Shoalhaven Astronomers Inc.
www.shoalhavenastronomers.asn.au

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Issue 10

Astro Flyer

OCTOBER 2018

Club News

Hello All,

There are so many planets in our night sky at this time I have trouble deciding which one to look at first. A few of them I have not seen for at least 15 years - Uranus and Neptune. With the map of the sky that Eugene O'Connor had distributed at the last meeting I will give these elusive planets a go - when the rain ends.
A big treat awaits the Shoalhaven Astronomers and general public this October monthly meeting. We are going to have new member and astronomer, Clare Williams, give a talk on the Electrified Universe. The meeting, this month will be in the lecture hall a couple of buildings south of our usual meeting room with a 7 PM to a 7:30 PM start. There will be loads of refreshments available and I am sure Clare will expand our minds on the night.

See you all there!

Frank Gross, president.

Next monthly meeting will be held at the Shoalhaven Campus of the Uni of W'Gong, George Evans Road off Yawal Road, West Nowra, September 21st, 7pm for 7.30 start.

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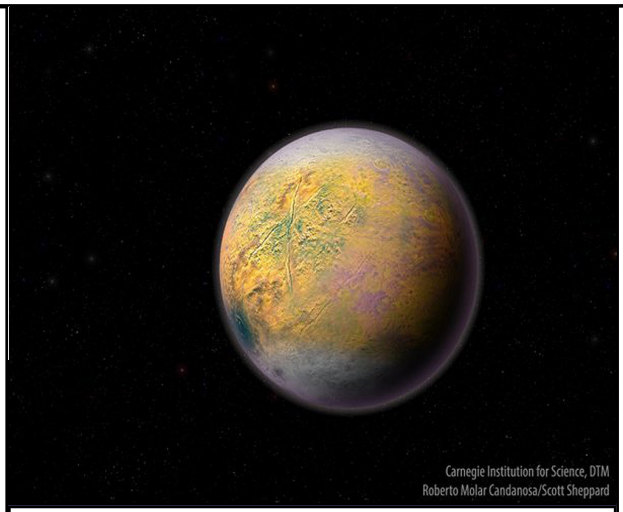


New Moon	First Quarter	Full Moon	Last Quarter
8th Nov	17 Oct	25 Oct	1st Nov

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 10 Nov (back-up night Sun 11 Nov) 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 Page 15

"The Challenge of the Electric"

Given by Clare Williams of the Shoalhaven Astronomers, Inc., the Canberra Astronomical Society, Canberra Space Dome and Observatory (CSDO), and the Australasian Planetarium Society.

Abstract: The lecture entitled "The Challenge of the Electric" will be about the theory of the electrical universe and how it challenges the conventional paradigms of cosmology and astrophysics such as the Big Bang, dark energy, black holes, gravity, stellar and planetary evolution, providing a new paradigm based on laboratory tested plasma science and well known principles of electrical engineering.

Friday, October 19, 2018
7 PM for a 7:30 PM start
at the
Administration Building of the University of Wollongong, Shoalhaven Campus
George Evans Road (off Yawal Road)
West Nowra

Refreshments will be available. Limited seats strictly first come first serve.
Shoalhaven Astronomers, Inc. Ph: 44226241

OUT THERE
Bob Turnbull OBSERVATION OFFICER

OCTOBER-NOVEMBER

Clearing skies and warmer days and nights together with welcomed rain should help the farmers, gardeners and reservoirs together with clearer air for viewing.

PLANETS

MERCURY Is above Jupiter in the western evening sky, however it's descent back towards the Sun From the 8th to the 11th of November it will be near Antares in Scorpio.

VENUS Is in the constellation of Virgo and will return to the dawn Eastern sky, as the Morning Star.

MARS Is in Capricorn then moves to Aquarius. It will be visible in the mid North Western evening sky and encounters an 8 day waxing Moon on the 16th of November where the two are only 3 degrees apart. (See sky Map in Astronomy 2018 for November p.69 for the evening sky). Unfortunately optical telescopes my not be able to much information on this planet because of it's. rapid decline in apparent size. CCD devices may be able to still gather acceptable data, for those who have them.

JUPITER Only see in the low western twilight sky.

SATURN Is low in the evening western sky and is hindered by the proximity by a close MOON and it's low position on the horizon.

URANUS Transits the meridian (due North) around 10pm in Aries.

NEPTUNE Is in Aquarius with Mars about 4 degrees in proximity, so watch in early December for this event, which is said to be the best collimation viewing for this year.

COMETS

21P/Giocobini-Zenner will fade from ninth to eleventh magnitude in November, while it moves into Puppis from Canis Major.
Comet 46/P Wirtanen, should brighten from 7th to 5th magnitude, making it easier to spot just before Dawn, and spends most of November in Fornax before moving into Cetis.

METEOR SHOWERS

Northern Taurids (out of the direction of Tauris) are bright slow moving meteors, active in October- November which peak around 12th of November.
The Southern Taurids peak in October so watch for the colourful fire balls, however, they have not been seen recently. Being bright and slow, they should be easier for Astro photographers.

