

Astro Flyer

AUGUST 2017



Club News

Hello to all,

This is my first front page bit of Astro Flyer copy since becoming President. I have big shoes to fill and want to thank Jack Apfelbaum for the work he put into the club over the years. I have some ideas for the club which will become apparent over the next few months. I, unfortunately, will be missing the August and September meetings as I will be in the USA for a month, part of which is to view and film the Total Solar Eclipse on August 21st, USA time. I will be sending my regular Astro Talks for someone to read for me whilst I am away. The Vice President or other committee member, if need be, can hold the fort whilst I am in the USA. See you all in October. Frank Gross

Club Meetings and News from Committee

The next Club Meeting is to be held on Friday August 18th 2017 at 6.30 pm for 7pm start at Shoalhaven Campus, University of Wollongong, Nowra. To see the names of elected officials at the AGM in July see page 15.

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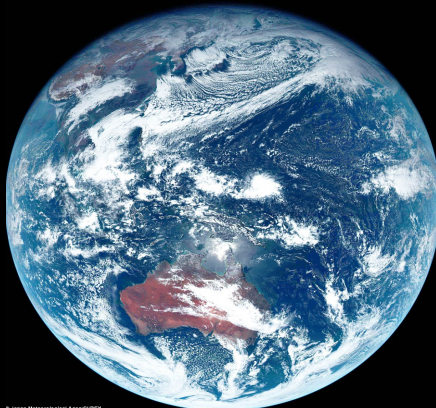
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MOON PHASES



New Moon **First Quarter** **Full Moon** **Last Quarter**
Aug 22 nd **Aug 29th** **Sep 6th** **Start → Aug 15**

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 Aug 19th (back-up night Sun Aug 20th)** at **Woncur Road**, South Nowra.

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

More viewing nights page 15

OUT THERE

Bob Turnbull OBSERVATION OFFICER

OUT THERE August-September

Congratulations on those hardy astronomers in our club for getting rugged up and doing some crisp viewing during our winter nights! Let us hear what you looked at, no matter how basic your viewing may have been. Also congratulations to those members who volunteered for Committee positions in Shoalhaven Astronomers Inc. these jobs are done quietly during the year, but are essential tasks to keep this club running efficiently.

TELESCOPES AND EQUIPMENT

For newer members, we use Reflecting Dobsonian telescopes, which are easy to set up and cheap to buy or even cheaper to make. These provide easy viewing and good portability, which are prime requirements to enable good regular viewing. Remember that easy and quick set up are what decides me to view or not view in some marginal conditions (such as scattered cloud or objects which may be better viewed if I travel a few KMs to get better viewing location, without obstructions). Some of us have small aperture refracting telescopes and although they are less favoured for quick set up and expensive for large apertures they still produce excellent images. The Celestron and Meade companies have an excellent range of models and prices and other companies sell a cheaper range.

Large aperture Reflectors are still rather heavy, so when looking at some which are larger than 250mm diameter mirrors may start to get "HEAVY" particularly if the telescope cannot be broken down into its three component parts (Tube, Mounting box and Mirror) and reassembled on site after travel.

Reflectors can be available up to 400 mm mirrors but the weight factor and storage need to be considered. Compound telescopes are now sold at reasonable prices in the Maxutov- Cassegrain and Schmit-Cassegrain which usually include a go-to and tracking to follow objects you wish to find and then hang onto them in the field of view for longer periods.

"Australian Sky and Telescope" magazine (Aug-Sept. has an excellent write up on the selection of a telescope to suit you or give to someone else).

EYEPIECES

Crucial for satisfactory results under most conditions! I have standardised to a basic kit of:-

26mm plossl, this is a wider field with smaller image to find your celestial target after looking through your finder scope. Then when centred, a 10mm or 15mm plossl to look at the target.

I have usually been able to skip to a 10mm Televue which is an excellent middle priced option and has 20mm eye relief and a 72 degree apparent Field of view. The aforementioned magazine has a review of Sky-watcher's Panorama eyepiece Kit release which could be of interest to you.

PLANETS

JUPITER Can be seen in the constellation of Virgo, passing Spica and by months end will be less than 4 degrees from Spica. This is the last month to view this planet at a practical altitude before it moves closer to the Sun.

SATURN In Ophiuchus in the NW sky in September and on the 14th is where the Sun-Earth and Saturn at 90degrees, as shown on the Aspects diagram on page 17 of your Astronomy 2017 Magazine. In this position you should see the planets rings covered by the planets shadow, which gives it a 3 dimensional appearance through your telescope.

URANUS will be in opposition in October, when it rises in mid evening, eastern sky, in Pisces near the border of Aries.

Double Stars Beta Piscis Austrini (All sky map 8) is another excellent double for small telescopes, so see further details on p.63 of Astronomy 2017.

Good viewing Bob Turnbull



A Search for Southern Doubles

Episode 7: Sagittarius: The Heart of our Galaxy

We are both blessed and cursed in observing what I claim is the most rewarding constellation in the sky, namely Sagittarius, the Archer; blessed as from our position on the planet we get the best possible views of this remarkable constellation but cursed in that we battle our coldest and windiest nights to view it. However, it is worth the effort of rugging up on these winter nights to view this constellation as it crosses the zenith this month and is visible for many weeks ahead.



To northern viewers Orion with its riches is the favourite, with its massive Orion Nebula and its enigmatic Horsehead, but think for a moment on what Sagittarius offers: the densest part of the Milky Way, an abundance of Messier objects and its sweeping star fields that fill the simplest pair of binoculars, in addition to a wealth of amazing nebulae and clusters and a cornucopia of double stars that are hard to choose from. I will select just five and thanks again to the eagle eyes of Harry Roberts and his hours at the eyepiece, we have a real challenge in the last multiple star system.

