Shoalhaven Astronomers Inc.
www.shoalhavenastronomers.asn.au
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Issue 1

Astro Flyer

JANUARY 2022

Club News

From The President. The Covid 19 situation continues to rapidly evolve. The current rules and the 95% vaccination level in NSW means we can now 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 21 Jan 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!

Keep on watching! Cheers, Mark Town

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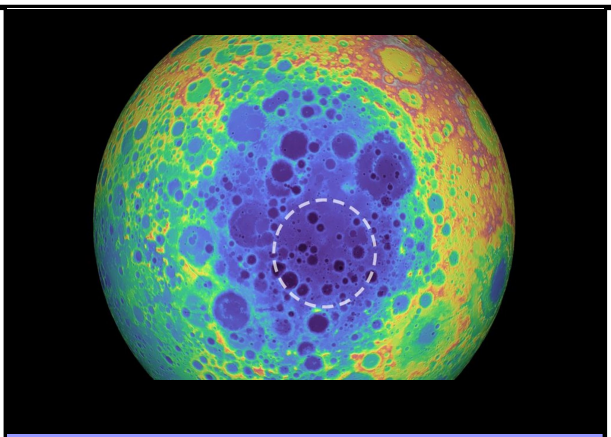


MOON PHASES

New Moon Feb 1 | **First Quarter** Feb 8 | **Full Moon** start here Jan 18 | **Last Quarter** Jan 25

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 19s

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° 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 28th Saturn and Mercury are 4° 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.

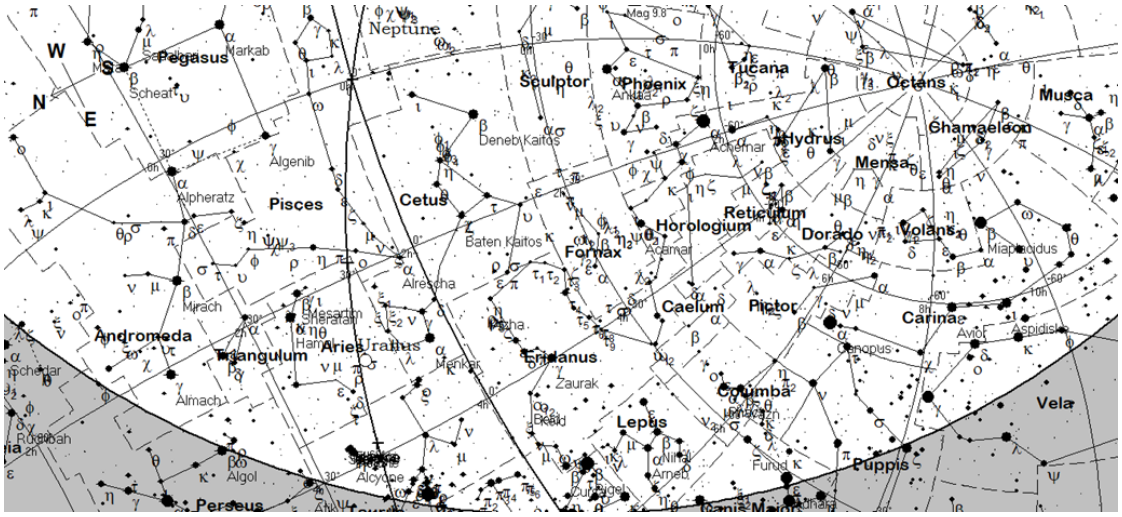
METEOR SHOWER From 28th January to February 21st (maximum zenith hourly rate of .6 around the 8th) Watch out for the yellow and blue coloured fire balls when they reach negative magnitude!

Wishing you all good viewing  Stay safe and COVID free.

Bob Turnbull
Observations Officer

Under the Dark Dome (11) final Beta Ceti's Summer Delights

The celestial dome in Australian summer seems not as prominent with complete darkness arriving late and traces of a hidden sun close to our horizon. Our ancestors with much shorter nights pictured the summer sun drawn by horses in a carriage of light seeming to graze the night horizon as if it longs to return early to fill the empyrean with birdsong in the crepuscular dawn. Despite the short hours of darkness and when we move away from the dazzling constellation of Orion and the delight of Taurus 's Seven Sisters and the Hyades, we find a triangle of bright stars in our eastern sky which guides us to some rominent deep sky objects near the guide star Beta Ceti (see maps 1 and 2 below).

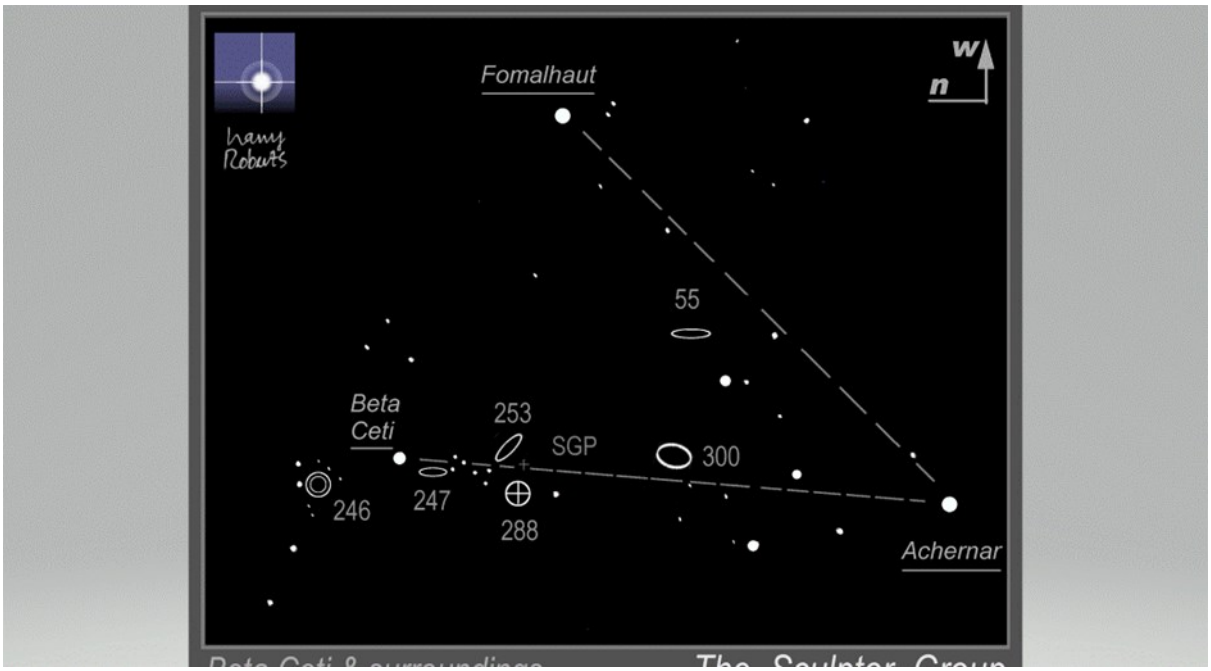


Map 1. Looking east after dark, Beta Ceti is located centre and to the top of picture and more detailed map (2) show the deep sky objects .