CLEAR SKY AND GOOD VIEWING
BOB TURNBULL

Sky Objects By Eugene O'Connor

A Search for Southern Doubles

Episode 20: The Top Ten Doubles

As mentioned last month, I end this series by listing what I regard as the best doubles from the 100 or so I have observed over the past two years compiling this series. This is a personal choice and the top ten are mainly selected on the basis of doubles that have impressed me with my search using my 10" Dobsonian telescope. Some of these may be difficult for some observers, depending on experience and telescope used. This list is in no particular order. Enjoy the search!

1) a) Delta Ori (Mintaka); b) RA 05hrs. 32 mins; Dec -00° 18'; sep. 52.8"; m 2.4; 6.8. Mintaka has been a favourite of viewers going right back over 200 years. This is a contrasting vivid white primary with a delicate bluish companion wide and well within reach of smaller 3" beginners' scopes. I notice two other fainter stars close together in the field at low power.

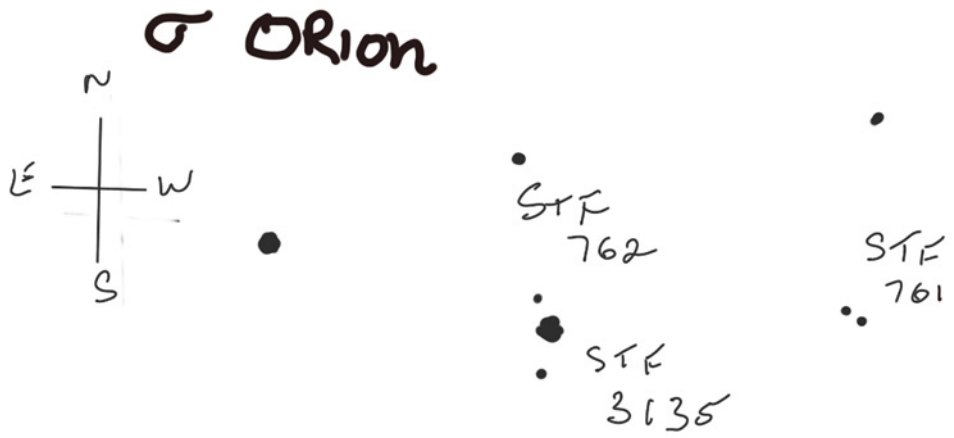
2) **Sigma Ori;** RA 05hrs 18.7mins; c)11.5"; d) 238°; e) m 3.7; 8.8.Sigma (σ) is familiar to Horsehead hunters, sitting as it does just outside the field but often passed over. All double hunters are in awe of this one. First observed 250 years ago, it was found to be two separate star systems forming a wedge-shaped grouping in the field. My drawing made at the eyepiece suggests two groups of three stars with the sixth star some distance east (front to back of 'wedge' is approx. 8'). Under high power the brightest of the seven, stf 3135 I have split to make 8 stars in the field. It looks like a planetary(* see drawing below)

3**) Beta Crux β, Mimosa**. While rarely listed as a double star this mag 1.2 brilliant blue white star marks the end of the eastern limb of Crux and reveals an extraordinary star in the low power field, namely the crimson-red carbon star, EsB 365 at mag 8.6. It lies 2'.4 west of Beta. Centre Beta in a wide field and the carbon star is easily located as a blood red gem nearby. If you have difficulty seeing this, try averted vision. In your telescope, 80 x magnification should distinguish it clearly. Another faint star forms a triangle with Mimosa and EsB 365. This carbon star is possibly the deepest red star you will see in the sky.

4) □, XI **or 51 Scorpio** RA 16hr.05m; Dec. -11°22", mag 4.8/5.1/7.5 Sep AB 1", AC 7.5This triple star has a second pair in the field, Σ1999, Mag 7.3/8.1 sep 11.7" and 28.3" in the same field.. This rich group is far removed from the claws and seems to belong in the nearby constellation of Libra, but is well worth the hunt (see map below). I was fortunate in a night in March this year and following days of rain to be able to split both pairs in the same field at medium power This was A and C with B too close. Reminiscent of the lovely double double in Delphinus, the Dolphin, which appears in July, or the more famous Epsilon Lyre, this treasure is rich in golden shades. The brightest A star is a brilliant deep yellow of mag 4.9 with a C off-white companion. In the same field the double Σ1999 is an equal golden pair, easily separated. Brilliant!

Cont...2

5) **h3945** CaMaj. RA 7°16'; Dec -23.19', mag 5/5.8; sep 26.8".
This is one of my favourite easy doubles located just above the Dog's rump The easiest pathway is by using O2 and Delta CaMaj as the base of a triangle and h3945 as the apex on the eastern side. Colours are deep gold and blue. Split in 25X binos. A brilliant object of the same class of Beta Cygnus (Albireo). *Showcase Pair!*