Finding Sagittarius: This impressive constellation is found by following the tail of Scorpio SE through the brightest part of the Milky Way, where the familiar cart or -plough shape appears. Figure 2 below shows the brightest section of Sagittarius and what occupies the left shoulder of the typical depiction of the constellation as viewed above.

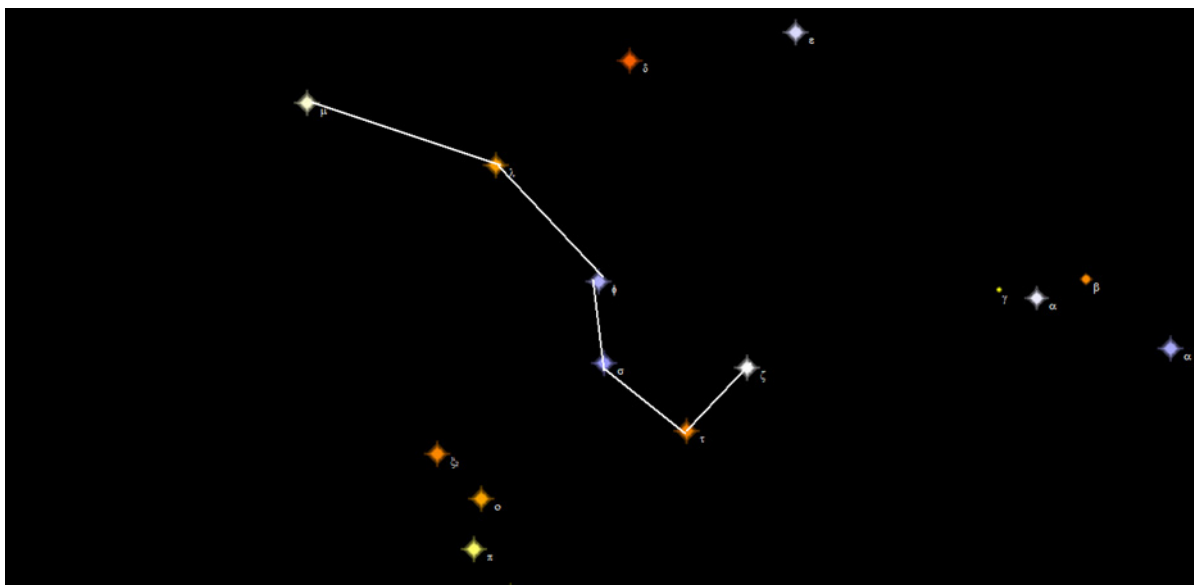




Figure 2. North is left of page

Cont....2

All of these six stars are about mag 2 and 3 and stand out in a field studded with star clouds and clusters. Once this group is found the rest of the constellation falls into place. The more detailed map at the end of the piece shows where the chosen doubles are located. Many people find it useful to see the central area of Sagittarius as shaped like a teapot. As a help in finding the listed doubles I have added additional parts to the map in figure 2 below. (The figure above shows the handle of the Teapot and part of the lid).

- 1]  Eta Sag. RA 18.17.6; Dec -36.46. Sep 3.1/7.8 Sep , sep 3.6" PA 107 is a brilliant moderately close pair of white stars of contrasting brightness. I found the pair easy to split at medium power and noticed a third star wide in the field making this a fine view at the eyepiece.
- 2] β 245. RA 18.10.1; Dec -30.44. Located just behind Gamma Sag in the teapot spout is a challenging double but worth the effort when viewed at high power. The Deep Yellow and pale Blue components are a beautiful contrast and reminiscent of Albireo in Cygnus.
- 3] β 2 RA 19.22.6; Dec -44.28. This striking pair is in the remote corner of the constellation and near the Southern Crown, While β 1 and β 2 are wide visual doubles, the latter at low power is a wide contrasting Yellow and Blue pair and easy to split.
- 4]  Mu Sag RA 18.13.8; Dec -21.04. mag 3.9/10/10.5 Sep 16.8" and 17.6" is found a few degrees north of the Teapot's lid (see map below) and is a fine triplet. The two companions at mag 10 and 10.5 are faint and sit on both sides of the brighter 3.9 primary, I notice a reddish glow in both. See what you think.
- 5] The heart of the Trifid (M 20): HN 40 : RA 18.02.4; Dec -23.02 mag 7.6/10.4; Sep 6.1". This is a multiple star complex lying in the core of the Trifid Nebula. The Trifid can easily be spotted in the finderscope by running a line through Phi and Lambda Sag until the Lagoon Nebula is spotted as a small cloud in the finder. In a wide field eyepiece is a bight binocular double star which marks the heart of the Trifid. At the eyepiece, these two stars are wide and are referred to as HN 40 and HN 6. As Harry's detailed map below of this area shows, there are many stars in this field, which when viewed for fifteen minutes or so are seen surrounded by four distinctive dim clouds with dark lines in between. Early observers just noticed three divided nebulous fields and named the object the Trifid. These clouds are dim and only spotted on the darkest nights. In my 10" on a really dark night my dark adjusted eyes can easily spot the clouds and three distinct stars with several outliers where they meet. Two stars are easy to spot but the third requires high power and good seeing.