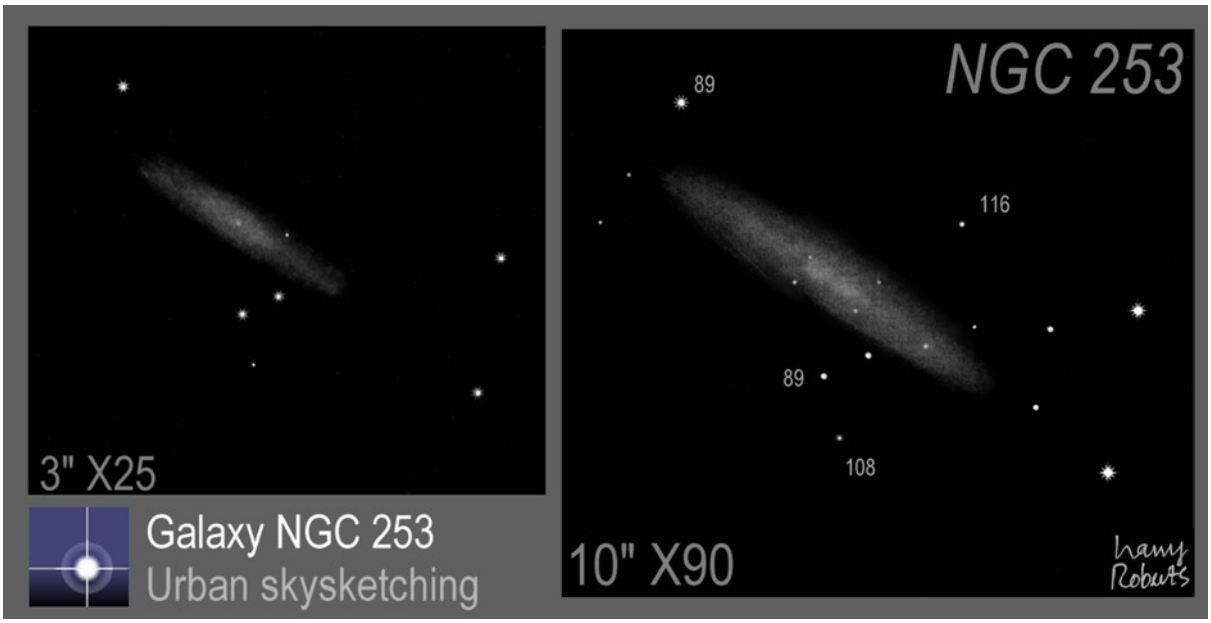
Cont...2

[I am indebted to Harry Roberts for sharing his maps and drawings revealing some of these deep sky objects in the Beta Ceti area, easily spotted in telescopes from 4" to 10" aperture.]

(Map 2. The Beta Ceti group of deep sky objects nearby)



Notice in Map 2 above that Harry has traced, two small triangles of faint stars which when we head south take us to the huge and bright stellar city that is NGC 253 in Sculptor. This pops into my finder scope and fills the eyepiece of an 8" telescope at moderate power. I love the sprinkling of unrelated stars that are scattered in front of 253. See below. Harry has followed the usual practice of omitting the decimal point in accessing star magnitudes in maps below.



This is also known as the Silver Coin Galaxy, has a visual magnitude of 6.99 and sits at 12,000,000 ly from our eyepiece. It was discovered by Caroline Herschel on September 23rd 1783. It is the nearest object we southerners have to the amazing Andromeda Galaxy so popular with northern hemisphere viewers.

Cont...3

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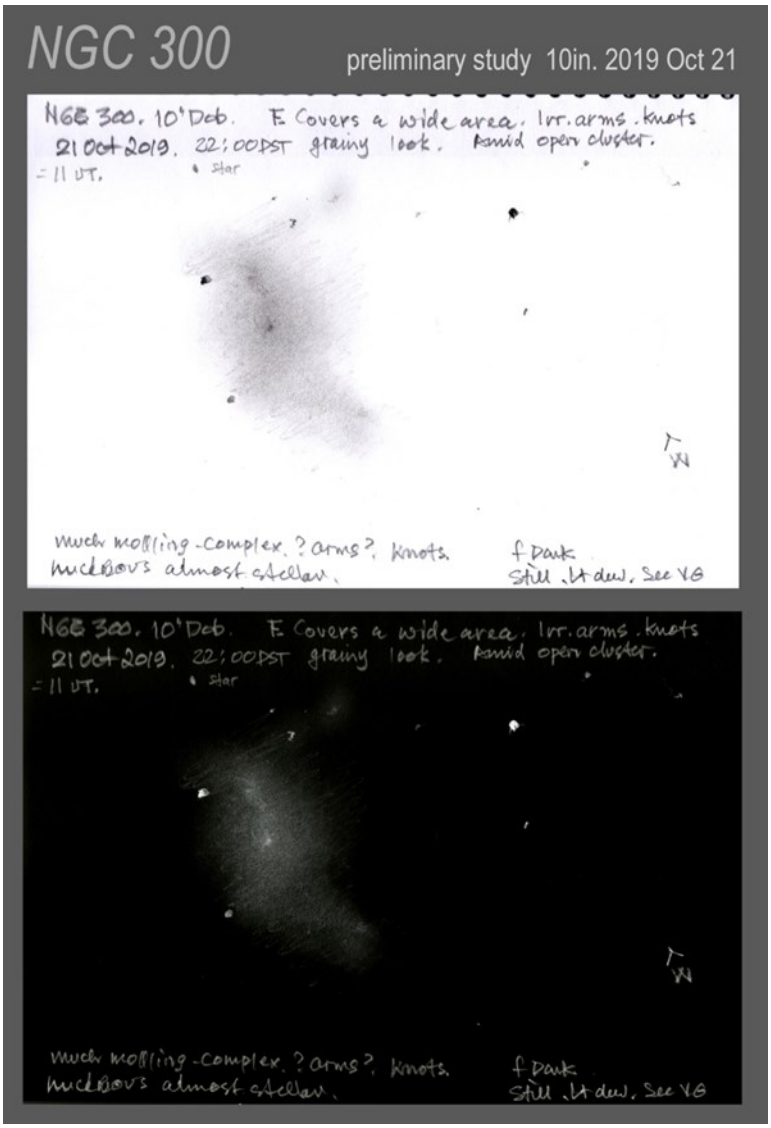
Halfway between Beta Ceti and Achernar lies the massive galaxy NGC300. Over the border in Sculptor lies NGC 300.

