

Astro Flyer

AUGUST 2018

Club News

Hello All,

Through the efforts of Tracey Newcombe, John Gould, Harry Roberts and myself, we have had an influx of lecturers come to the club interested in speaking. Rather than limit these lectures to the club meeting I say we should host these people at a public lecture using the large lecture hall in the Admin building of the University. I am working to have the first talk in October.

What a cold and blowy AGM we had last month. Hopefully the weather will be more calm during the August meeting so we can do some viewing with our telescopes.

Frank Gross, President

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MOON PHASES



New Moon **First Quarter** **Full Moon** **Last Quarter**
Sept 10 **Aug 18** **Aug 26** **Sept 3**

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 8 Sept** (back-up night **Sun 9 Sept**) at the new viewing site. Go to the university on George Evans Road and go straight ahead through the second turning circle to the new viewing site.

More viewing nights

OUT THERE

Bob Turnbull OBSERVATION OFFICER

August – September

I found the viewing of the local objects both interesting and challenging over the last six weeks, mainly due to the wind and dust in the air,

I sought better detail of Mars at opposition and even up to the time I write this not on the 9/8/2018 I've not got much improvement but live in hope of a couple of warmer still nights to catch up on viewing one of our favourite objects.

Highlights

Venus and Spica (in Virgo) close.

Mars is still worth viewing on a calmer evening.

Jupiter and the colourful double star Alpha Libra are close and watch for the three planets brighter than magnitude -2 Mars, Jupiter and Venus.

The Moon

On our meeting night of 17th August, the Moon will be at maximum libration 10.2° at 10.20am EST.

The bright south easterly limb the zone feature will be Lyot, which will be seen at its best. This is a flooded wall plain with a dark floor and many smaller craters to the west and south west. See page 12 & 13 of Astronomy 2018 for a good explanation of what libration means and how it increases our field of view of the Moon, due to tilting of angles during its phases. This moon rise on the above date is 10.20am and sets at 23.42pm EST so you should have a chance to look at the Moon during the day and night to make a comparison with light and dark shadows on the craters.

Mars on the 23rd August the 12 day old waxing gibbous Moon and the red planet appear side by side (page 55 Astronomy 2018 evening sky map).

Jupiter is in Libra in August and moves to a higher position in September (still in Libra).

Venus will be 1.2° close to Spica in August and at its most brilliant on the 15th September.

Clear sky and good viewing.

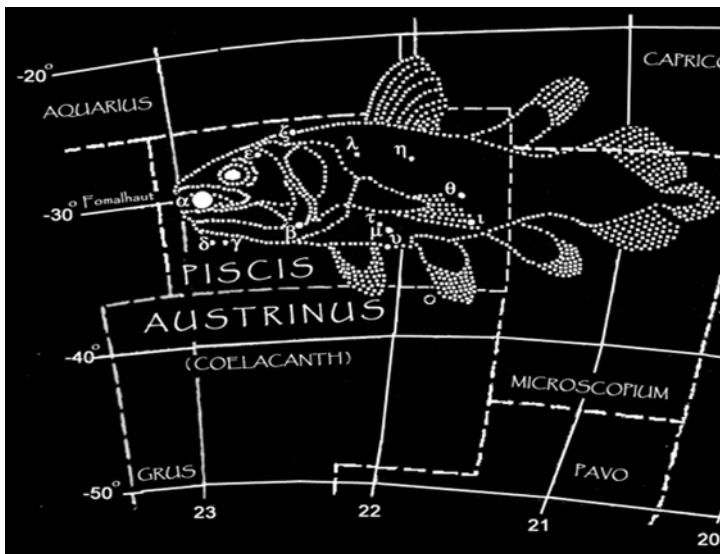
Bob Turnbull
Observation Officer



A Search for
Southern Doubles

Episode 18: Pisces Australis (The Southern Fish)

Glancing south east after Capricorn and Mars have well cleared the horizon, that bright white first magnitude star rising in SE this month is Fomalhaut, the Mouth of the Fish and the main star of Pisces Australis, the Southern Fish. Pis Aus is unremarkable as a constellation, but it contains a handful of readily found double gems and the very special Fomalhaut as explained later.