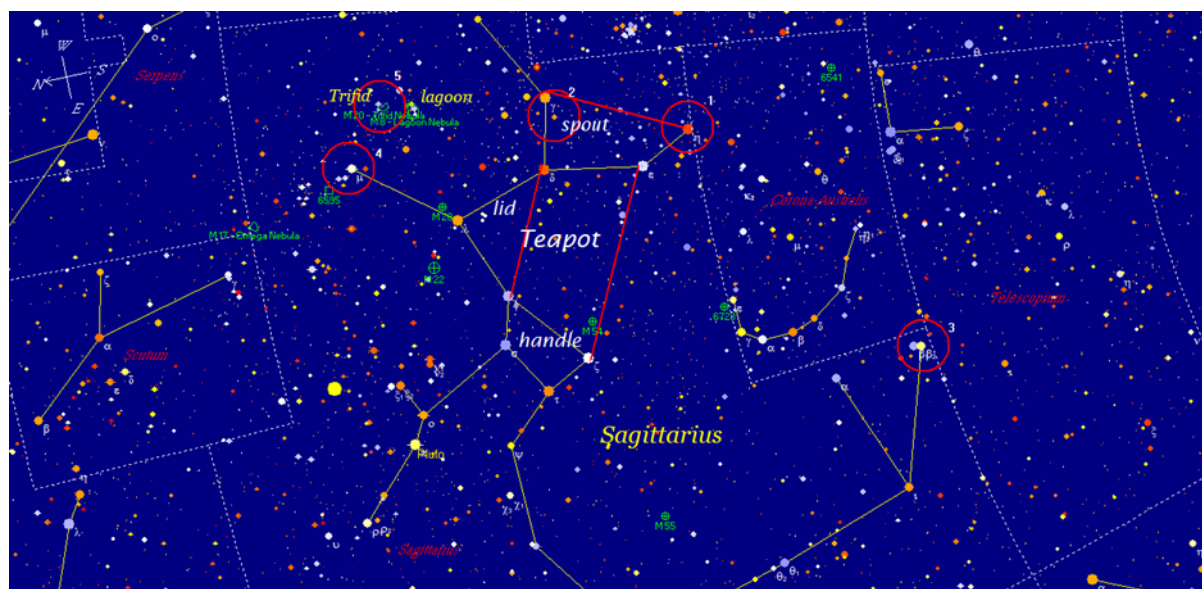
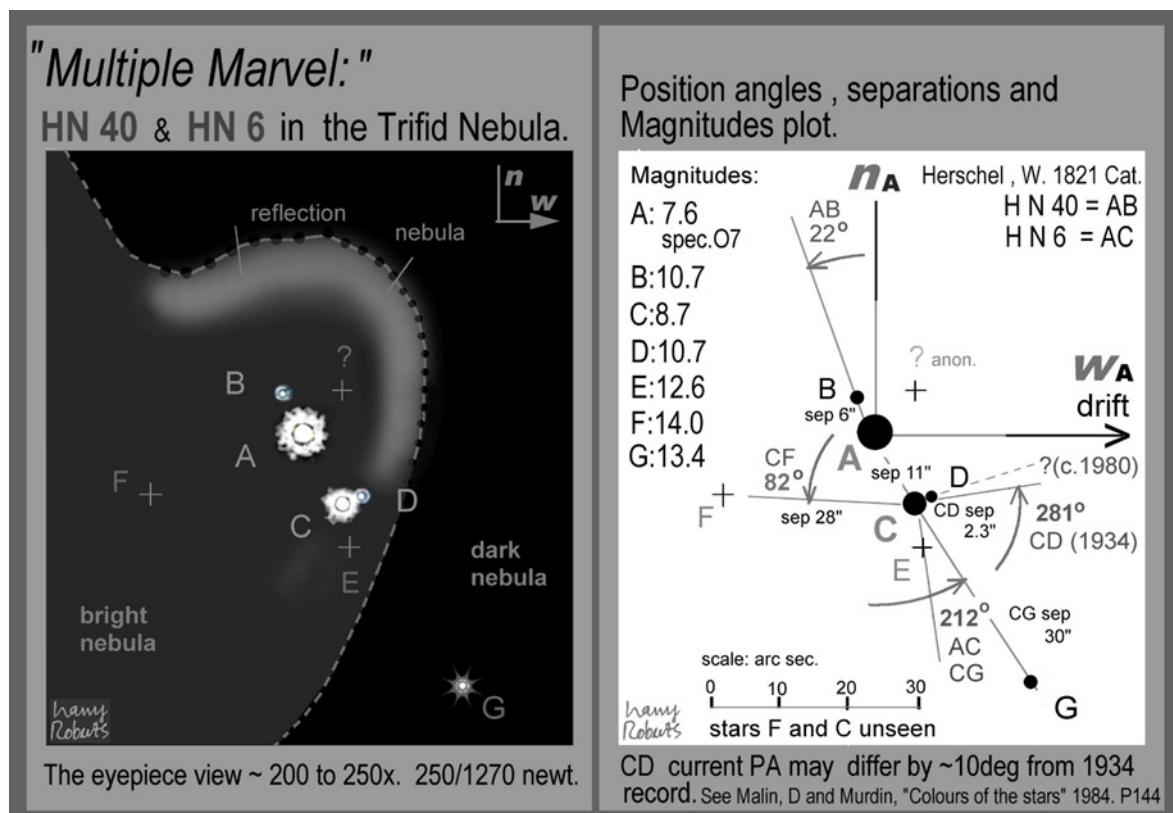


Fig 3 Detailed map of Sagittarius with additional lines in red and listed doubles numbered in white and circled in red.

Cont....3

Fig 4 below: Harry's closely observed study of the Trifid's core.



To avoid confusion, I have deliberately omitted many deep sky objects from the detailed map above. At the next meeting, I hope to take you over many of these objects which flood the finder and binoculars on a dark night. It is worthwhile going out in the cold some clear dark night soon and filling you eyes and imagination with some of the best views our galaxy has to offer.