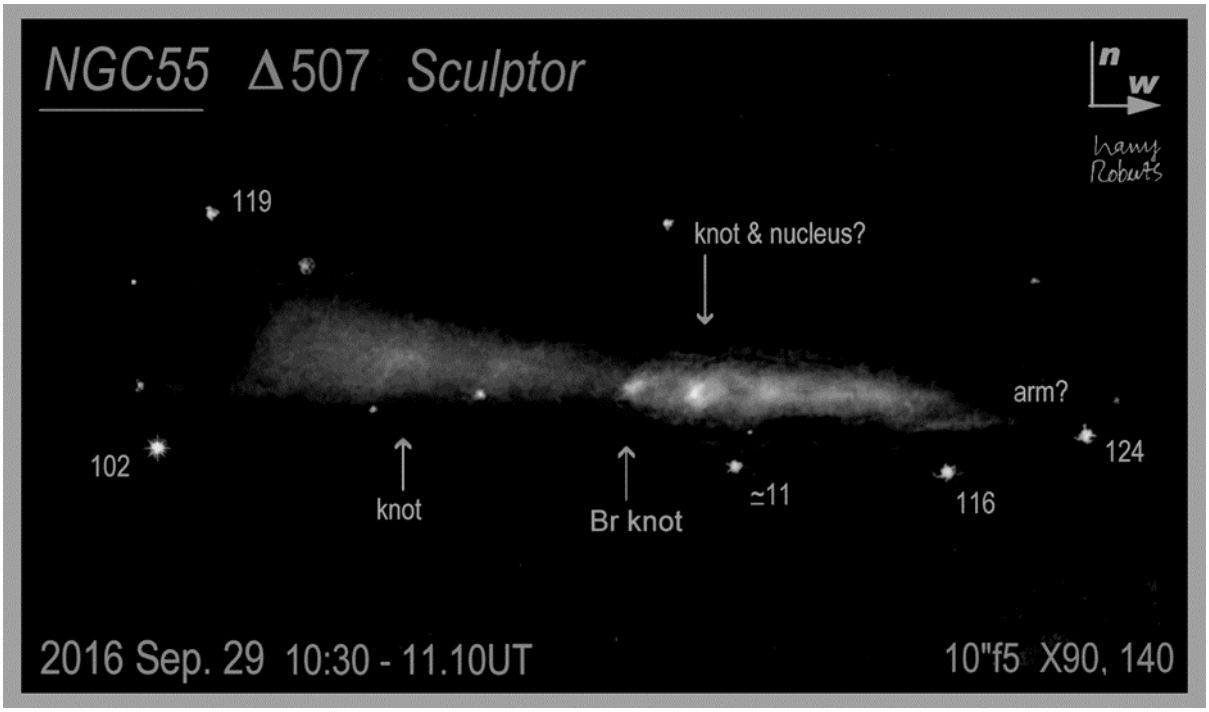
Spanning a full moon size in our skies. It has a visual magnitude of 7.8 and is 6.5 M ly away. Hartung has difficulty examining this object in his 12" and even Harry reckons this a challenging object. I observe an oblong haze in the spot dimmer than M83.

Could younger eyes untouched by Optical Doctors please view this object and report back!

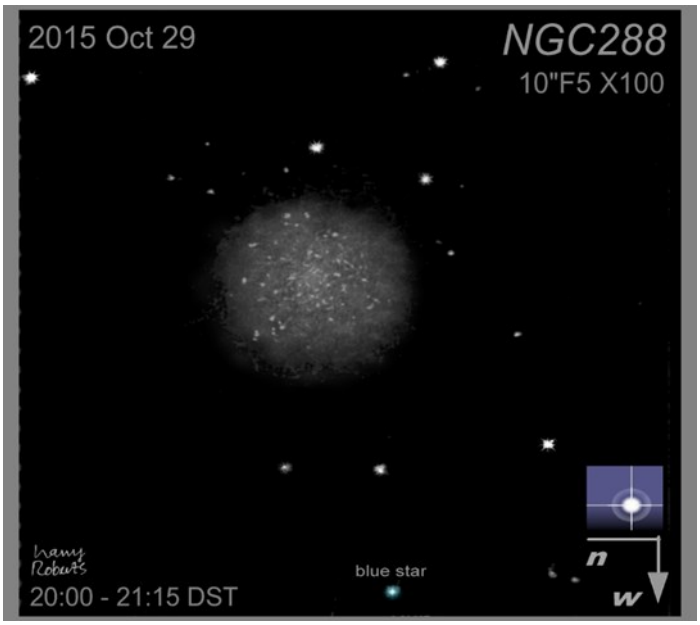


Cont...4

NGC 55. This is an edge-on barred spiral galaxy about 7,000,000 ly away in Sculptor. Discovered by James Dunlop on August 4th 1826 and listed by him as Δ 507. At mag 8.8 it is easily spotted as a long and thin band of light. Its shape is 32.4X 5.6 arc minutes. In moderate telescopes some brighter spots are noticed in small telescopes.



NGC 288. Located about 1.8 degrees southeast of 253(above) lies a Sculptor globular cluster with a 3' dense core surrounded by a disuse haze of faint stars. At mag.8 it can be spotted in large binoculars in the same field as NGC 253. 13 arc minutes in size. A furball of stars.



Some interesting double stars in the area:
1). H323, also part of Ceti13. RA 00.07.59. Dec 14.13. mag. 6/8.4. This is spotted in a row of mag 5 and 6 stars of which Ceti 13 is one. White with a light blue companion with a kite-like formation east in the field.

2) Gamma γ Ceti.RA 02.43; Dec. +3.14. mag. 3.4/6.5. sep. 2.5" Warm white and blue pair closer than expected. Fainter stars in the field to the west.