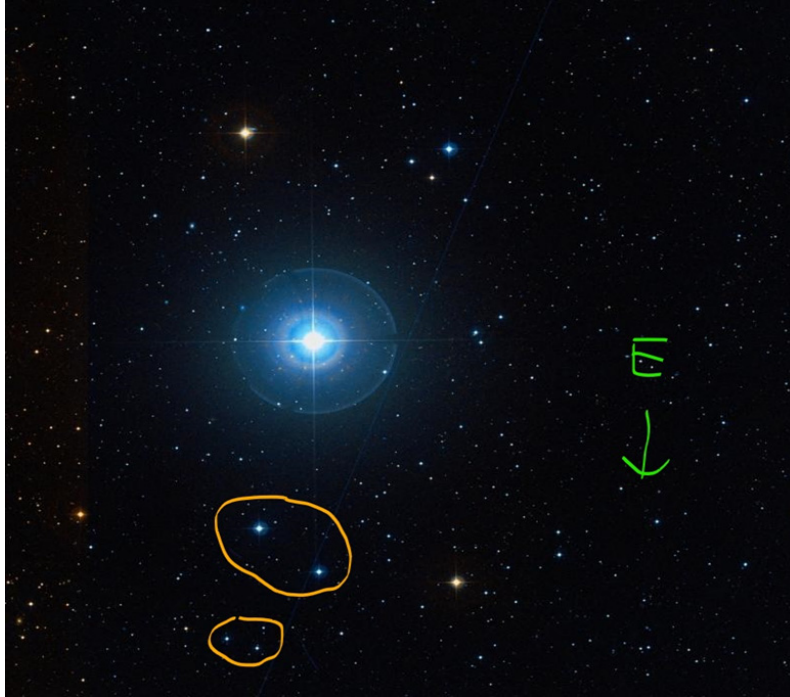
Refer to numbers on the map below to identify listed double stars.

- 1 Gamma γ Pis Au, h5367**, RA 22.52; Dec -32.53. mag. 4.5/8.2 Sep 4.2". This white and deep blue pair are wide and easily resolved at medium power in a small telescope.
- 2 Delta δ Pis. Au Howe 91**. RA 22.56; Dec -32.32. mag. 4.2/9.2 Sep 5". Another wide pair with an interesting colour and magnification contrast. I found the primary yellow and the companion grey.

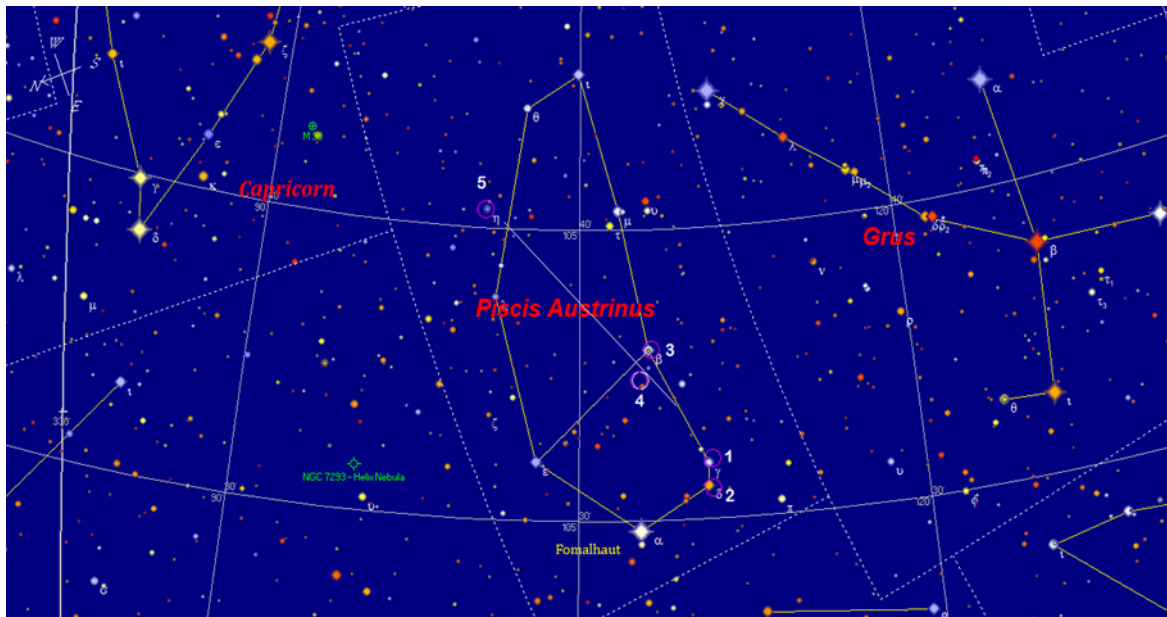
Sky Objects By Eugene O'Connor

Cont...2

3. **Beta β Pis.Au** RA 22.31. Dec -32.21. mag 4.3/7.1; Sep 30.3" A bluish white and yellow pair widely separated in small optics.
4. **Dunlop Δ 241.** RA 22.36; Dec-31.40. mag.5.9/7.6 Sep93.3". A delightful orange and yellow pair and a wide object in all optics,
5. **Eta η Pis.Au** RA22.00;Dec-28.27.mag 5.7/6.8.Sep.1.7". This is a close white double which I failed to split on 3 occasions last month. However, as WIKISKY has so well captured in the photo below, the field is delightful with two fainter doubles east in the field at about X75. (*see below*)