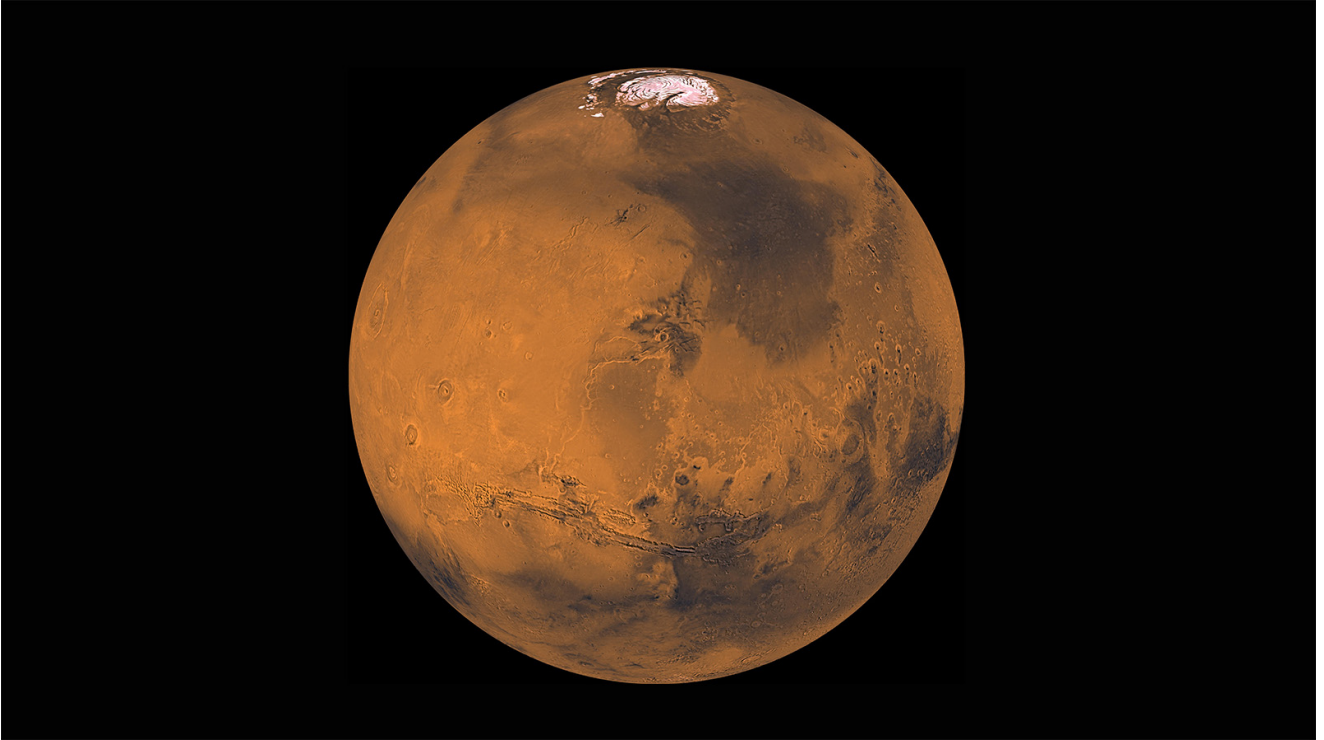
The next object which I have observed is the essence or substance of the Milky Way. By the aid of a telescope anyone may behold this in a manner which so distinctly appeals to the senses that all the disputes which have tormented philosophers through so many ages are exploded at once by the irrefragable evidence of our eyes, and we are freed from wordy disputes upon this subject, for the Galaxy is nothing else but a mass of innumerable stars planted together in clusters. — Galileo Galileo

Astro Events from Frank Gross

I agree we should colonize Mars. But what are the reasons to not colonize Mars other than the costs?

As a colonization place, Mars sucks.

It has enough **gravity** to be a pain to get off of, so you need a proper rocket and fuel for it. Therefore, getting things to it and from it are a major expense, and major risk. But for humans it's going to be pretty weak and is likely to make long term inhabitant have great difficulty coming back to Earth.



It has an atmosphere, but it's only thick enough to be painful. It's not thick enough that parachutes work effectively enough to slow things down. or for regular aircraft to fly. or for balloons to be effective. You can't breath it, so basically you have to wear a full space suit.

It has no magnetosphere, so basically provides no radiation protection, and combined with the lack of atmosphere, offers basically zero protection from outburst from the sun.

It's a long way, away. Humans tend to like being able to talk to other people.

Mars is going to make that a major pain with a many hours lag between conversations between Mars and Earth .

The dust is a pain, long term exposure is unclear, and it's highly reactive, very fine, and whipped up by winds enough to make solar power perhaps not reliable for human habitation without massive but rarely used battery reserves.

Solar exposure is going to be pretty dam weak with the sun's rays only 40% of their power on Earth, so crop growing is going to be problematic, as is solar power.

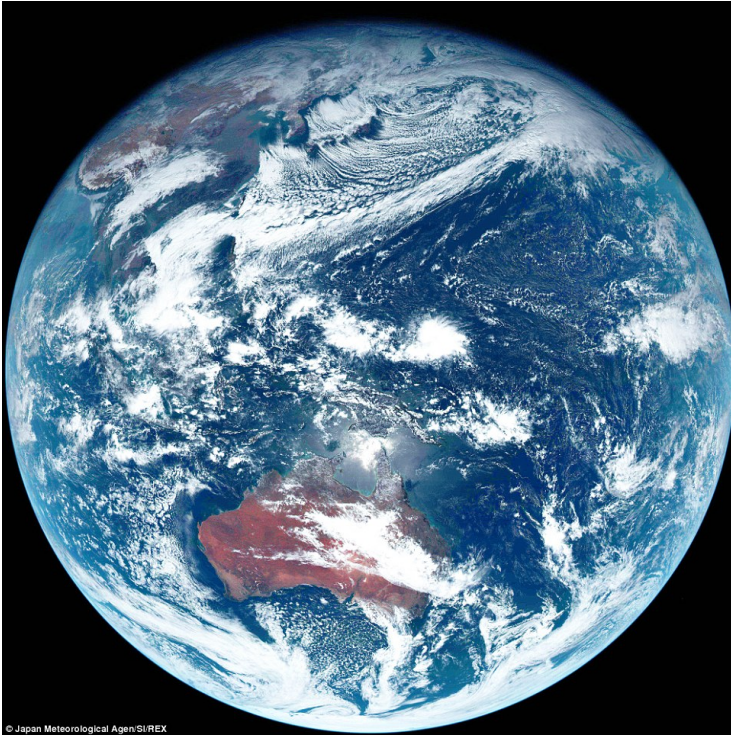
There are just so many more places that are going to be dead set easier to colonize and arguably more interesting and useful.