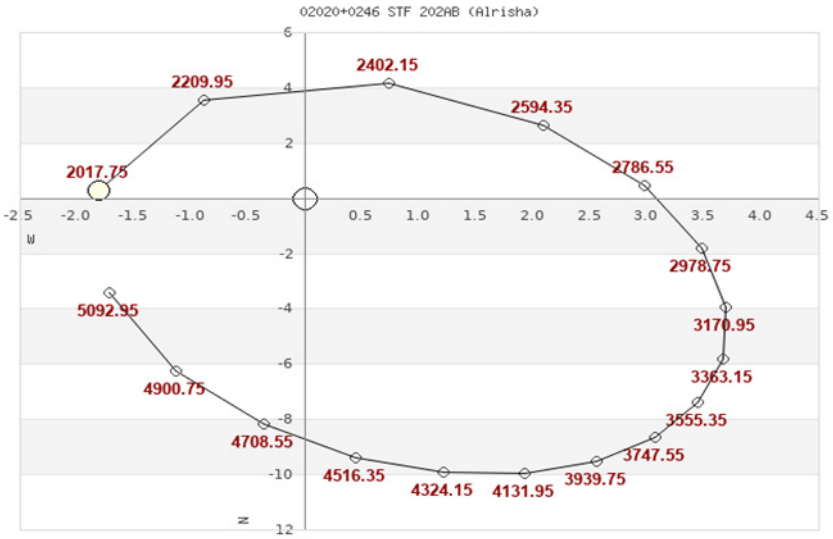
6) **Graffias, β** Scorpio RA 16 hr. 5.4m; Dec -19.48m. This marks the NE claw of the Scorpion and is a fine mag 2.6 classical double star with its blue companion of mag 4.9 well separated @ 13.6" and therefore an easy object for small telescopes at medium power. The contrasting yellow and blue hues stand out

7) **ρ, 5** or **Rho Ophi**: RA 16hr 25.6 mins; Dec -23°, 27'. Sep. 5.1/5.7 mag. When you pay close attention to the finderscope field north of Antares you will find a group of mag 5 stars forming a pentagon. Four stars lie in Scorpio, one in Ophi. This is a fine 4.6 binary star which appears as a wide triple star in the finderscope. Closer analysis at medium power reveals a brilliant white pair with wide but fainter yellow and rose mag 6 and 7 stars nearby. This binary has a 2,000 year orbit. Beautiful field.

8) The heart of the Trifed Nebula (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 Trifed Nebula. The Trifed 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 Trifed. At the eyepiece, these two stars are wide and are referred to as HN 40 and HN 6. Early observers just noticed three divided nebulous fields and named the object the Trifed. 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.

9) **Alpha Psc**. RA 02.02; Dec +02.46, Sep 1.9" PA 270°. This is a true binary star visible in good conditions in a moderate scope. It separated nicely at X150 in my 10" F5 machine and both stars are white.
It is 182 ly away and has a period of 700 years. Notice from the orbit projection below that this classy double star is slowly closing when viewed from earth. Best viewed before the year 2300!

Cont...3



10**) Delta (Δ) 252**; Alpha Crucis. RA 12 hr 26.6m; Dec-63. 06 S, mag 1.4 and 1.9, sep 4" PA 110, and C star mag 4.9, sep 90"
Finally, no search for double stars is complete without turning your instrument to a stunning binary, Acrux in the Southern Cross. In finder scope and binoculars Acrux is a delightful brilliant white star with a wide blue companion. The telescope reveals that the brilliant 'A' star can be split into a fine binary 'A 1 and A2'. The period of this pair is a whopping 1.500 years. Further spectrum analysis reveals 'A1' is an eclipsing binary with an orbit of 76 days! Acrux is 25,000 times brighter than our sun and 320 ly away.

The wide third blue companion 'C' (See *Picture* above), is also a binary and nearby fainter star are now thought to be related. This is truly a stunning multiple system. I found alpha hard to split at high power but my 4" offset mask revealed two clean points of light.

Updates on Solar System
If you have a 4" telescope or more and a good working knowledge of the constellations you can collect detailed maps at the next meeting locating the dim gas planets, Uranus and Neptune and the movement of the periodic comet, Wirtanen, now at about mag 7 and a binocular object.

Astro Events from Frank Gross

HOW FAR AWAY ARE THE PLEIADES?

Contributed by Phil Plait

I've written quite a bit recently about the Gaia mission, but as my excuse the recent release of a huge amount of second-generation data from the space-borne observatory is revolutionizing a lot of basic astronomical knowledge.
Sound grandiose? Well, it's no exaggeration! Gaia is precisely measuring the positions, movements, and colors of more than a billion stars. There's almost no way to do that without overturning a basic premise or two.
For example, Polaris is a special kind of star that we use to find the distances to other galaxies, and Gaia helped nail down how far away it is from us — the very basis of our cosmic distance ladder — better than ever before. It found a cluster of stars previously unknown to us, and solved an old mystery about an apparent double star that's been a pain in the neck of amateur astronomers for decades.
That's just a taste, a nibble, an amuse-bouche. There's plenty more, and boy howdy I have a pile of notes for more articles. But there was one particular mystery I was excited for Gaia to solve, one that's been brewing for many years and is actually pretty important. And it's a simple one to ask:

How far away are the Pleiades?

Simple to ask, but hard — very hard — to answer with any degree of accuracy. Astronomers have been trying to answer this question for a long time, and things were going well until suddenly they were going not well at all. Different methods yield different answers, and a recent mission that was supposed to help made things worse. I was truly hoping that Gaia would put the nail in the coffin of this conundrum, and it actually may have… but in some ways, I fear, things have gotten weirder.

A gorgeous deep image of the Pleiades, a nearby cluster of stars.

