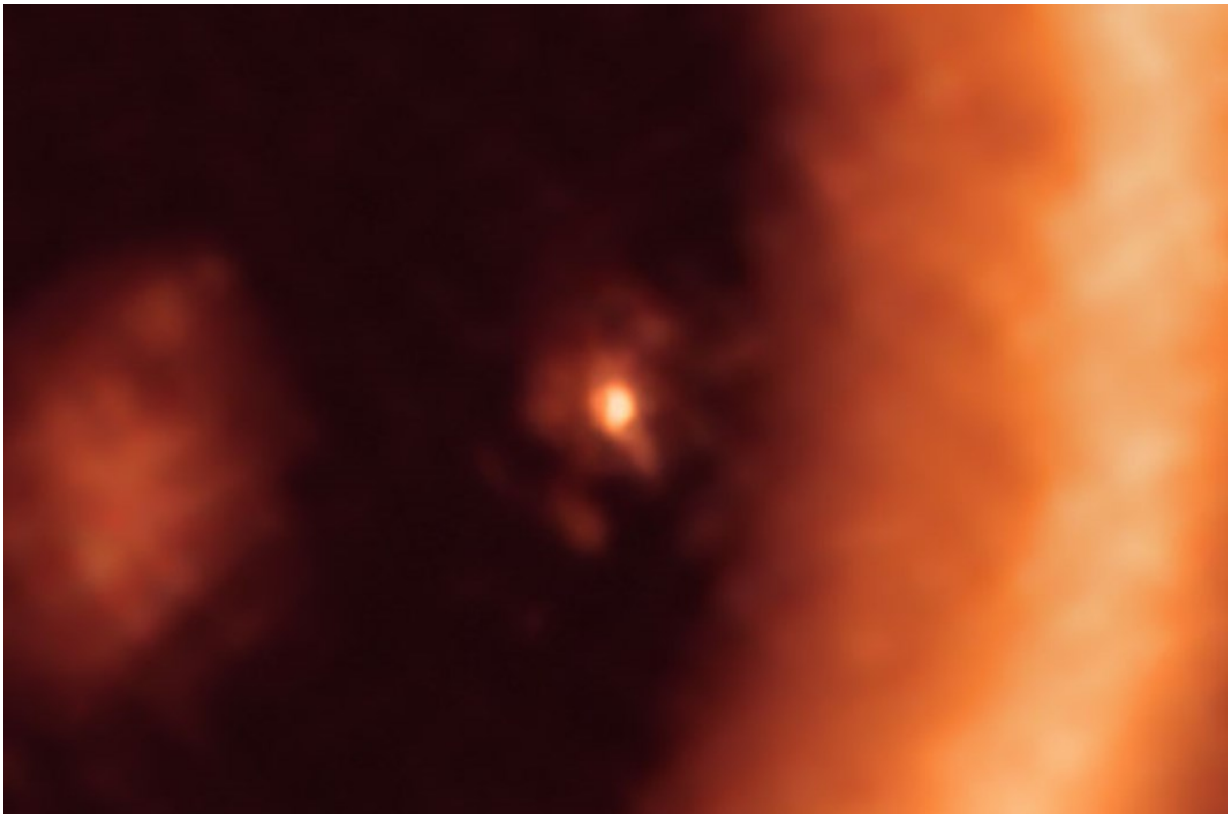
Unlike PDS 70c, 70b does not appear to have a moon-forming disk. That may be because it has a narrower orbit than PDS 70c, which is nearly as far from its star as Pluto is from the sun. That puts PDS 70c closer to an outer disk of debris surrounding the star.

## Astro Events from Frank Gross

Cont...4

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Just inside a ring of debris surrounding a young star is the planet PDS 70c, which is surrounded by its own disk of possible moon-forming material (bright dot at center).ALMA/ESO, NAOJ AND NRAO, M. BENISTY *ET AL*  
“C is getting all the material from the outer disk, and b is getting starved,” says study coauthor Jaehan Bae, an astrophysicist at the Carnegie Institution for Science in Washington, D.C.

“In the past, b must have gotten some material in its [disk], and it could have already formed moons,” Bae says. But to make the new images, ALMA observed wavelengths of light emitted by sand-sized dust grains, not large objects, so those moons would not be visible.