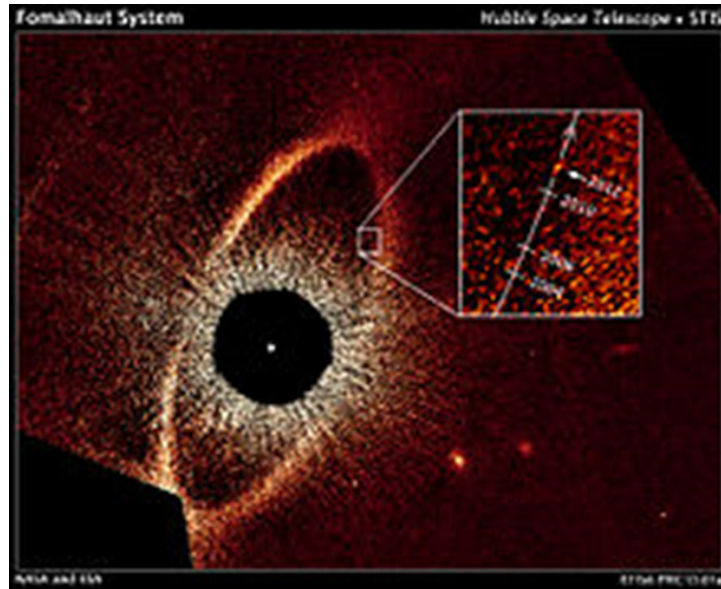
Pisces Austrinus Doubles, in the SE sky during August 2018



Sky Objects By Eugene O'Connor

Cont...3

Finally, a word on Fomalhaut, the Mouth of the Fish. This brilliant white mag. 1.2 star is called the loneliest star as it is remote from any other bright stars and it sits in a particularly dark area of sky. This star is famous for its planet Fomalhaut B, discovered recently and the first to be confirmed visually from photographic plates. This Exoplanet may be an accumulation of rubble embedded in a dust ring about the star. Hubble B has a 1,700-year period. The Hubble photo below shows the evidence:



The Fading Ghost of a Long-Dead Star

Supernova remnant HBH3



Thin, red veins of energized gas mark the location of the supernova remnant HBH3 in this image from NASA's Spitzer Space Telescope. The puffy, white feature in the image is a portion of the star forming regions W3, W4 and W5. Infrared wavelengths of 3.6 microns have been mapped to blue, and 4.5 microns to red. The white color of the star-forming region is a combination of both wavelengths, while the HBH3 filaments radiate only at the longer 4.5 micron wavelength.

Credits: NASA/JPL-Caltech/IPAC

A supernova "remnant" refers to the collective, leftover signs of an exploded star, or supernova. The red filaments in this image belong to a supernova remnant known as HBH 3 that was first observed in 1966 using radio telescopes. Traces of the remnant also radiate optical light. The branches of glowing material are most likely molecular gas that was pummeled by a shockwave generated by the supernova. The energy from the explosion energized the molecules and caused them to radiate infrared light.

The white, cloud-like formation also visible in the image is part of a complex of star-forming regions, simply named W3, W4 and W5. However, those regions extend far beyond the edge of this image. Both the white star-forming regions and the red filaments are approximately 6,400 light years away and lie inside our Milky Way galaxy.

HBH 3 is about 150 light-years in diameter, ranking it amongst the largest known supernova remnants. It is also possibly one of the oldest: Astronomers estimate the original explosion may have happened anywhere from 80,000 to one million years ago.

In 2016, NASA's Fermi Gamma-Ray Telescope detected very high-energy light -- called gamma rays -- coming from the region near HBH 3. This emission may be coming from gas in one of the neighboring star-forming regions, excited by powerful particles emitted by the supernova blast.

Astro Events from Frank Gross

Cont...2

The Spitzer Space Telescope is one of NASA's four Great Observatories -- along with the Hubble Space Telescope, the Chandra X-ray Observatory and the Compton Gamma-Ray Observatory -- and will celebrate its 15th birthday in space on Aug. 25. Spitzer sees the universe in infrared light, which is slightly less energetic than the optical light we can see with our eyes. In this image, taken in March 2010, infrared wavelengths of 3.6 microns have been mapped to blue, and 4.5 microns to red. The white color of the star-forming region is a combination of both wavelengths, while the HBH3 filaments radiate only at the longer 4.5-micron wavelength.