OK, first: The Pleaides* is a cluster of very roughly 1,500 stars in the constellation of Taurus. The brightest few of them form a distinctive dipper shape (and are commonly mistaken for the Little Dipper) and are of roughly the same brightness, making them a lovely and striking sight. Binoculars reveal dozens of stars, and a telescope hundreds.
The entire clutch of stars is about 440 light years away, making it one of the very closest star clusters to us, which is why it's so obvious in our sky.

That's cool for a bunch of reasons. All the stars in a cluster are born around the same time and from the same material, so differences in their appearance (brightness and so on) are probably due to their mass alone. That makes understanding how they age much simpler. The Pleiades being really close means even fainter members can be well-observed, which is much harder for more distant clusters, and helps us understand what's going on at the lighter end of the mass scale too. You get a more complete view of the entire cluster, not just the brighter, easier-to-see stars, and that insight can lead to understanding all clusters better.

The distance to the cluster is important, because then you can get absolute numbers, like how luminous the stars are. But that distance to the Pleiades isn't well determined. A variety of methods have been used to try to get the distance to the cluster, some yielding a distance of about 415 light years to the cluster center, some 470. That's a broad range. Even accounting for the physical size of the cluster, which is well over 50 light years wide, that's a big uncertainty.

It was hoped this would be solved once and for all when the Hipparcos satellite went into business back in the early '90s. But when the data for the Pleiades came back, it found a distance of 380 light years, far closer than previous results. Even after a big recalibration of Hipparcos data, the calculated distance fell short of nearly every other method. It is almost certainly due to some systematic error in the Hipparcos data, but that controversy still goes on today.

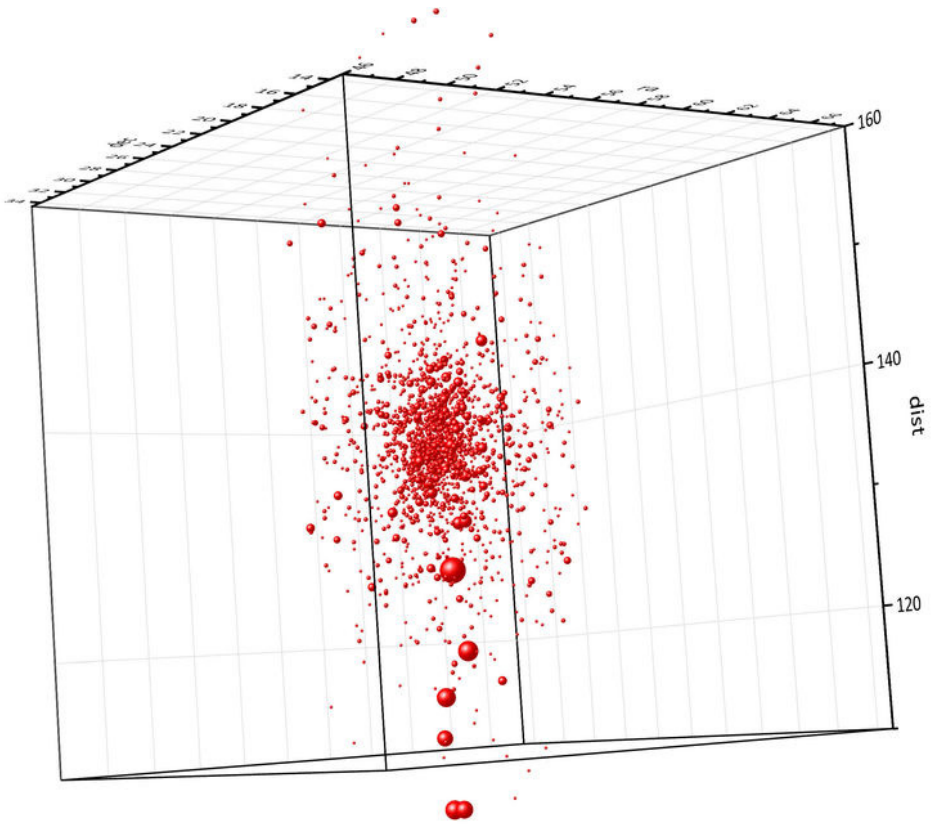
Cont...2

Enter Gaia. With its unprecedented accuracy, it should, quite literally, put the Pleiades in its place.
And it does! But then things get weird.

Guillermo Abramson, an astronomer with the Centro Atómico Bariloche, CONICET and Instituto Balseiro in Argentina, examined the Gaia results for the cluster and recently published his findings. I contacted him about his work, and we've been discussing it for a few weeks now, trying to interpret the results.

Briefly, he used the Gaia data to isolate the members of the cluster, using various methods to ignore foreground and background stars (a method that had been used in a previous study using first generation Gaia data, for consistency). He found nearly 1,600 stars. Looking at their distances from Earth and taking the average — which should yield the center to the cluster — he got a distance to the cluster center of 445.5 light years. Boom! This is consistent with earlier measurements using other methods, near the middle of them in fact, and seems to clearly show that the Hipparcos measurement is in error.

But…
Look what happens when you make a 3D box plot of the stars' positions:



A 3D plot of the positions of 1,600 Pleiades stars; the labeled axes on the top are position in the sky, and the third axis along the side is distance from Earth (in parsecs; 1 pc = 3.26 light years). Note the cluster is elongated, and that the brightest stars are all on the near side of the cluster.