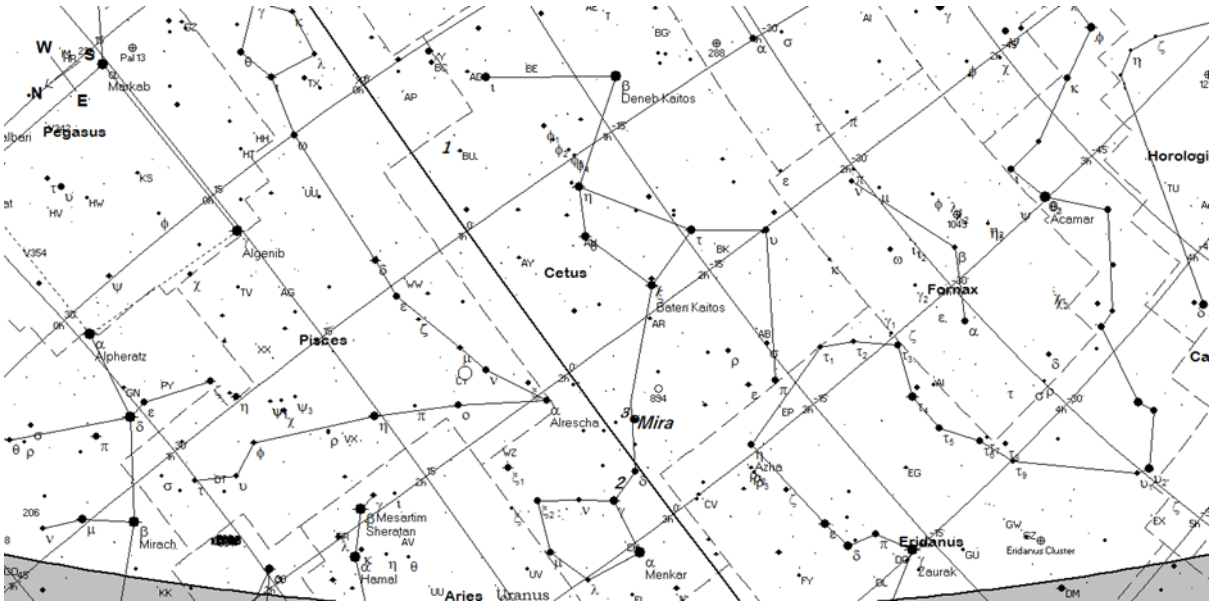
Cont...5

3) Mira (Wonderful!) O Ceti. RA 2.20; Dec -2.52. sep. 45.5" (3.5-10.1/ 9.) This unique long-period pulsating variable multiple star was the first variable star as such discovered as it ranges from mag. 3.5 to 10.1 but this can vary and Mira is known to reach mag. 2 with a period of about 333 days. It appeared and disappeared on early maps until its qualities were finally nailed by the dutch astronomer Jan Fokkens Holwarda in 1639. It was known to Chinese observers from 1590 onwards. This star is 250 times brighter at maximum than at minimum and sometimes the changes can move very slowly over certain periods and fast over others. It seems to have many companions and the mag 9 companion at a wide 45.5" listed is only one of many. Mira looks very red at minimum and orange at max (3 months ago this year!) Worth searching out.

By the way, Mira was discovered in 2007 to have an amazing comet-like tail! A trail of blue cast across the heavens – discovered by astronomers using a space telescope – it is actually hot gas thrown off by Mira. The image below – an ultraviolet mosaic from NASA's Galaxy Evolution Explorer – shows Mira's tail. The large blue dot at left is a star that is closer to us than Mira. The star Mira appears as a small white dot in the bulb-shaped structure at right. Mira is moving from left to right in this view. Within Mira's tail are "seeds" for new solar systems. That is, Mira is shedding material that will later be recycled into new stars and planets. Wonderful indeed!!

Cont...6

(A new look at Mira - shedding its gasses comet-fashion!)



Astro Events from Frank Gross

Astronomers Find a “Massive, Dense Structure” Beneath the Largest Crater on the Moon

 Ivan Petricevic

"The dense mass—"whatever it is, wherever it came from"—is weighing the basin floor downward by more than half a mile..."

Astronomers have recently found a strange, humongous deep mass structure beneath the largest crater in our solar system; the Moon’s South Pole Aitken basin.

There, researchers discover an anomaly with a massive unexpected mass. Although it’s not aliens, astronomers say that the mysterious mass may very well contain the metallic remnants from the asteroid that slammed into the Moon, forming the crater.

“Imagine taking a pile of metal five times larger than the Big Island of Hawaii and burying it underground. That’s roughly how much-unexpected mass we detected,” said lead author Peter B. James, Ph.D., assistant professor of planetary geophysics in Baylor’s College of Arts & Sciences.

This photo was taken by Apollo 8 during the 1968 mission on their first approach to the Moon.

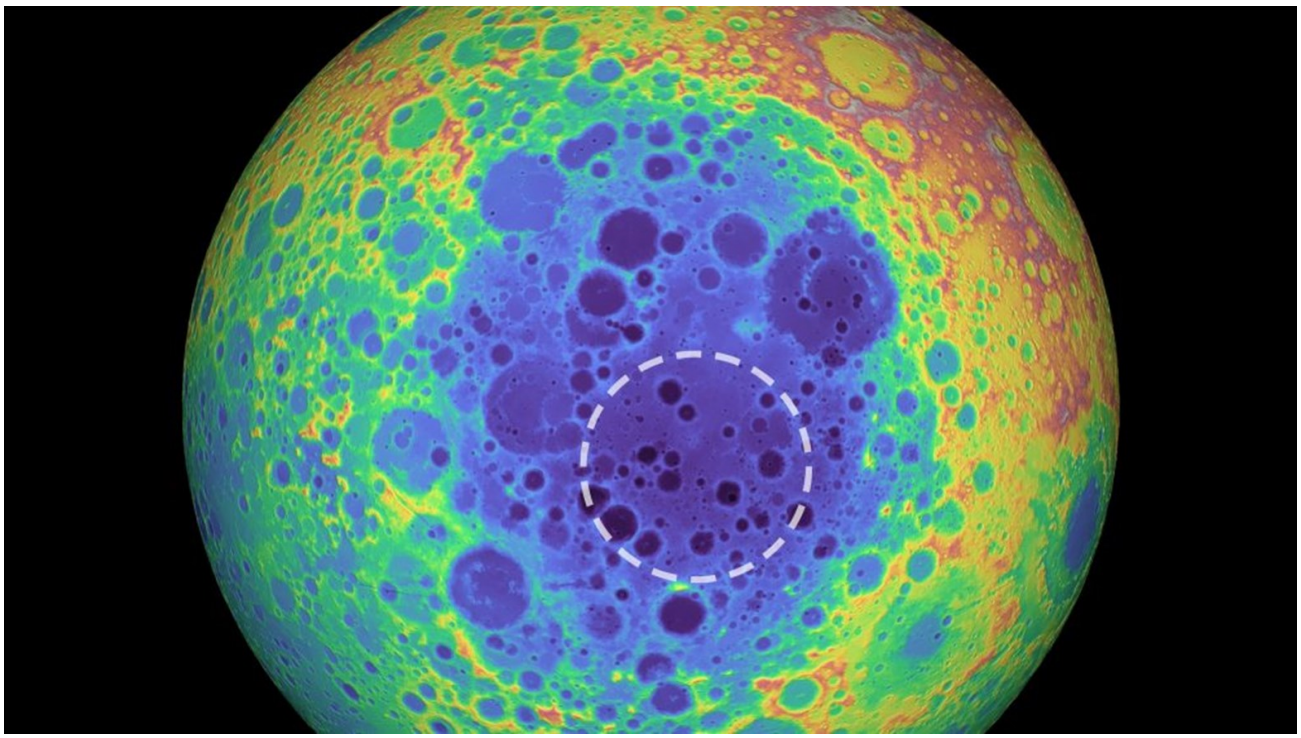
Cont...2

An oval crater

The crater located on the far side of the Moon is an oval-shaped region around 2,000 kilometers wide. Measurements throughout the years have revealed it is several miles deep.