Boeing CST-100 Starliner: Next-Generation Spaceship

By Elizabeth Howell, Space.com Contributor | August 2, 2018 01:50pm ET



Boeing CST-100 Starliner: Next-Generation Spaceship

An artist's rendition shows Boeing's CST-100 Starliner heading for a rendezvous with the International Space Station. Credit: Boeing

Boeing's CST-100 Starliner is a spacecraft under development for NASA's Commercial Crew Program. The space agency plans to use Starliner, as well as SpaceX's Dragon, to take astronauts to the International Space Station by 2019 or 2020. Uncrewed test flights are scheduled for late 2018 or early 2019, with crewed test flights tentatively set for mid-2019.

The Starliner is similar in shape to the Apollo spacecraft, but its electronics are half a century more advanced. The spacecraft is designed to carry up to seven astronauts, with additional cargo also possible if fewer astronauts fly in a particular mission. Measuring 14.8 feet (4.5 meters) across at its widest point, the gumdrop-shaped spacecraft will first fly into space aboard Atlas 5 rockets.

Astro Events from Frank Gross

Cont...3

Money from NASA

Money for the development of the spacecraft largely came through NASA's commercial crew program, which aims to replace the Russian Soyuz spacecraft flights required to take astronauts to the International Space Station.

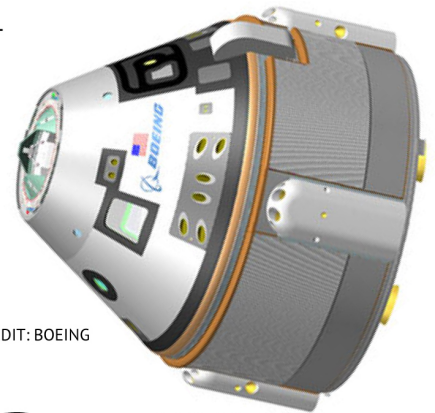
In one phase of the program, called Commercial Crew Transportation Capability (CCtCap), Boeing received \$4.2 billion in September 2014. Competitor SpaceX received \$2.6 billion for its Dragon spacecraft.

Boeing is developing the CST-100 capsule for use ferrying astronauts to Earth orbit and to the International Space Station. See how Boeing's CST-100 spacecraft works in this Space.com infographic. Credit: Karl Tate, SPACE.com Contributor

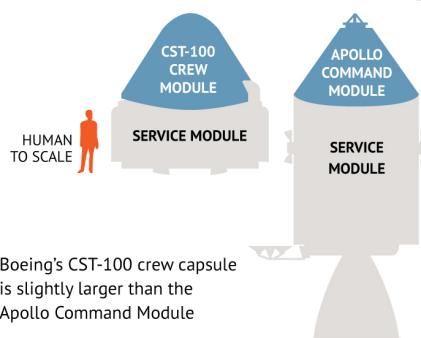
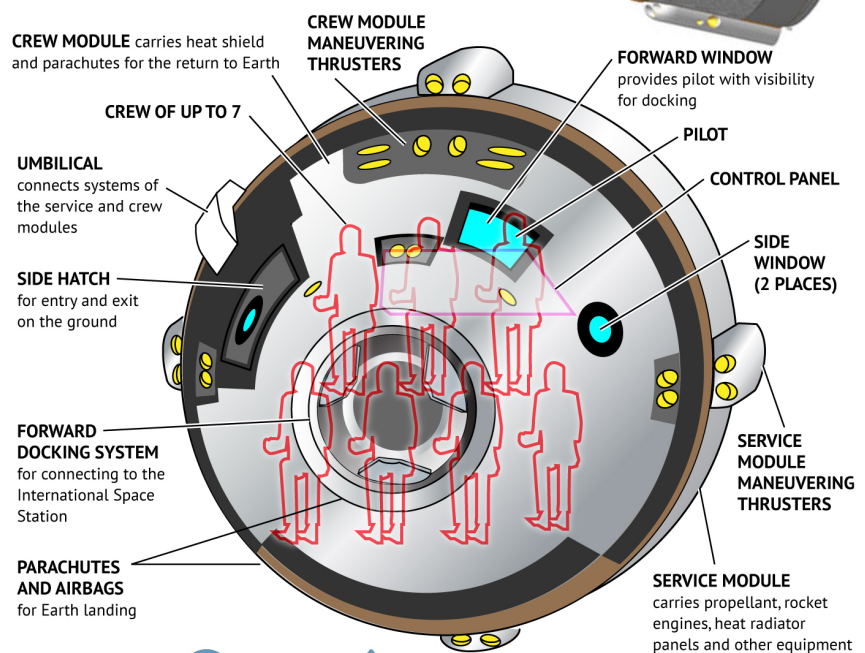
NASA is hoping to relaunch astronauts from American soil, which has not been possible since the space shuttle retired in 2011. The program has been pushed back several years, NASA has said, due to Congress not allocating as much money as what the agency requested.