Several things jump out. The box is displayed to be about 150 light years on a side, but due to the constraint Abramson put on his member search, the cluster is much smaller than that, so it only occupies the central part of the figure (the size of the ball represents brightness, so bigger ball = brighter star).

Astro Events from Frank Gross

Cont...3

Still, you can see that the cluster appears to be elongated! That's an interesting result right away! An elongated shape had been hinted at in previous research, so that's neat. I'll admit, too, I was immediately suspicious that the axis, the direction of the elongation, appeared to be pointing right at us (in this graphic the direction toward Earth is down). I don't like coincidences! Could there be something wrong with the data?

As it happens, not long ago I was contacted by Chris Anderson, the Production Specialist & Observatory Coordinator of the Faulkner Planetarium in Idaho. He had read my earlier articles about Gaia, and noted that the new release of data could help resolve the Pleiades distance problem! I told him I was already working on it, and saw the elongation of the cluster as a potential problem.

Then he told me something I didn't know: A lot of clusters are elongated, and moreover, they're elongated in such a way that they point toward the center of the galaxy! That's no coincidence: The gravity of the galaxy can stretch the cluster, pulling on stars closer to the galactic center harder than the stars on the opposite side — this is called the galactic tide, and while it's weak it can be sufficient over the size of a cluster to elongate it.

I immediately checked the coordinates of the Pleiades, and sure enough, they are located pretty close to opposite the galactic center from us. So if the Milky Way is stretching the cluster, you'd expect that elongation to point toward us. From the Pleiades' point of view, we're in the sky right next to the galactic center!

So that made me feel better. But then something else weird popped up. And it's related. Look again at the plot. The brightest stars are the biggest balls. See anything odd about them? They all appear to fall along a line on the near side of the cluster, aimed right at us.

That's pretty strange. The fact that all the stars are on a line pointing at us might be related to the galactic tide, but I can't think of a physical scenario where the brightest stars would all lie on one side of the cluster, and so far from the center. Usually the most massive stars (which are the brightest) fall toward the cluster center. Every time two or more stars pass each other as they orbit the cluster center, the net effect is that less massive stars move toward the outskirts of the cluster and the more massive ones fall toward the center. This is called dynamical friction and is a fairly well-understood process. So this is a head-scratcher.

When I saw this I wondered if it were real. Maybe there's something in the data making it look like all the bright stars were on the near side of the cluster!

From previous work, I happen to know that Gaia has trouble getting measurements for very bright stars; they flood the detectors with light and make it hard to measure their positions accurately. The brightest Pleiad, Alcyone, is right at that limit, so it's likely to have a pretty big uncertainty in its distance. And in fact when you look at the actual measurement and the error bar, Alcyone could be anywhere from 364 to 465 light years away from us! It's more likely to be on the near side of the cluster, but it could be on the other side, too.

However, the other bright Pleiads — Atlas, Electra, Maia, Merope, Taygeta, Pleione, and Asterope — all have much lower uncertainties, and look like they do in fact lie on this side of the cluster. So this is the opposite of what you'd expect, and I do not have an easy answer for it. Abramson and I have discussed it at length, but we're not sure what to make of it; he even wrote about it on his own blog. Maybe a closer look at the data or a more in-depth analysis of the stars' interactions with each other will reveal some solution to this puzzle.

Cont...4

The Pleiades cluster happens to be plowing through a cloud of gas and dust, warming it up enough for it to glow in the infrared, where it was seen by the WISE astronomical observatory

One very out-there idea: Perhaps the brightest members... aren't. Members, that is. As it happens, the cluster is passing very close to a dark cloud of gas and dust, which is lit up by the brightest stars in the Pleiades; you can see it in the images of the cluster. This is just a coincidence; measurements of the motions of the cluster and the gas show they're moving in different directions, so they're unrelated. But it makes one wonder if maybe the brightest stars are also not part of the cluster, and coincidentally just happen to be near it in the sky.

This strikes me as extremely unlikely. They have about the same proper motion (motion across the sky) as the cluster itself, indicating they are highly likely to be a part of it. Some of the brightest stars have motions that are a bit off from the overall cluster motion (just as in a flock of birds one or two birds might be moving a little bit faster or slower or in a slightly different direction than the others) but not enough for me to yell **"j'accuse!"** You expect that in a cluster of stars where they interact gravitationally. Some will get yanked and pulled in different directions. What we see there could just be that normal distribution of velocities.

So there you have it. It looks like we now know the distance to the Pleiades center, and can therefore nail down other properties of it much better... but some pretty interesting mysteries remain. Hopefully this and further studies will lead toward a deeper physical insight into the nature of the cluster, and will also explain why the brightest stars seem to align for us. I'd very much love to know why this is.

* Technically this word is plural, and the singular is Pleiad, but it's also used as a group or collective noun, so it's singular. So perhaps "How far away are the Pleiades?" isn't as simple to ask as I first thought. At least grammatically.