Astro Events from Frank Gross

Cont...2

What will Earth, Mars, and the Moon be like in 50 years?

Earth in 50 years:



This is the real color picture of Earth. Most brighter pictures are enhanced to satisfy your vision - so if you are in orbit, this is how Earth would look like to you unlike the Blue Marble picture.

Earthlings would still mill about their daily and pointless businesses, stock markets would still rise a bit and plummet a bit the same as every other day in the past few decades, wars and diseases would still threaten the lives of millions of people daily.

Exciting things would happen sometimes, but not much would change.

Oh and the debut of iPhone 30.

Moon in 50 years:

If you zoom in carefully, you can see a Moon lander that has touched the surface in 2035, humans again have returned to space.

Mixed within the dark void of space outside of the glaring surface of the Moon is a discarded component of a space tourism crew capsule launched just a few week prior to the taken of this picture.

Space wouldn't be much of a far-off place anymore, the closest body to us being the Moon seems to take the spot of Paris being the most dreamy place of getting to nowadays.

There have been romantic proposals while in the orbit of the Moon, something akin to: "I promised to give you the stars and the Moon, and I have - with a loan of about a million dollars from my Dad to fund this one month trip for us. etc, etc..."

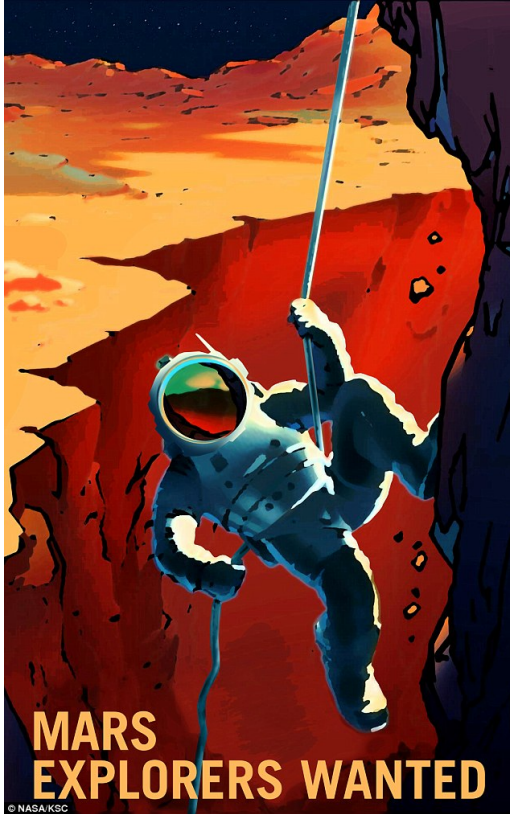
Nothing would change significantly beside all that. The Moon will still be in orbit around Earth, we won't suddenly find that there are actually magical bunnies living in potholes on the Moon making mooncakes to sustain themselves.



Astro Events from Frank Gross

Cont...3

But Mars, Mars would change:



Alright, not that exciting, but what is exciting is on the surface.



Elon Musk is already preparing for us to go to space, and by 2067, we definitely would have a self-sustained colony on Mars, and the number of colonists as well as new colonies would spring up more and more. Mars suddenly become the Wild West like in 19th Century America - the new frontier.



Milky Way Galaxy: Facts About Our Galactic Home

The Milky Way Galaxy is most significant to humans because it is home sweet home. But when it comes down to it, our galaxy is a typical barred spiral, much like billions of other galaxies in the universe. Let's take a look at the Milky Way.

Astro Events from Frank Gross

Cont...4

Location, location, location

A glance up at the night sky reveals a broad swath of light. Described by the ancients as a river, as milk, and as a path, among other things, the band has been visible in the heavens since Earth first formed. In reality, this intriguing line of light is the center of our galaxy, as seen from one of its outer arms.



Understanding the structure of the Milky Way has long been challenging. The solar system sits on the outer edges of one arm in a disk of material, and no one can see across the dense center to the other side.

"The sun's location within the dust-obscured galactic disk is a complicating factor to observe the galactic structure", Denilso Camargo, of the Federal University of Rio Grande do Sul in Brazil, said in a statement.

The Milky Way is a barred spiral galaxy, about 100,000 light-years across. If you could look down on it from the top, you would see a central bulge surrounded by four large spiral arms that wrap around it. Spiral galaxies make up about two-third of the galaxies in the universe.