COMMERCIAL SPACECRAFT STARLINER

The Boeing CST-100 "Starliner" capsule is designed to carry a combination of crew and cargo to the International Space Station, orbiting 240 miles (390 kilometers) above Earth. Each capsule can remain in orbit for six months, and could be re-used up to ten times.



CREDIT: BOEING



Boeing's CST-100 crew capsule is slightly larger than the Apollo Command Module



The pressurized cabin of the CST-100 provides a comfortable shirt-sleeve environment for the crew (CREDIT: BOEING)

| | CST-100 | Apollo |
|----------------------------|------------------|-----------------|
| Builder | Boeing | Rockwell Int'l. |
| First crewed flight | to be determined | 1968 |
| Crew | up to 7 | 3 |
| Launch vehicle | Atlas 5 | Saturn IB or V |
| Height overall | 16.5 ft (5.03 m) | 36 ft (11 m) |
| Capsule diameter | 15 ft (4.56 m) | 12.8 ft (3.9 m) |

SOURCES: BOEING, NASA



KARL TATE / © SPACE.com

Astro Events from Frank Gross

Preparing for first flight

In 2011, the company put a 12-by-14 inch model of the CST-100 in a wind tunnel to determine the spacecraft's aerodynamic characteristics. The model was placed in several different positions to simulate different phases of an abort-mode landing.

In 2012, Boeing did parachute drop tests of the CST-100 to determine how well the spacecraft's parachutes and air bags worked. Unlike the Apollo missions, the CST-100 will touch down on land, making the air bags especially important for the job. Later in the year, the company and NASA determined what would be the basic layout of the spacecraft, which NASA considered an important milestone under the third round of CCDev.

In 2014, Boeing unveiled a full-scale mockup of the spacecraft at the Kennedy Space Center, showing the inside of it for the first time publicly. Airbag testing of the spacecraft proceeded successfully in February 2016, and in March 2017 it underwent a successful parachute test in the New Mexico desert.

Also in 2017, Boeing unveiled the spacesuit astronauts will wear aboard the Starliner. The spacesuit features several advancements over previous spacesuit designs. It is smaller and lighter, and includes special gloves designed to allow use with touchpad screens.

Due to a problem during an abort engine test in June 2018, Boeing announced in August that uncrewed test flights would be pushed back to late 2018 or early 2019 and crewed test flights would not happen until mid-2019.

Europa Lander May Not Have to Dig Deep to Find Signs of Life

By Mike Wall, Space.com Senior Writer | July 23, 2018 11:00am ET

Artist's illustration of a potential NASA lander on the surface of Jupiter's icy, ocean-harboring moon Europa.

Credit: NASA/JPL

If signs of life exist on Jupiter's icy moon Europa, they might not be as hard to find as scientists had thought, a new study reports.



The 1,900-mile-wide (3,100 kilometers) Europa harbors a huge ocean beneath its icy shell. What's more, astronomers think this water is in contact with the moon's rocky core, making a variety of complex and intriguing chemical reactions possible.

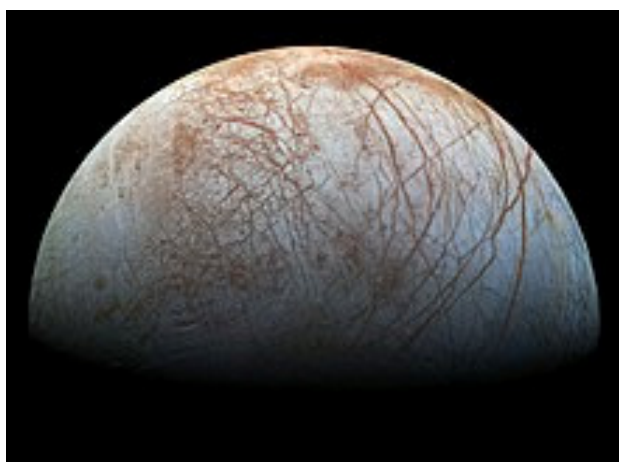
Astro Events from Frank Gross

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Researchers therefore regard Europa as one of the solar system's best bets to harbor alien life. Europa is also a geologically active world, so samples of the buried ocean may routinely make it to the surface — via localized upwelling of the ocean itself, for example, and/or through geyser-like outgassing, evidence of which has been spotted multiple times by NASA's Hubble Space Telescope. [Photos: Europa, Mysterious Icy Moon of Jupiter]

NASA aims to hunt for such samples in the not-too-distant future. The agency is developing a flyby mission called Europa Clipper, which is scheduled to launch in the early 2020s. Clipper will study Europa up close during dozens of flybys, some of which might be able to zoom through the moon's suspected water-vapor plumes. And NASA is also working on a possible post-Clipper lander mission that would search for evidence of life at or near the European surface.