The new, anomalous mass beneath the crater is detailed in the study "Deep Structure of the Lunar South Pole-Aitken Basin," published in the journal *Geophysical Research Letters*. To spot the anomaly, astronomers analyzed data from NASA's Grail Mission, which allowed them to accurately measure gravity strength changes around the Moon. "When we combined that with lunar topography data from the Lunar Reconnaissance Orbiter, we discovered the unexpectedly large amount of mass hundreds of miles underneath the South Pole-Aitken basin," James said.

"One of the explanations of this extra mass is that the metal from the asteroid that formed this crater is still embedded in the Moon's mantle."



The location of the underground structure circled in the South Pole-Aitken Basin. Image Credit: NASA/Goddard Space Flight Center/the University of Arizona.

Mysterious structure

The researchers revealed that the dense mass of the structure –"whatever it is, wherever it came from" is causing the entire basin floor to weigh in by more than half a mile.

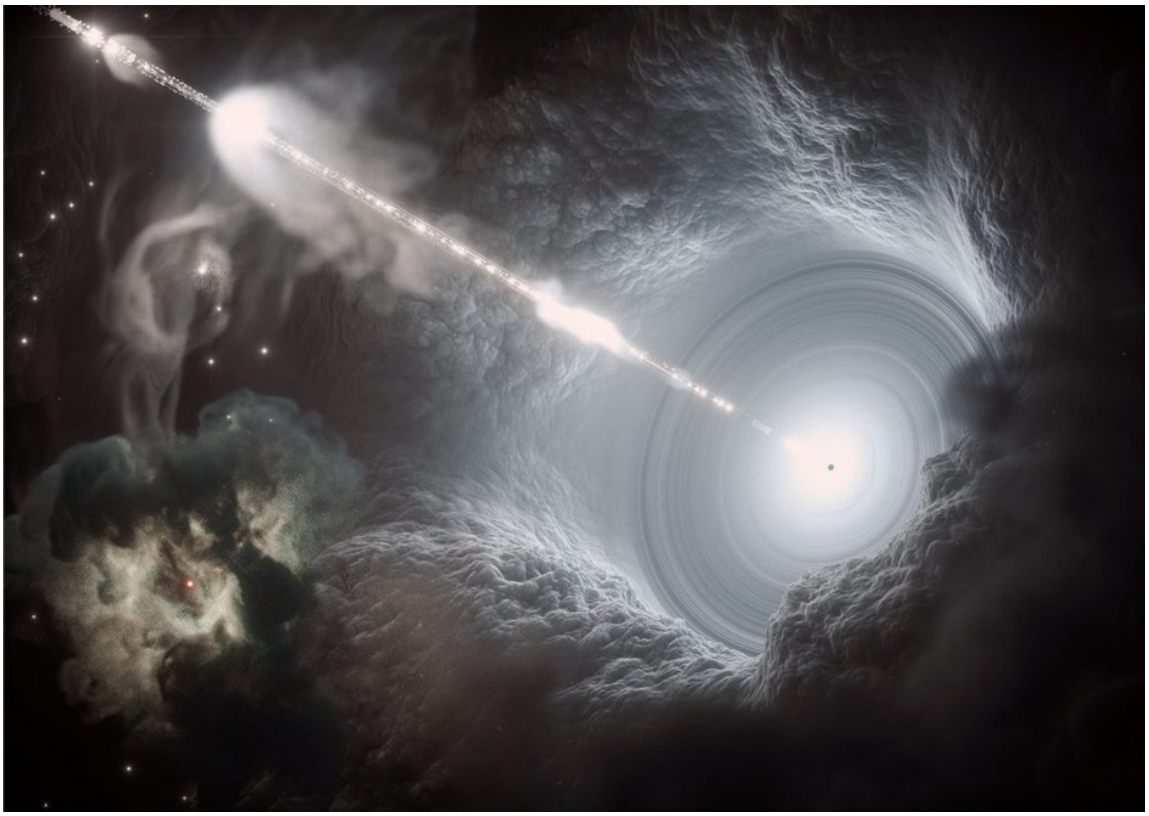
The researchers' team revealed through computer simulations of asteroid collisions into the Moon that, under the right conditions, iron-nickel cores from asteroids could have been dispersed into the Moon's upper mantle during collisions.

"We did the math and showed that a sufficiently dispersed core of the asteroid that made the impact could remain suspended in the Moon's mantle until the present day, rather than sinking to the Moon's core," James explained.

In addition to coming from asteroid impacts, astronomers say that the mysterious structure's origin could be related to the concentration of highly dense oxides left there by the last phases of lunar magma ocean solidification.

Cont...3

Some Black Holes Might Be Made Of Collapsed Universes



Ivan Petricevic

Scientists have proposed a theory suggesting that some black holes could be made of collapsed universes, and our universe might look like one to an "outside" observer.

A new theory proposes that primordial black holes – black holes that formed at the beginning of our universe – could account for the sought-after dark matter and, strangely, contain tiny collapsed universes within them.

While the new theory is surely a strange idea, the universe we live in is anything short of strange. As revealed by Motherboard, the refreshing theory tackles several of the cosmos' most important mysteries at once, albeit in a speculative way.

The new study, published in the journal Physical Review Letters, is different from previous theories since it suggests that our entire universe could look like a black hole bubble to an outside observer–from another universe.

Scientists have long struggled to understand and identify dark matter– the invisible matter that is theorized to make up most of the mass in the universe and the "stuff" that helps keep groups o galaxies together. Dark matter is essentially one of the most mysterious components of our universe.

Several physicists have proposed that this matter is made of particles that have not yet been detected, that it was formed by boiling plasma, and that it might not even exist at all.

Cont...4

However, the new study proposes that these primordial black holes (PBHs) could explain the dark matter that scientists are struggling to understand.

All of this is refreshingly interesting and sounds interesting mostly because, as explained by Alexander Kusenko, an astrophysicist at UCLA, we are far from understanding what dark matter is.

Speaking to *Motherboard*, Kusenko, who led the new study, revealed:
"We still don't know what dark matter is made of, but since the black holes are known to exist, it is natural to ask whether the dark matter could be composed of black holes that could form before the stars and galaxies formed." Therefore, the study of dark matter is one of the most difficult lines of research in cosmology.

Since its detection at the beginning of the thirties, a lot of effort has been put into characterizing and understanding it. However, still, in the XXI century, it remains a great mystery to astrophysics. Although much progress has been made towards understanding it in recent decades, it is still unknown exactly what its origin is and what molecules it is composed of.

Dark matter is strange; it can be deduced from its gravitational effects, but not through electromagnetic interactions, such as those found in ordinary matter.

Dark matter has no electrical charge–or so little that we have not yet been able to detect it–, no one has been able to observe it, but despite this, we believe it exists due to its multiple effects on gravity and the movement of galaxies.
That alone makes it one of the most interesting subjects of study in cosmology, and which is why the recent study is so appealing.