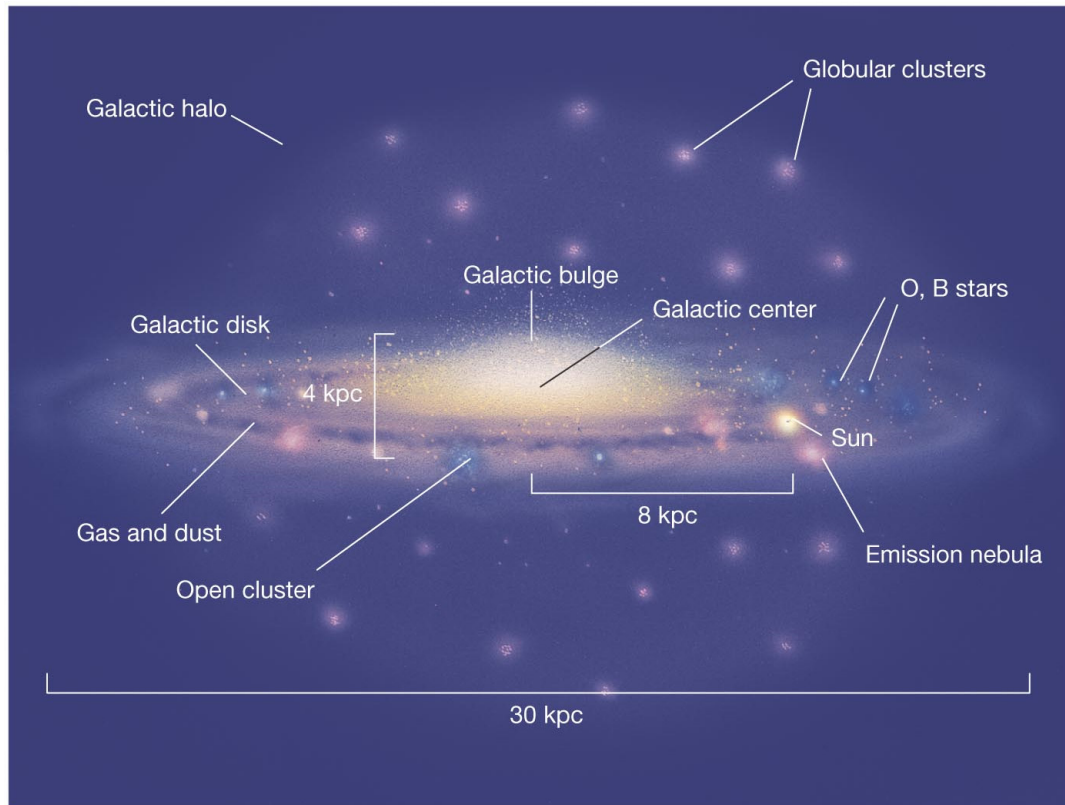
Unlike a regular spiral, a barred spiral contains a bar across its center region, and has two major arms. The Milky Way also contains two significant minor arms, as well as two smaller spurs. One of the spurs, known as the Orion Arm, contains the sun and the solar system. The Orion arm is located between two major arms, Perseus and Sagittarius.

The Milky Way does not sit still, but is constantly rotating. As such, the arms are moving through space. The sun and the solar system travel with them. The solar system travels at an average speed of 515,000 mph (828,000 km/h). Even at this rapid speed, the solar system would take about 230 million years to travel all the way around the Milky Way.



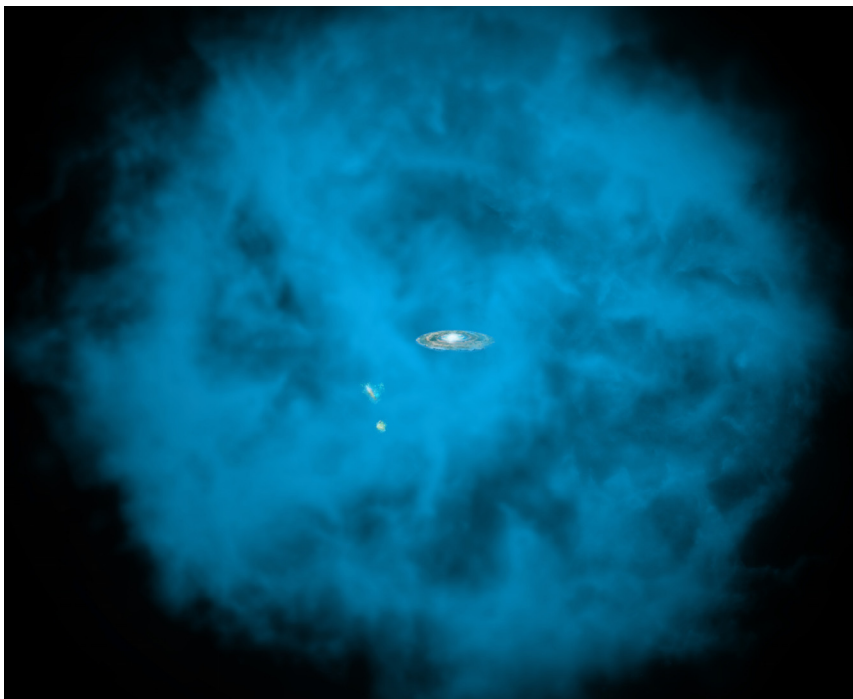
Astro Events from Frank Gross

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"Spiral arms are like traffic jams in that the gas and stars crowd together and move more slowly in the arms. As material passes through the dense spiral arms, it is compressed and this triggers more star formation," said Camargo. Our galaxy is surrounded by an enormous halo of hot gas that extends for hundreds of thousands of light-years. The gas halo is estimated to be as massive as all of the stars in the Milky Way. Like the galaxy itself, the halo is spinning rapidly.



Curled around the center of the galaxy, the spiral arms contain a high amount of dust and gas. New stars are constantly formed within the arms. These arms are contained in what is called the disk of the galaxy. It is only about 1,000 light-years thick.

At the center of the galaxy is the galactic bulge. The heart of the Milky Way is crammed full of gas, dust, and stars. The bulge is the reason that you can only see a small percentage of the total stars in the galaxy. Dust and gas within it are so thick that you can't even peer into the bulge of the Milky Way, much less see out the other side.