It's unclear, however, just how deep a Europa lander would need to dig to have a chance of finding anything. That's because Europa orbits within Jupiter's radiation belts and is bombarded by fast-moving charged particles, which can turn amino acids and other possible biosignatures into mush.



Jupiter's moon Europa, as imaged by NASA's Galileo spacecraft.

Credit: NASA/JPL-Caltech/SETI Institute
That's where the new study comes in.

NASA scientist Tom Nordheim and his colleagues modeled Europa's radiation environment in detail, laying out just how bad things get from place to place. They then combined these results with data from laboratory experiments documenting how quickly various radiation doses carve up amino acids (a stand-in here for complex biomolecules in general).

The researchers found significant variation, with some European locales (equatorial regions) getting about 10 times the radiation pounding of others (middle and high latitudes).

At the most benign spots, the team determined, a lander would likely have to dig just 0.4 inches (1 centimeter) or so into the ice to find recognizable amino acids. In the high-blast zones, the target depth would be on the order of 4 to 8 inches (10 to 20 cm). (This is not to imply that potential European organisms would still be alive at such depths, however; doses there are high enough to cook even the hardiest Earth microbes, study team members said.)

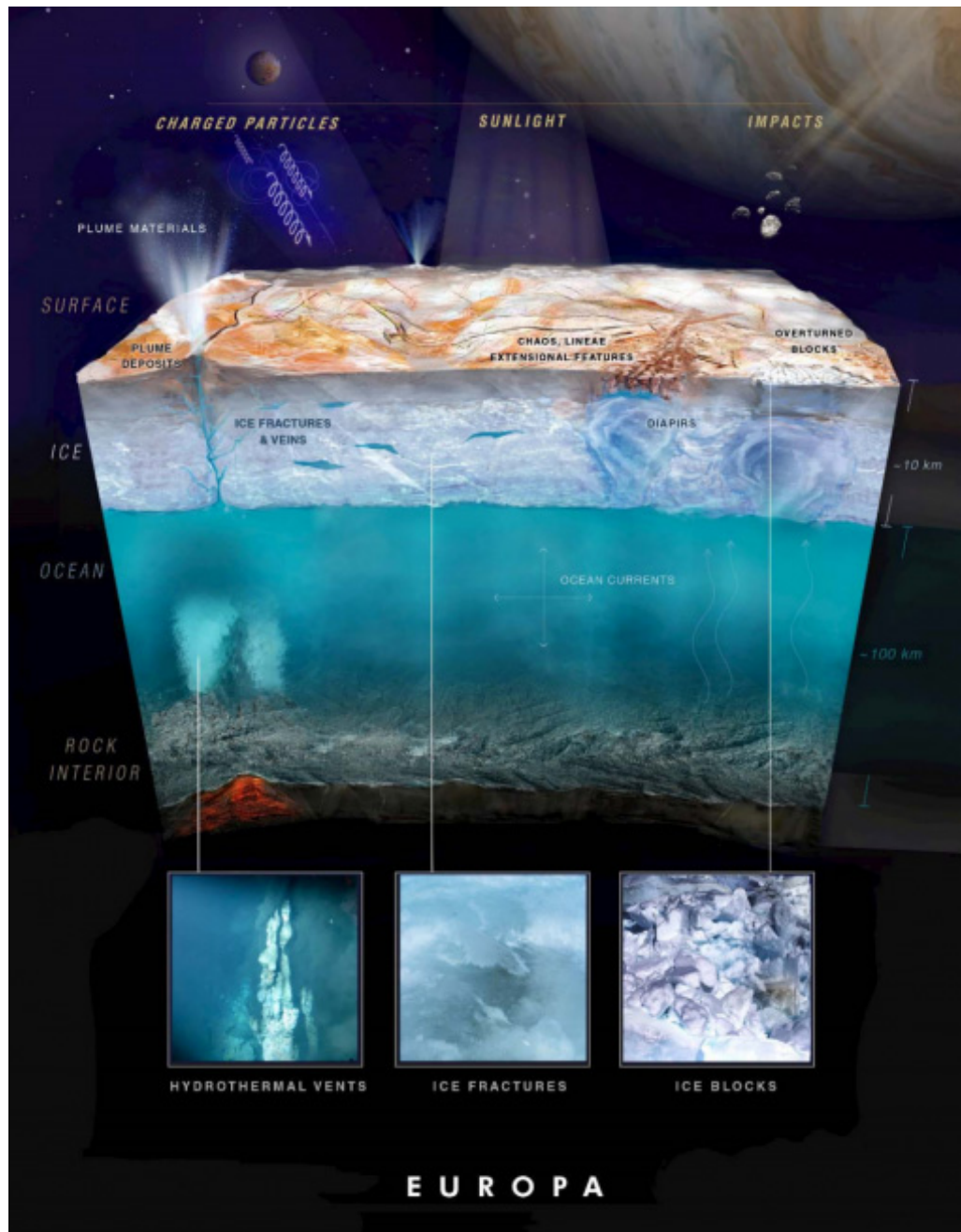
That latter range is still quite manageable, said Nordheim, who's based at the California Institute of Technology and NASA's Jet Propulsion Laboratory, both of which are in Pasadena.