Primordial Black Holes and dark matter

What's the connection? The so-called Primordial Black Holes would have sprung into existence during the early moments of our universe when it was extremely dense and in a state of constant flux. Within them, Kusenko explains, there could be small universes, devoid of matter, that began and did not form as our own universe rapidly expanded.

This, essentially, could mean that we could also exist in such a "bubble" that an outside observer could identify as another primordial black hole.

Kusenko reveals that although baby universes we considered were devoid of matter, a little extra physics could probably make them look more like our own to an internal observer.
While this certainly is an exciting concept, it will remain in theory until scientists can obtain factual observational data to expand the theory.

To that end, Kusenko's team is optimistic that their hypothesis could be tested by the **Subaru Hyper Suprime-Cam** (HSC) atop Mauna Kea in Hawaii or the **Legacy Survey of Space and Time** (LSST) of the Rubin Observatory in Chile, which is scheduled to start operating in 2022.

Again, new technology will help humankind peer deeper into the universe than ever before, helping us solve, among other mysteries, what the deal with dark matter is.

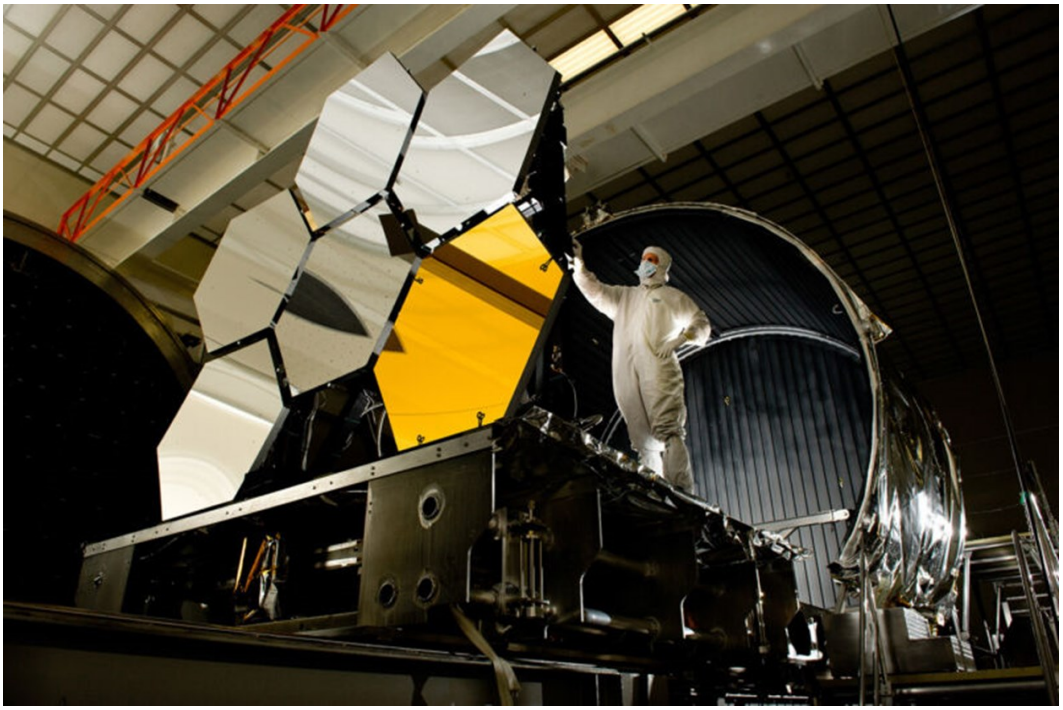
However, the journey towards proving the theory will be a long one. Unfortunately, we cannot detect arbitrarily small mass black holes, and if primordial black holes form dark matter, most of those black holes would go unnoticed, revealed Kusenko.

If black holes formed in the early universe in a variety of sizes, we can probably detect them by the tail of their distribution" In other words, looking for larger PBHs can help scientists make inferences about their smaller counterparts.
PBHs can also collide with neutron stars, which means that scientists may detect primordial black holes as they destroy the neutron star.

Cont...5

An “incident” with the James Webb Space Telescope has occurred

NASA is leading an anomaly review board to investigate and conduct additional testing.
ERIC BERGER - 11/23/2021, 9:09 AM



Technician standing near some of the segments of the James Webb Space Telescope primary mirror.

The projected launch date of the $10 billion James Webb Space Telescope came out of NASA on Monday, and it wasn't exactly a heart-warming missive.
The large, space-based telescope's "no earlier than" launch date will slip from December 18 to at least December 22 after an "incident" occurred during processing operations at the launch site in Kourou, French Guiana. That is where the telescope will launch on an Ariane 5 rocket provided by the European Space Agency.

"Technicians were preparing to attach Webb to the launch vehicle adapter, which is used to integrate the observatory with the upper stage of the Ariane 5 rocket," NASA said in a blog post. "A sudden, unplanned release of a clamp band—which secures Webb to the launch vehicle adapter—caused a vibration throughout the observatory."
Let's be honest, words like "incident," "sudden," and "vibration" are not the kinds of expressions one wants to hear about the handling of a delicate and virtually irreplaceable instrument like the Webb telescope. However, NASA, the European Space Agency, and the rocket's operator, Arianespace, have a plan for moving forward.

Cont...6

NASA is leading an anomaly review board to investigate and conduct additional testing to determine with certainty that the incident did not damage any part of the telescope. NASA said it will provide an update when the testing is completed at the end of this week. A senior source at the space agency said this testing is currently running ahead of schedule and that, provided some serious issue is not identified, the December 22 launch date should stick.

Any setbacks now in Webb's progress toward launch feel especially painful because reaching this point has been such a long, long road. NASA's follow-on instrument to the wildly successful Hubble Space Telescope was originally due to launch about a decade ago, with a development cost of $1 billion. Since then, technical problems and delays have bedeviled the complex telescope.

Building Webb has been difficult because its 6.5-meter mirror needs to unfurl itself once it reaches an orbit about 1.5 million kilometers from Earth. This is an exceedingly complex process, and there are more than 300 single points of failure aboard the observatory. NASA has had a difficult time testing them all on Earth in conditions that mimic the temperatures, pressure, and microgravity of deep space.

NASA's science chief, Thomas Zurbuchen, said Monday it was important for NASA to ensure the telescope was healthy before its launch. "I am confident the team will do everything they can to prepare Webb to explore our cosmic past," he wrote on Twitter. "Certainly, this step is worth the wait."

Solar Activity by Harry Roberts

Anomalous Surges: in unseen AR12891

Sunspots are centres of activity on the Sun where a range of unusual transient events may occur in the H-alpha band. These include flares, sprays and surges.

Surges are best defined as flare ejecta that, being well collimated and confined by magnetic fields may, after ejecting a great distance, return (retract) to its origin, to then repeat the in-out cycle many times![1] Surges, while common, are hard to believe! They are best seen when the host group is at or near the Sun's limb. Surges are then seen as bright prominences moving out and back against the blackness of Space. They can take a variety of odd shapes, as we will see.
When on the disc surges may be confused with filaments, but "tune" your filter 'in' and 'out' of band and fast moving surges will "jump out" at you, being Doppler-shifted from the H-alpha band by their velocity. See report on AR87.