The Astro Flyer

Astro Events from Frank Gross

Cont...6



Tucked inside the very center of the galaxy is a monstrous black hole, billions of times as massive as the sun. This supermassive black hole may have started off smaller, but the ample supply of dust and gas allowed it to gorge itself and grow into a giant. The greedy glutton also consumes whatever stars it can get a grip on. Although black holes cannot be directly viewed, scientists can see their gravitational effects as they change and distort the paths of the material around it, or as they fire off jets. Most galaxies are thought to have a black hole in their heart. [Photo Gallery: The Milky Way's Core]

The bulge and the arms are the most obvious components of the Milky Way, but they are not the only pieces. The galaxy is surrounded by a spherical halo of hot gas, old stars and globular clusters. Although the halo stretches for hundreds of thousands of light-years, it only contains about two percent as many stars as are found within the disk. Scientists can't directly detect the material, but like black holes, they can measure it based on its effect on the objects around it. As such, dark matter is estimated to make up 90 percent of the mass of the galaxy.

Recent measurements have weighed the galaxy at between 400 billion and 780 billion times the mass of the sun. By focusing on how the Milky Way affects its neighboring globular clusters, dense groups of stars smaller than a galaxy, scientists were able to calculate the mass of the Milky Way at varying distances. The result can help them improve their understanding of how much of the galaxy is made up of ordinary material like dust and stars, and how much is composed of dark matter.

"Even though we know the dark matter should be there, [and] we think it should be there, the ratio of dark matter to luminous matter in particular galaxies may be under debate," Gwendolyn Eadie, a Ph.D. candidate in astrophysics at McMasters University in Ontario, Canada, and co-author on the research, told Space.com.

Astro Events from Frank Gross

Cont...7



The dark **Coal Sack** is readily apparent in the middle of the image. The stars Alpha Centauri (the closest star to our solar system at 4.3-light years away) and Beta Centauri are to the left of the Coal Sack, while the famous Southern Cross (Crux) is poised just above and to the right of the Coal Sack. The Southern Milky Way is far more spectacular than the Milky Way that those of us situated north of the equator can ever see. The dark Coal Sack is readily apparent in the middle of the image. The stars Alpha Centauri (the closest star to our solar system at 4.3-light years away) and Beta Centauri are to the left of the Coal Sack, while the famous Southern Cross (Crux) is poised just above and to the right of the Coal Sack. The Southern Milky Way is far more spectacular than the Milky Way that those of us situated north of the equator can ever see.

Milky Way facts

The Milky Way contains over 200 billion stars, and enough dust and gas to make billions more.

The solar system lies about 30,000 light-years from the galactic center, and about 20 light-years above the plane of the galaxy. Earth and its neighbors don't orbit within the plane of the galaxy but are instead tipped by about 63 degrees. "It's almost like we're sailing through the galaxy sideways," Merav Opher, an astrophysicist at George Mason University in Virginia, told Space.com.

More than half the stars found in the Milky Way are older than the 4.5-billion-year-old sun. Galaxies like ours typically undergo a stellar baby boom, churning out stars in enormous quantities roughly 10 billion years ago.

The most common stars in the galaxy are red dwarfs, a cool star about a tenth the mass of the sun. Once thought unsuitable for potential life-bearing planets because such bodies would have to be too close to meet the criteria, red dwarfs are now considered potential suspects.

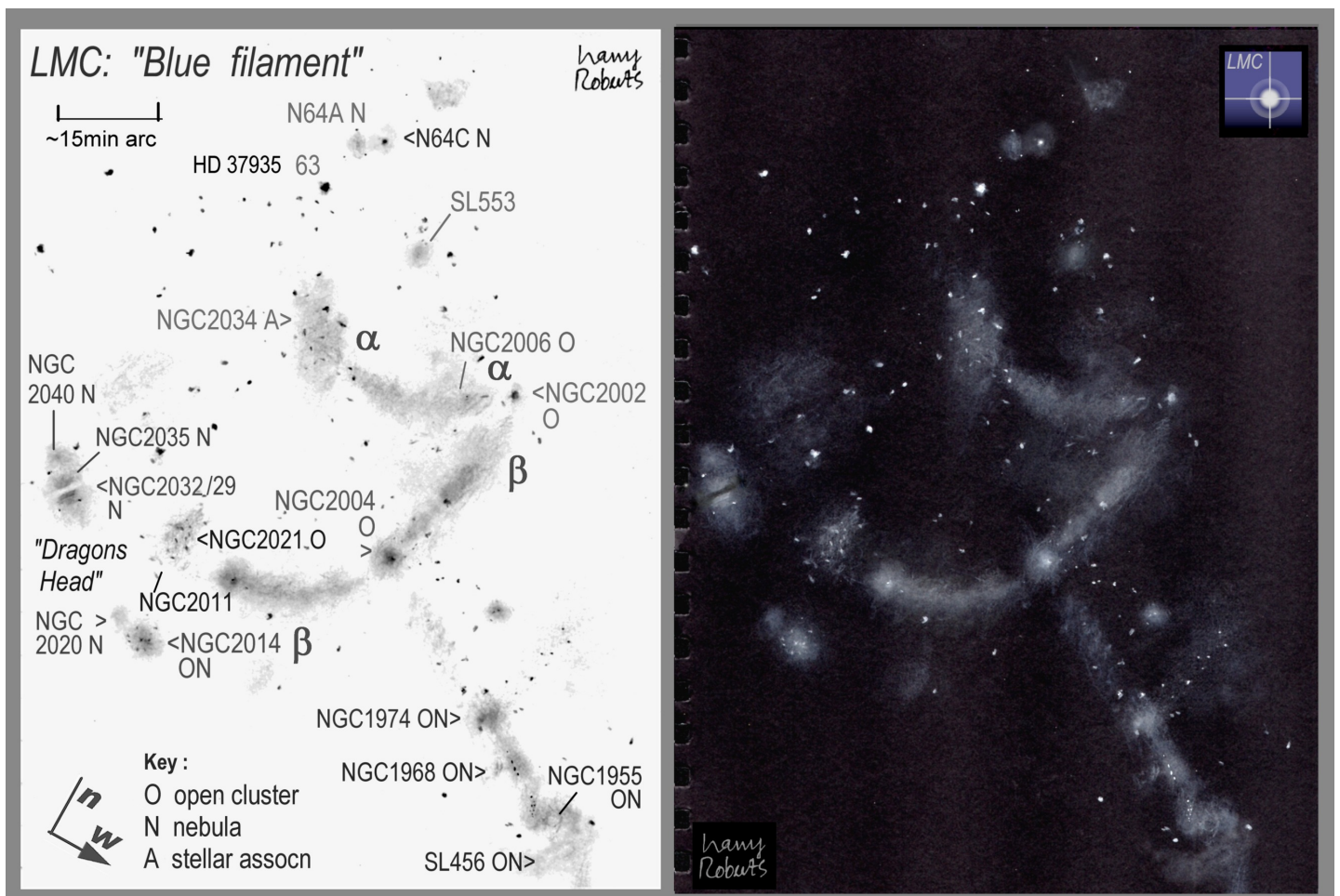
As late as the 1920s, astronomers thought all of the stars in the universe were contained inside of the Milky Way. It wasn't until Edwin Hubble discovered a special star known as a Cepheid variable, which allowed him to precisely measure distances, that astronomers realized that the fuzzy patches once classified as nebula were actually separate galaxies.