Astro Events from Frank Gross

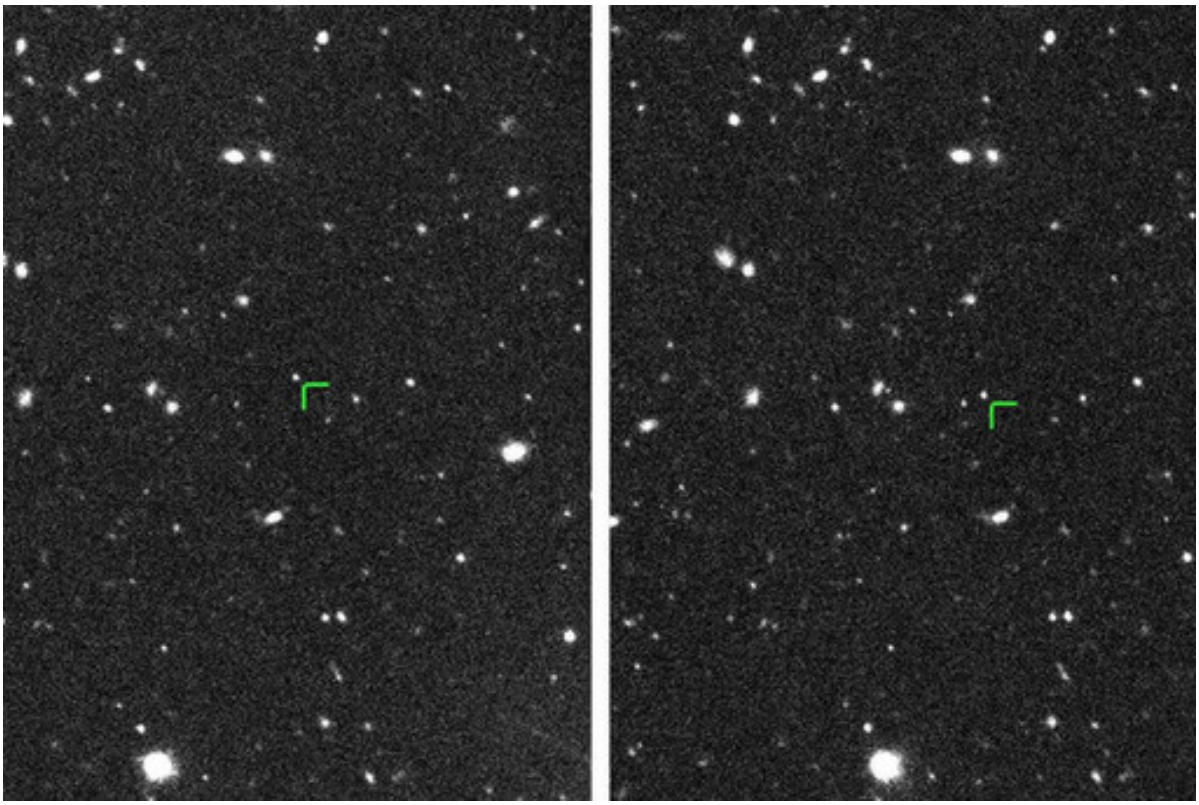
Cont...5

Newfound Dwarf Planet 'The Goblin' May Lead to Mysterious Planet Nine

By Mike Wall, Space.com Senior Writer, October 2, 2018

Scientists have discovered yet another marker on the trail toward the putative Planet Nine.
That clue is 2015 TG387, a newfound object in the far outer solar system, way beyond Pluto. The orbit of 2015 TG387 shares peculiarities with those of other extremely far-flung bodies, which appear to have been shaped by the gravity of a very large object in that distant, frigid realm — the hypothesized Planet Nine, also known as Planet X.
"These distant objects are like breadcrumbs leading us to Planet X," study leader Scott Sheppard, of the Carnegie Institution for Science in Washington, D.C., said in a statement
"The more of them we can find, the better we can understand the outer solar system and the possible planet that we think is shaping their orbits — a discovery that would redefine our knowledge of the solar system's evolution," he added.
And 2015 TG387 is special among these bread crumbs, because it was found during a relatively uniform survey of the northern and southern skies rather than a targeted hunt for clustered objects in certain parts of the sky, Sheppard said. Targeted hunts can produce biased results — for example, the appearance of clustering where none may actually exist, he explained.

2015 TG387 has two dwarf-planet companions in the low-bias class, Sheppard said: 2012 VP113, which he and his colleague Chadwick Trujillo (who's a co-author of the new paper as well) spotted in 2014 as part of the same, ongoing long-term survey; and the relatively bright Sedna (because the whole sky has been searched to its level of brightness).
"And then if you bring in some of the other extreme objects — several of them were found in our survey as well," Sheppard told Space.com. "The statistics get better and better that this planet is likely out there."