## Astro Events from Frank Gross

Cont...5

### **Astronomers believe they have intercepted what could be the first radio emission coming from a planet beyond our solar system.**

*In Brief: A group of astronomers exploring the universe using a series of radio telescopes have identified what they believe is a possible radio emission coming from an exoplanet in the constellation Tau Boötes.*

*It is noteworthy that this radio emission, while likely real, does not mean it is a signal sent out by an intelligent species inhabiting the planet. On the contrary, based on what we know so far, researchers believe that the planet is responsible for the emission.*

*The planet from where the signal is believed to originate is a gas giant.*

*Follow-up observations will be needed to confirm the discovery. However, if confirmed, it would open an entirely new window to study planets beyond our solar system.*

*Studying the magnetic field of exoplanets can help us understand the habitability of distant alien worlds.*

A team of astronomers led by Cornell postdoctoral researcher Jake D. Turner, Philippe Zarka of the Observatoire de Paris-Paris Sciences et Lettres University, and Jean-Mathias Griessmeier of the Université d'Orléans, has revealed in a paper published in the journal [Astronomy & Astrophysics](#) that they have identified what they believe is a radio emission coming from an exoplanet in the [constellation](#) Tau Boötes.

The discovery was made after the group of scientists was monitoring the cosmos using a vast array of radio telescopes; they spotted a single emanating from the Tau Boötes system, and [they explain](#) the signal they have intercepted could be **the first radio emission** spotted coming from a planet beyond our solar system.

As per the researchers, the Tau Boötes system is home to a binary star and at least one exoplanet. The researchers write in their study that the signal is coming from the planet itself, and their conclusion is based on the “strength and polarization of the [radio signal](#) and the magnetic field of this world, which are compatible with theoretical predictions.”

The system itself is relatively close by—in terms of astronomical distances. Tau Boötes is located at a distance of about 51 light-years. Interestingly, the primary star should be easily visible to the unaided eye under dark skies.

Discovering the radio signal in Tau Boötes If confirmed, the researchers say that the radio signal could open an entirely new field of research for exoplanets, offering experts a novel way to examine alien worlds that are dozens of light-years away. The signal coming from Tau Boötes was spotted by researchers using the Low-Frequency Array (LOFAR), a radio telescope located in the Netherlands.

The researchers discovered bursts of emission from a star system that is home to a so-called hot Jupiter, a gas giant that is very close to its own sun. The group also looked at other possible candidates for exoplanetary radio emissions in the 55 Cancri (in the constellation Cancer) and [Upsilon Andromedae](#) systems. Researchers picked out these systems because of “their proximity to the Solar System, the stellar age, the estimated planetary mass, and the small orbital distance of the planet.”

But of the systems they surveyed, only the Tau Boötes exoplanet exhibited a significant radio signature, a unique potential window that will allow us to study the planet’s magnetic field.

This is actually a big deal because observing an exoplanet’s magnetic field helps astronomers decipher a planet’s interior and atmospheric properties, as well as the physics of star-planet interactions.

For example, Earth’s magnetic field plays a huge role in our world’s habitability since it protects us from the hazardous solar wind. This is why the study of distant exoplanets’ magnetic field is such a big deal; through this study, we can see how likely an exoplanet is habitable.

## Astro Events from Frank Gross

Cont...6

### Our Take

The discovery of a radio signal possibly originating from an exoplanet in the Tau Boötes system is unprecedented, to say the least.

If confirmed, the discovery could help us peer deeper into the universe and expand our understanding of distant exoplanets in our galaxy.

This, in turn, will greatly increase our chances of identifying potentially habitable planets and worlds that meet the necessary conditions for life as we know it to exist on their surface.

Having that aside, this discovery is far from confirmed.

The authors themselves explain in their study that the radio signal they have intercepted is weak.

“There remains some uncertainty that the detected radio signal is from the planet. The need for follow-up observations is critical,” Turner [revealed in a statement](#) by Cornell University.

Hopefully, this will be confirmed as the first radio emission from a planet beyond our solar system, opening a new page to study distant exoplanets, and allowing us to better understand the chances of life on faraway worlds.