The LMC “Blue Filaments” First Impressions

The writer has gazed at the Large Magellanic Cloud (LMC) many times over the years: only to be deterred by the complexity of the galactic ‘landscape’ seen, even in binoculars. More recently, efforts were made to sketch some of this baffling detail. And, surprisingly, some LMC formations began to reveal the anatomy of an irregular galaxy, much reshaped by tidal interaction with its nearby SMC ‘companion’, our Galaxy, and it seems, even stranger forces.

Cloud dynamics. The LMC, the SMC and our Galaxy (MWG) apparently interacted some time ago, reshaping the LMC, ‘slinging’ the SMC westward and leaving a ‘tail’ of galactic debris in their wake: the Magellanic Stream.

A recent paper describes the ‘Clouds’ thus: “*The youngest stars reveal an irregular structure characterised by spiral arms and tidal features while the older stars are smoothly and regularly distributed*”. Also “*The LMC shows an extended circular shape with a prominent, off-center bar, a nucleus and irregular spiral arms*.” And “*Each region is associated to a different age group*”. (“*The morphology of the Magellanic Clouds revealed by stars of different age...etc*”. Cioni, M-R, Habing, H. et al. *Astronomy and Astrophysics*, 2000, May 3.)



To this ‘exotic’ mix of forces, they add “...the LMC must be embedded in a gravitational potential produced by an unseen mass component ...in agreement with Stil (1999) that the class of dwarf galaxies to which the LMC belongs (‘fast rotators’) is dominated by **dark matter**” (Ibid. P2). As well we read “Weinberg (1998) found that the resonant interaction between the MWG (our Galaxy) and LMC is sufficient to excite a warp and cause lopsided asymmetries”!

The LMC “Blue Filaments” by Harry Roberts

Cont...2

Tidal forces! Bursts of star formation – even the effects of *dark matter*: the Clouds are a witches brew of galaxy dynamics!

Blue filaments

One autumn night in 2016 the ‘binos’ showed a large hazy region, 3° north of the LMC central bar. What was that? The 10 inch Dob and ‘rich-field’ e.p. showed a strange sight. Spread over a two degree field were groups of nebulae or clusters apparently ‘tied together’ by bright ‘filaments’, or ‘ropes’, that twisted and turned across the fov, much like ‘ghostly’ branches hung with spectral fruit! An amazing sight!

Early attempts to find the filaments on charts failed. They were uncharted in all of the writer’s maps, including Thompson and Bryan’s “SN Search Charts”, surprisingly, as the filaments were visible even in 8x40 bino’s. Soon it was clear that twenty or so catalogued objects lay in the field, mostly NGC objects: nebulae and clusters or stellar associations, with some from other lists. Yet the connecting filaments were, it seemed, anonymous.

In H-beta the filaments had a strong response: they were blue objects, likely ‘streams’ of young OB type stars. Yet they stretched across thousands of light years - and why were they so elegantly curved (Fig)?

Deep images on the LMC/SMC website (<http://cloudsofmagellan.net.au/index.htm>) confirmed the filaments were blue stellar objects. To further discuss them a detailed sketch of what is visible was needed; a daunting task as the filaments threaded through a field ~4 square degrees in area! Over two weeks in April, with the LMC near the zenith, enough clear hours were had to complete a sketch (Fig). While star positions are only approximate, the overall impression is, I believe, accurate. The two gracefully curved filaments, α - α and β - β , lie near the centre.

Hundreds of fainter stars pepper the field, some 170,000ly away. Many bright nebulae can be seen (tagged N) with unresolved open star clusters (O) and stellar associations (A). There are even one or two dark nebulae to be seen near NGC2032, known, it seems, as the ‘Dragon’s Head’. In fact the ‘filaments’ and the ‘head’ do resemble a feudal dragon!

In our next piece we will consider that which is catalogued and contrast what is not. We will speculate on the origins of the features in this remarkable field – and what they tell us of the Clouds morphology, their past and their dynamical interactions.

Until then: take a look. The filaments can be seen in binoculars

More Club News continued from page 1

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) but consult Jack first on Landline: 44232255, Mobile:0407 018 982

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

Dates for Club/Social Viewing Nights for 2017 On Saturday Nights As Follows:

Aug-19, Sept-16, Oct14, Nov-11, Dec-9

More Monthly Meeting Information

The AGM was held at the July monthly meeting. Elected officials for 2017 - 2018

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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Nowra NSW 2541

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.