AR12891. Session 1. This spot group was suspected behind the NE limb as the session for 2021, Oct25 began, since a superb surge adorned the limb, stretching north ~160Mm, across 14deg Lat., to a height of 60Mm! (Fig1, 22:30UT) A strong flare is needed for such a surge, yet no spot or flare was seen at the limb site (+13,219). Yet a GOES C9 flare was logged behind the limb 2hrs earlier.

Anomalous solar surging. Fig 1/2

Surges may show some distinctive features. One is an 'elbow' shaped bend where the ejecta emerges from the solar interior and bends to conform with sunspot fields as in Fig1, 22:30. At the end of surges the ejecta stream may separate into thin 'strands' or 'fibres'. (We may not call them filaments!) Both were seen here. Surges change their shapes rapidly as magnetic fields evolve in the parent spot-group during and after a flare.

Flares. A GOES C8.3 flare had erupted behind the east limb some mins earlier, likely equal to an M1 due to limb attenuation, with the C9.9 ~ 2hrs earlier.

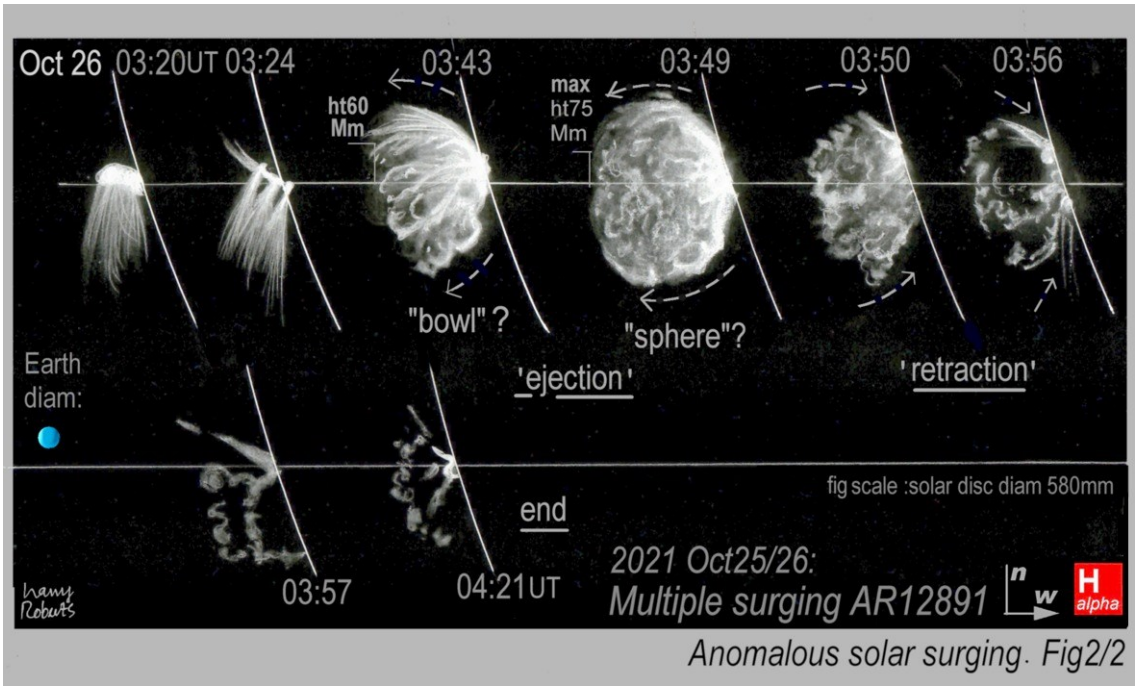
22:46UT. (Fig 1) The big north surge was gone (retracted/faded), a faint surge now stretched 14deg southward with a very bright core and dark disc filament at the origin site (+13,219). The three following surges are shown at 23:19, 23:22 and 23:38. At 00:08, Oct26 UT (Fig1) we see low, bright Post Flare Loops (PFL), a sign of more flaring and some 'ghost' remnants of earlier surges at the site.

After the initial ejection a surge may fully retract, partially retract, or stay 'put' and fade away slowly as confining fields decay. A 'ghost' surge may persist for some time as seen 23:19 to 23:38. H-alpha session1 ended at 00:10 Oct26UT. Session2 resumed at Oct26, 03:20.

Solar Activity by Harry Roberts

Cont...2

Session2. The +13,219 site was briefly quiet when a small "blister" erupted above the east limb, likely a fragment of a GOES M1.3 flare at the (unseen) spot site at 03:00(Fig2).



Spherical structure? Most surges are linear or a simple curve, sources agree (Zirin; Schrijver & Zwaan etc). Yet at 03:43UT we are presented with what seems to be many surges forming a spherical structure? A remarkable event! Logs at 03:43 to 03:49 show a cloud-like ejection comprised of many surge-like units, all more or less curved to create a 3D basin-like shape, coordinating their action to form at 03:49 a flattened sphere! Its point of origin was the +13,219 site, its maximum height 75Mm. Note Earth's diameter!
The speed of the involved surges was rapid and motion was detected by eye. They then coordinated their retraction, also very rapid and the structure contracted until only a few faint surges and wisps remained at 04:21UT.

"Round" Surges are not reported it appears? Yet curved surges are common. It may be that the formation resulted from a spherical ejection, a CME event perhaps? Several CMEs erupted at this site it was reported, but no corresponding event has yet been confirmed. A circular Morton shockwave would likely have been involved too, but no sighting is likely with our equipment.

Expectations. Such extreme surging implied that a large Active Region lay just behind the limb. Yet, when it appeared, AR12891 was nothing like! (See elsewhere). A meagre group of area ~250MH with magnetic complexity of (Hale) Beta-Gamma and low field strengths: an Anticlimax! It, **AR91,** was monitored as closely as weather would permit, and two M-class flares were logged in it. See AR91 Figs 3 and 5. Yet this hardly explains its remarkable surging whilst behind the East limb?

1 Surge: First defined by Helen Dodson-Prince. 1950s? P298 "Astrophysics of Sun", Zirin, H. Cambridge Uni. 1988. She published 130 Articles, many in ApJ on solar flares.