"Even in the harshest radiation zones on Europa, you really don't have to do more than scratch beneath the surface to find material that isn't heavily modified or damaged by radiation," he told Space.com.

Astro Events from Frank Gross

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That's good news for the potential lander mission, Nordheim added: With radiation exposure seemingly not a limiting factor, planners can feel free to target the areas of Europa most likely to harbor fresh ocean deposits — the fallout zone beneath a plume, for example — wherever they may lie.

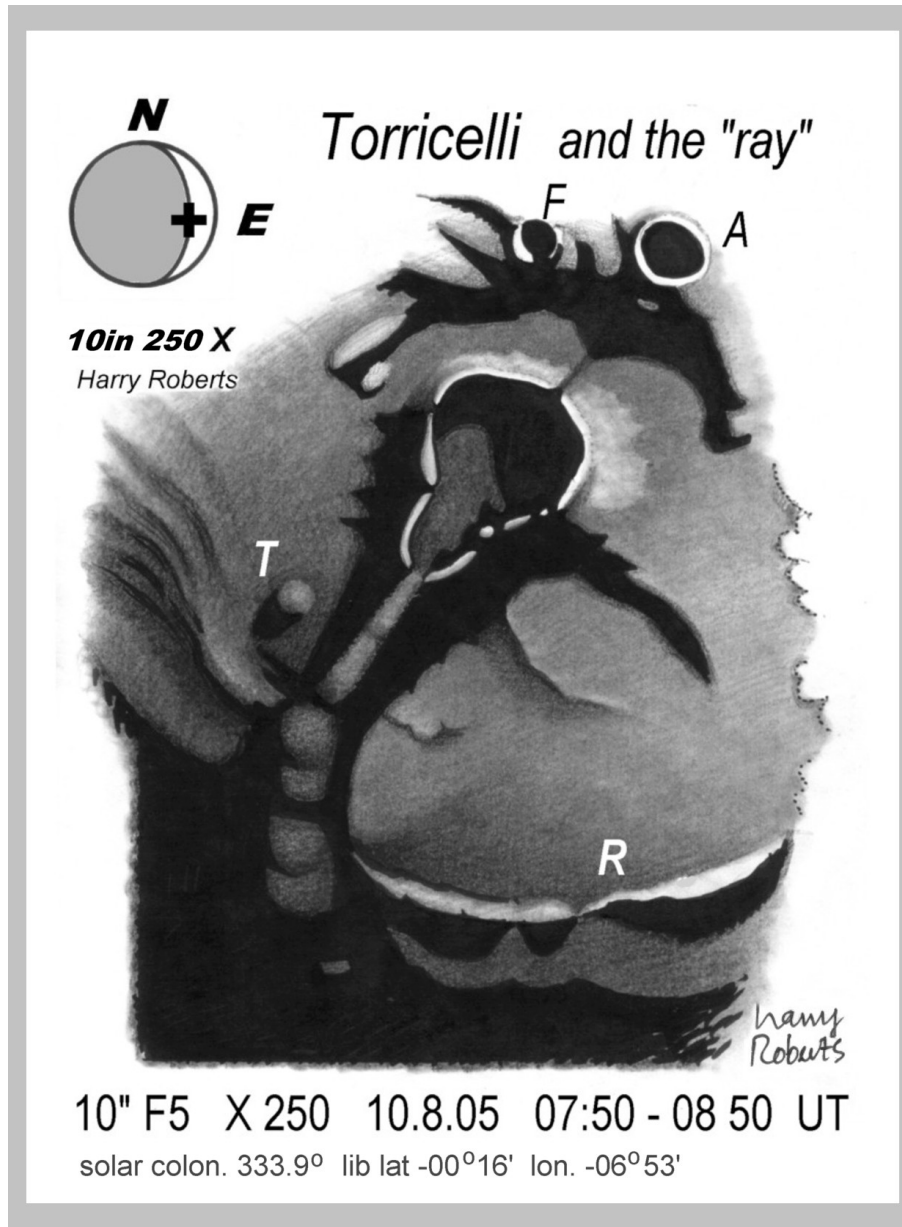


Scientists still haven't identified any such promising touchdown areas; the Europa imagery captured to date just hasn't been sharp enough. But Europa Clipper's work should change things, Nordheim said.

"When we get the Clipper reconnaissance, the high-resolution images — it's just going to be a completely different picture," he said. "That Clipper reconnaissance is really key."

The Moon by Harry Roberts

Torricelli: an amazing ray!



Just north of the huge Theophilus/Cyrrillus complex, in Sinus Asperitatis (southern Tranquillitatis), sits the enigmatic crater Torricelli. Torricelli is pear-shaped, and apparently resulted when a larger crater overlapped an earlier, smaller one. *Or did it?*

I have glanced at Torricelli many times, but on the night of August 10 2005 I saw an incredible sight when the crater was close to the terminator. The elevation and azimuth of the Sun (at the site) caused a pair of diverging shadows to be cast by the northern and southern walls of the crater, westwards, towards the terminator.

This produced the illusion that, I think, is called "Torricelli's Ray", a bright ray of light shining SW and flanked by narrow shadows. Remarkably the "ray" appeared to intersect with shadows from low mare ridges near the terminator, giving the impression that the "ray" turned southwards as it reached the terminator, where several dim lit ridges tattooed the landscape.

At the top or NE end of the crater, a dark cleft cut the rim and glaxis. The strange "ray" shining SW meant that the rim of Torricelli must have a gap at the pointy SE end, where the crater is narrowest, through which early morning light illuminated the terrain beyond. The effect must depend on a favourable libration resulting in the Sun shining along Torricelli's long axis; presumably an uncommon event. Libration was a large 7° eastwards.