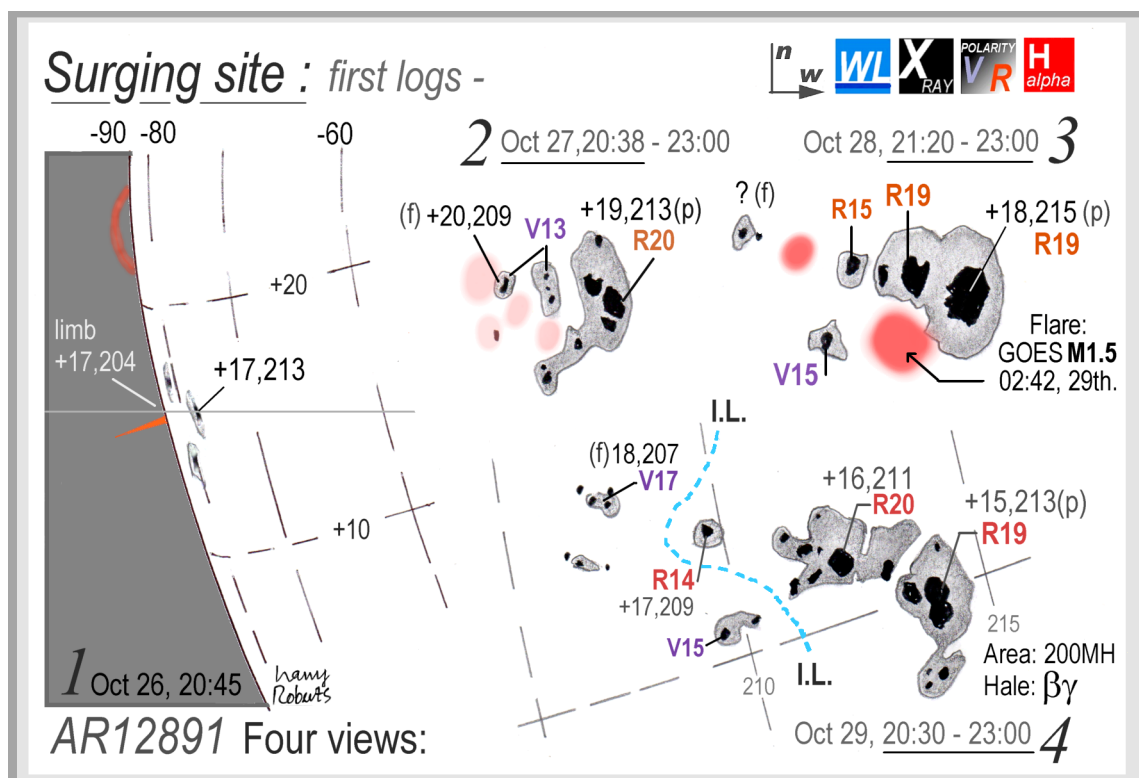
## Solar Activity by Harry Roberts

### AR12891 and Surging: An Explanation?

Spot group AR91 made “headlines” (at least on Spaceweather.com) when, unseen behind the E limb, it hosted some remarkable surges and other transients. See the Spaceweather.com site archive for 2021 Oct 26 and 27. Yet here in ‘Aus’ we have our own time zone and on the 25th and 26th October a ‘salvo’ of (mainly) bright H-alpha surges staged a dazzling display at the E limb!

Transients. Three observing sessions during the transition from Oct 25 to 26 (UT) logged some twenty transients, all emerging from the same site on the solar east limb at +13, ln214 degrees. Most are presented here to the scale solar disc diameter is 580mm. (Earth is 6mm!) See “Surging Report”.

The surges are presented separately to the new spot group (AR12891) that was first seen at this station Oct26, 20:45UT, after all surging had ended. It was presumed that a large spot group was hosting the transients and strong solar flares, yet the group when it appeared was rather meagre.



AR12891. This was also something of an enigma<sup>1</sup>. Five logs are presented. Fig1: Oct 26<sup>th</sup>, the first limb view after the ‘salvo’ of surges! We see three small spots at +17,213, the (p) spot 9 deg from the limb. Yet a major group was expected based on earlier activity! This seemed too small! Magnetic complexity may explain this – yet the Hale class of 29<sup>th</sup> was only BetaGamma: i.e. a complex inversion line to separate unlike polarities (Fig 4, I.L. blue). Yet it hardly accounts for the earlier flaring and surge activity?

Flaring. An M1.5 flare on the 28<sup>th</sup> hinted at growing activity (Fig3.)