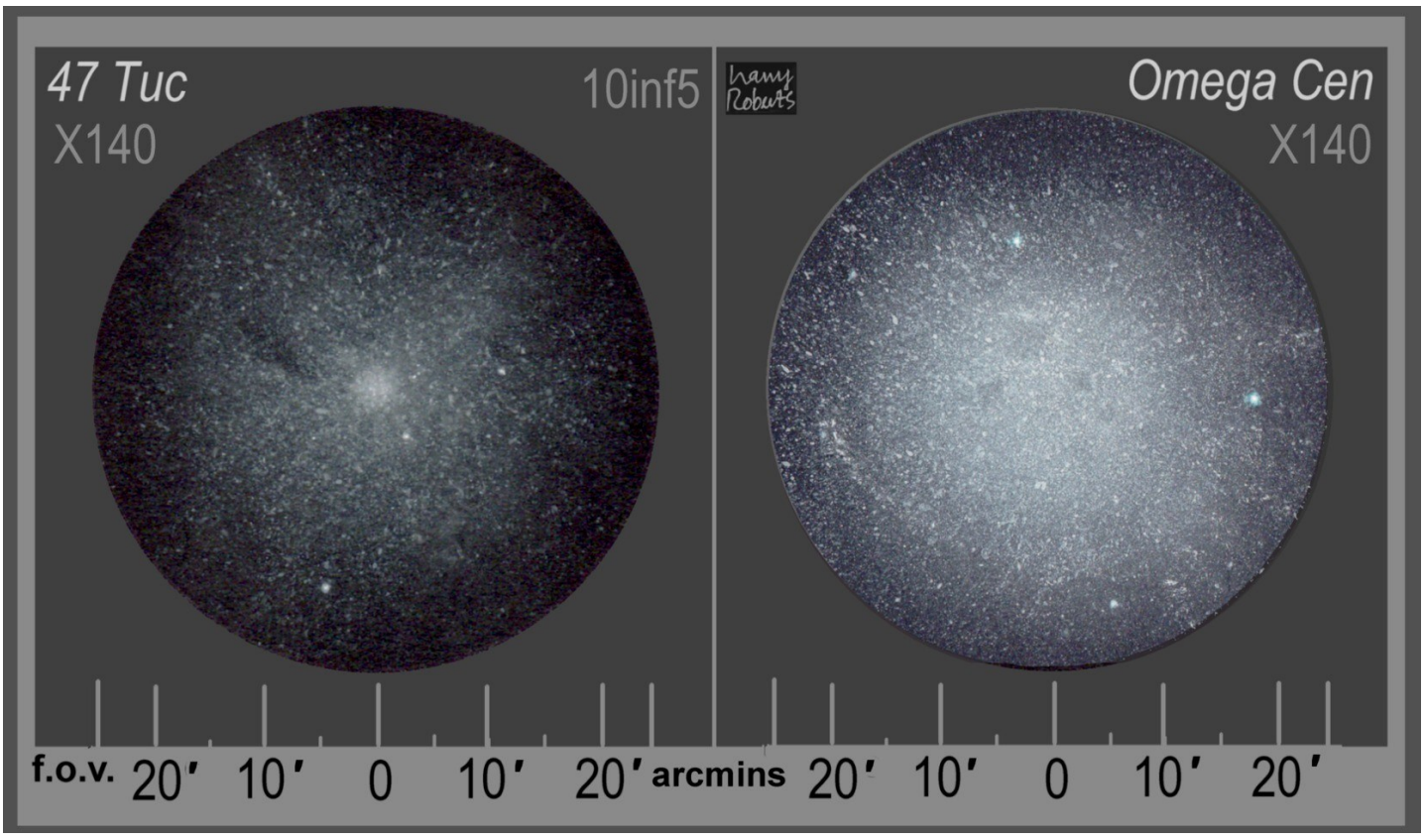
47 Tucanae by Harry Roberts

Globular Cluster 47 Tucanae.

We recently viewed Omega Centauri, long deemed the largest globular cluster - and noted its reclassification as a galaxy nucleus, being stripped of its attendant stars by a close approach to the Milky Way's core.
If correct, this leaves 47 Tuc at the top of the list of globular clusters and, ergo, the next one to be recorded.
The sketchbook was soon outside by the 'scope on a cold May morning as a sketch of 47 Tuc was begun. The details logged included its visual diameter, its irregular outline, a dark wedge intruding on one side, the small partly resolved core and star chains etc, over many sessions.

Big surprise. During a break, the scope was pointed at Om Cen, still visible low in the west. It was a big shock! Om Cen was more than twice the size of 47 Tuc! What was wrong?

The gear in use was the same as that for the Om Cen sketch – including the 9mm Ortho e.p.(x140, fov 25arcmin). Both GC's have very similar listed diameters, Om Cen 36arcmin and 47Tuc 31arcmin (SkyCat2000), just 5arcmins smaller. Yet, in the eye-piece, 47Tuc appears to be <u>half</u> the size of Om Cen and much fainter! (Fig1)



Diameters. SkyCat states, p292, that 'Apparent diameter', *"in mins of arc on the Kukarkin System...roughly the size beyond which the cluster's gravity is insufficient to prevent stars from escaping. The listed diameter is based on star counts and may differ somewhat from that observed visually".* It surely does in this case!
Another listing is the 'Concentration Class', *"the smaller the number the more highly concentrated are the stars toward the centre of the cluster."* 47 Tuc is strongly concentrated (class 3) while Om Cen has low concentration at class 8.

The 47Tuc sketch shows a small but concentrated core <5arcmin dia, while Om Cen's broad concentration is 15 – 20arcmin across. The two are at opposite ends of the concentration classes.
Why had the big 'apparent size' difference between Om Cen and 47 Tuc not been noted years earlier? Maybe it's due to their very different locations in the sky: the pair is separated by ~12 hours of R.A.; when one is at the zenith the other is on the horizon or below it.

47 Tucanae by Harry Roberts

Cont...2

The attached diagram shows the two side by side at the same image scale, i.e. the field of view (fov) of the 9mm ortho, 25arcmins wide. This shows that big "apparent" size difference.

Om Cen. The fig (RHS) shows that Om Cen's central concentration (~ 20arcmins wide) just fits within the 25arcmin e.p. fov, with myriad 'outliers' beyond the field. Hartung says: *"Photographs (of Om Cen) show outliers extending to 65' diameter but the main region is about 20' across..."* Likely he meant the Mt Stromlo photos by Ben Gascoigne published in Hartung's 1968 "...Objects for Southern Telescopes".

47 Tuc. On the other hand most of 47 Tuc fits within the e.p. fov, with only extreme 'outliers' beyond. Its core is brighter, but not saturated, maybe 3arcmin diameter and partly resolved. This is encircled by a well resolved sphere of bright stars some 10 arcmin across. Beyond this are outlier stars, many in radial chains with some concentric ones, then scattered field stars and extreme outliers to 25arcmin and beyond. A superb sight!

Yet, beside Om Cen, 47 Tuc pales to insignificance! The other southern 'canonic' GC's are fine examples of the type too, but none outshine the 'runaway galactic nucleus' we call Omega Centauri.

Still, if we discount Om Cen, then 47 Tucanae is a magnificent cluster to head the globulars list. It is sited near the Small Magellanic Cloud – though there is no connection. It's a wonderful sight in any telescope. And the 47Tuc sketch? It was completed on a chilly June morning a month later.

Clear skies and close comparisons!

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

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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.