The Moon by Harry Roberts

Cont...2

Two ridges on the SE side of the crater cast dramatic shadows across the mare lava field. Further SW, in dim light, lay a curved fragment of the rim of Torricelli R, an ancient crater buried 3km deep in Asperitatus lavas. A low mound labelled T is actually a small Torricelli secondary crater. The dark patch in the “ray” just SW of Torricelli’s rim is a small un-named secondary too. Conspicuous secondaries A and F lie at the top of my drawing, atop some concentric ridges that may be part of buried Torricelli R.

Inspired by the view and the unusual “ray”, a follow-up observation was made the next evening and will be presented in a future article.

Torricelli is named after Italian physicist and mathematician Evangelista Torricelli who was born in 1608, and died in fabulous Florence only 39 years later. A student of Galileo, in his short life he discovered atmospheric pressure and invented the mercury barometer.

Crater Torricelli is said to be of the Imbrium era, i.e. more than 3.2 billion years old. Yet Orbiter images show sharp, steep walls and very few small craters on its floor, and in a future article it will be suggested that it is linked with another famous and *very young* crater pair 20degE of the site.

Add Torricelli to your program. Happy Moonwatching!

1 North, G. “Observing the Moon –the Modern Astronomer’s Guide.” Cambridge Uni. Press. 2000. P 337.

2 Wood, C. “The Modern Moon – a Personal View”. Sky Pub. 2003. P 114.

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).

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.

Other Viewing areas may be chosen at different times.

Dates for Club/Social Viewing Nights for 2018 On Saturday Nights As Follows:

Sep-8, Oct-6, Nov-10, Dec-8

More Monthly Meeting Information

The AGM was held at the July 2018 monthly meeting. Elected officials for 2018 - 2019

President: Frank Gross
Vice President: John Gould
Secretary/Treasurer: Tracey Newcombe
Public Officer: Frank Gross
Observation Officer: Robert Turnbull
Editor: Kaye Johnston
Librarian: Chris O'Hanlon

The Committee: Robert Turnbull, Rudolf Henssen, Robert Spruyt, Jack Apfelbaum, Chris O'Hanlon, John Gould

Check out the Astro Flyer on the web site: www.shoalhavenastronomers.asn.au

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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 is 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.