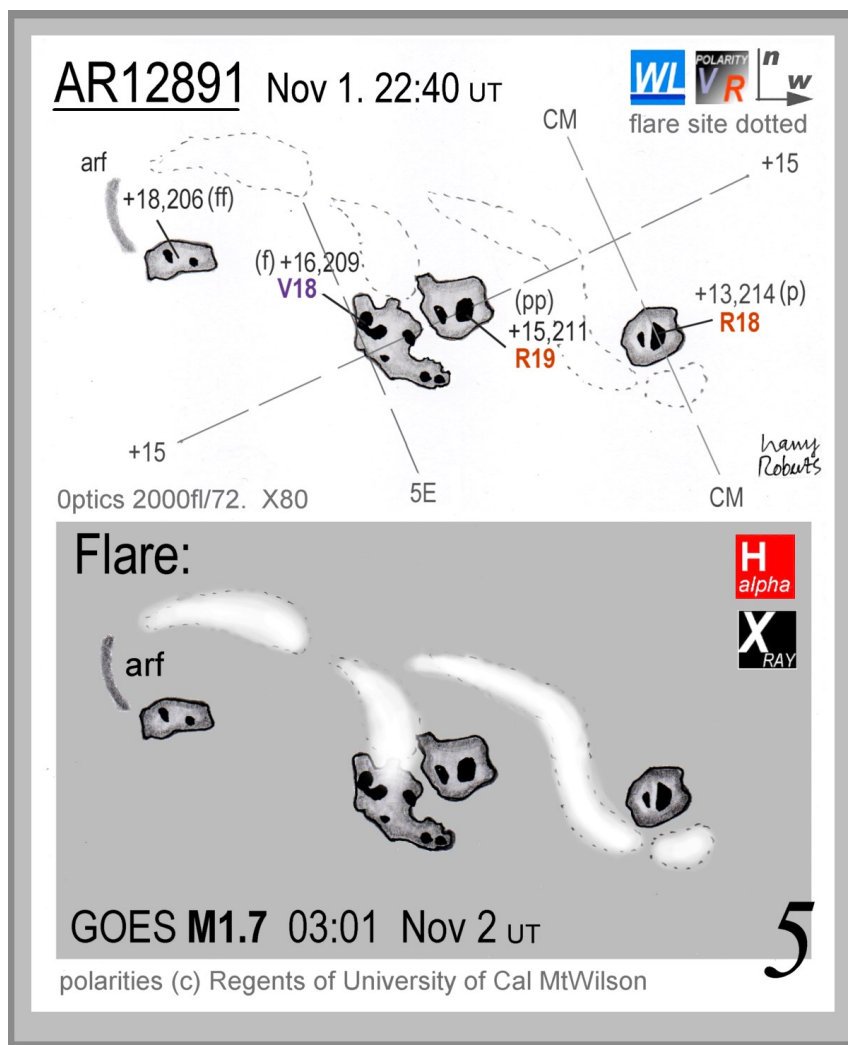
## Solar Activity by Harry Roberts

Cont...2

Polarity. As in AR87, discussed earlier, AR91 showed (p) preceding field (here red) as very dominant. Big spots were all 'red' with very little 'violet'. Were Coronal Hole (CH) factors at work in AR91 as in AR87? The evidence is not strong – though smaller CH's were scattered about solar mid-latitudes in the north as well as south. See Report on AR12887.

A fine bright M1.7 flare was logged in AR87 at 03:00 Nov 2UT. The flare 'tries' to divide the two close central spots with unlike polarities. The flare's extent hints at other low-power polarities covering a wide field with a complex 'inversion line' (I.L.). The (p) spot is now at the solar C.M. and the group begins a rapid decline.

Delta Polarity? The big factor in AR91's career was the burst of strong flaring and surging whilst behind the East limb. Perhaps a Hale Delta configuration arose then, lasting only a day or so? The 'anomalous surging', the odd mix of small spots and the large area of the M1.7 flare all hint at this. The answer must await further study.



1 For report on AR 12887 "Enigma" see elsewhere.

## More Club News continued from page 1

### Club/Social 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.

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.

### The AGM was held at the July 2019 monthly meeting. Elected officials for 2019- 2021

The 2021 AGM has been postponed due to Covid.

President: Mark Town

Vice President: John Gould

Secretary/Treasurer: Frank Gross

Public Officer; Frank Gross

Observation Officer: Robert Turnbull

Editor: Kaye Johnston

Librarian: Chris O'Hanlon

The Committee: Robert Turnbull, Rudolf Henssen, Robert Spruyt, Chris O'Hanlon, John Gould, Ernest Royston, Anthony Peters

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

### 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.