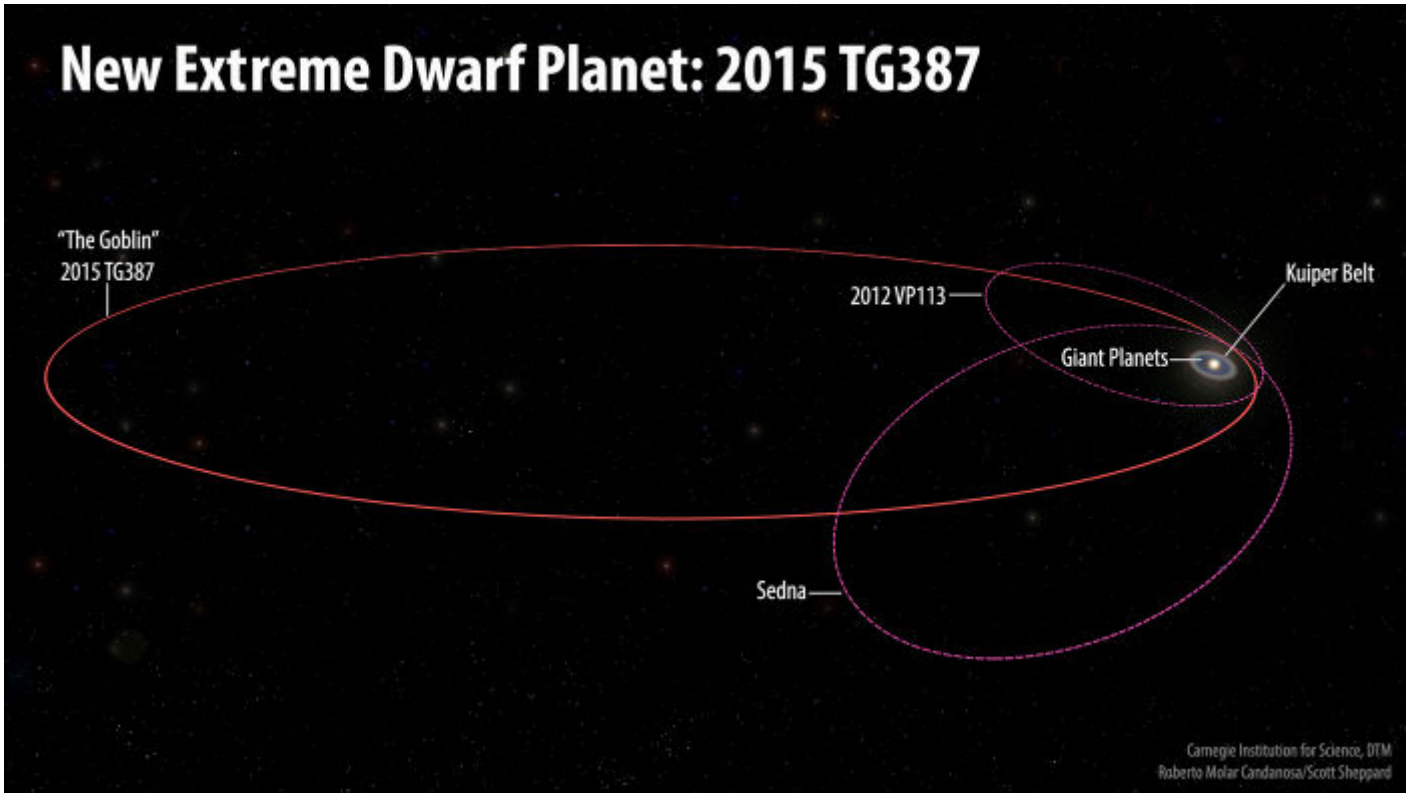
The discovery images of 2015 TG387 taken at the Subaru 8-meter telescope located atop Mauna Kea in Hawaii on October 13, 2015. The images were taken about 3 hours apart. 2015 TG387 can be seen moving between images near the center while the much more distant stars and galaxies are stationary.

Astro Events from Frank Gross

Cont...6
Sheppard and his colleagues first spotted 2015 TG387 in October 2015, using Japan's 26-foot (8 meters) Subaru telescope atop the volcanic peak Mauna Kea in Hawaii. The researchers nicknamed the object "The Goblin," because of the discovery date and the "TG" in the provisional designation.

It took the team three additional years to nail down The Goblin's orbit, which they did with the aid of observations by the Las Campanas Observatory in Chile and the Discovery Channel Telescope in Arizona.

2015 TG387 loops around the sun on an extremely elliptical path, coming within about 65 astronomical units (AU) of the sun at its closest point (known as perihelion) and getting about 2,300 AU away at its most distant (aphelion). One AU is the average Earth-sun distance — about 93 million miles (150 million kilometers). So 2015 TG387 is way, way out there. Indeed, it takes about 40,000 Earth years for the newfound object to complete one lap around the sun. Only two known solar system bodies have more-distant perihelia than The Goblin does (2012 VP113 and Sedna), and only one (2014 FE72) has a greater aphelion distance. (For perspective: Pluto never gets closer to the sun than 29.7 AU, or farther away than 49.3 AU.)



The orbits of the newfound extreme dwarf planet 2015 TG387 and its fellow Inner Oort Cloud objects 2012 VP113 and Sedna, as compared with the rest of the solar system.

Sheppard and his colleagues think 2015 TG387 is about 186 miles (300 km) wide and probably spherical, in which case it would qualify as a dwarf planet. But that's all they can really say about The Goblin's physical characteristics. "It's pretty faint, so we can really just see that it's there," Sheppard told Space.com. "We don't even know the color of the object; we haven't gotten any spectroscopy on the object yet, or anything like that."

(The 186-mile diameter is not a measurement but rather an estimate, assuming a "moderate" reflectiveness for 2015 TG387.)

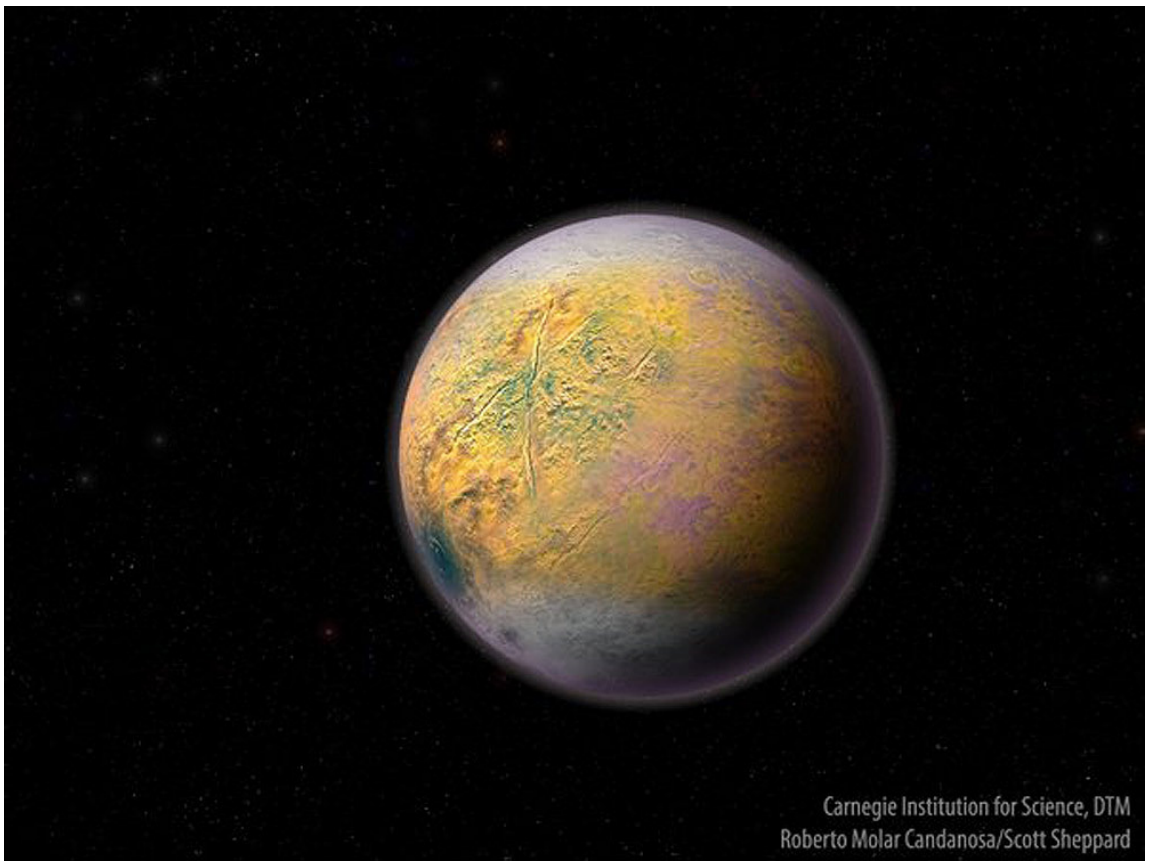
Astro Events from Frank Gross

Cont...7

But going back to the orbit: The Goblin's is similar in key ways to those of some other extremely distant bodies — particularly in an element called "longitude of perihelion." Basically, the elongated parts of their elliptical orbits are clustered in the same part of the sky, which is consistent with gravitational shepherding by Planet X.

The existence of Planet X was first seriously proposed in 2014 by Sheppard and Trujillo, to potentially explain oddities in the orbits of 2012 VP113, Sedna and a few other trans-Neptunian objects.

In 2016, astronomers Konstantin Batygin and Mike Brown presented more evidence for such an unseen "perturber," which they called Planet Nine. Batygin and Brown have suggested that this world may be about 10 times more massive than Earth and orbit about 600 AU from the sun on average.



An artist's illustration of the hypothesized but undiscovered Planet X, which could be shaping the orbits of smaller extremely distant outer solar system objects like 2015 TG387.

In the new study, the researchers also performed computer simulations to test how Planet X's gravitational tug might influence the orbit of The Goblin. They found significant shepherding akin to that inferred for other distant objects — and determined that 2015 TG387's orbit remains stable for the age of the solar system nonetheless.

"What makes this result really interesting is that Planet X seems to affect 2015 TG387 the same way as all the other extremely distant solar system objects," Trujillo, who's based at Northern Arizona University, said in the same statement. "These simulations do not prove that there's another massive planet in our solar system, but they are further evidence that something big could be out there."

Cont...8

Sheppard puts the odds of Planet X's existence at around 85 percent. And he says it's not at all surprising that astronomers haven't spotted it yet.

"Where we think the planet is — hundreds of AU away, if not 1,000 AU — something even as big as Neptune would be fainter than most telescopes could see," Sheppard told Space.com. (In case this sounds odd or incongruous: The Goblin was discovered near perihelion, at about 80 AU from the sun.)

"And most of our surveys to date do not go that faint, do not go that deep. We've covered very little of the sky to the depth that's needed to be covered to find something this faint," he added. "You can hide a very big thing in the outer solar system very easily."

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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.

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

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

Shoalhaven
Astronomers
PO BOX 1053
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.