

*The next WAS meeting will be held on Wednesday 5th of July 2017 at 7:30 pm at Carter Observatory, Upland Rd, Kelburn, Wellington*

## Pseudo Science in Astronomy - Sarah Taylor

As humans, we don't like not knowing the reasons or causes of natural events. Our ancestors came up with amazing stories of a range of gods, to demigods, even to leopards in the Sun to explain natural events such as Earthquakes, Volcanoes, Lightening, etc.

As science has progressed we have found the reasons for these natural processes, there are still areas of research ongoing and we will always be searching for answers.

Unfortunately, sometimes the answers from science are not always enough or when questions remain unanswered, people, either a group or one individual, can come up with their own version of events. This is where conspiracies can arise. Alien abductions, faked moon landings and Planet X are some of the most popular astronomy conspiracies.

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Though the talk we will be looking at the history of the Planet X theory and conspiracies, conclusions what science knows and what could be out in the Kuiper belt.

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## 2016 — 2017 SUBSCRIPTIONS DUE

The new subscription year began in September, so WAS looks forward to receiving your subscription renewal.

Renewal forms can be found on the website, but a summary follows:

### Subscription for Newsletter by Email 2016-2017

Adult/Waged: \$ 50.00

Student/Unwaged: \$ 30.00

Family: \$ 70.00

### Payment methods:

Cheque - make out to Wellington Astronomical Society Inc, and mail to PO

Box 3181, Wellington 6140

Direct Deposit or Internet Banking - use Acc No: 03-0502-0508656-00, please include reference so WAS knows who is making the payment

Cash - please bring exact amount to meeting

**It appears that quite a few members from last year have not yet renewed their subscriptions. If this is an oversight, can you please remedy it as soon as possible.**

## WAS COUNCIL MEMBERS AND CONTACTS

### Council Members

The following members were elected to Council at the Nov 2016 AGM

**President:** Antony Gomez  
[president@was.org.nz](mailto:president@was.org.nz) / 021\_253\_4979

**Vice President:** Duncan Hall  
[vice-president@was.org.nz](mailto:vice-president@was.org.nz)

**Secretary/Telescope custodian:** Chris Monigatti  
[secretary@was.org.nz](mailto:secretary@was.org.nz) / 021\_890\_222

**Treasurer:** John Homes

**Newsletter Editor:** Gerard Coyle  
[editor@was.org.nz](mailto:editor@was.org.nz)

**Membership Secretary:** Janine Bidmead  
[membership@was.org.nz](mailto:membership@was.org.nz)

**Website :** Peter Woods  
[webmaster@was.org.nz](mailto:webmaster@was.org.nz)

### Council

Andrew Fuller

Edward Wilcock

Frank Andrews

Janine Bidmead

Murray Forbes

Peter Woods

Sarah Taylor

**Postal Address:** Wellington Astronomical Society, PO Box 3181, Wellington 6140, New Zealand

## WAS ON FACEBOOK

Our Facebook page "Wellington Astronomical Society" is now operational. You can search for it on Facebook or click on this link <https://www.facebook.com/WellingtonAstronomicalSociety/>.

If you are a Facebook user, please use the page to receive up-to-date notifications of our Society's events and news. This is the easiest way to keep informed as to what is going on in the Society, as well as keeping up with astronomical news.

Remember you will need to interact occasionally with the page by liking or commenting on postings, or indicating whether you are coming to an event. Otherwise Facebook will, after a time, stop sending you new postings. So keep visiting the page as there are a number of Society events coming up in the next few months.

We also have Facebook group "WAS – Wellington Astronomical Society" <https://www.facebook.com/groups/96304353012/> which is open for

anyone to join by request. The public group is open for discussion or postings on astronomical news. The WAS Astrophotography Group <https://www.facebook.com/groups/1684738758511214/> is for those interested in astrophotography. It serves as a place to notify others of astrophotography gatherings at short notice and to display images captured by members.



This year we are organising a Midwinter dinner and we'd love for you to join us! Our chef will be cooking up a fabulous 2-course meal for you to enjoy with our like-minded awesome star-hugging community.

### MENU

#### First course

Egg and cheese frittata.

Roast chicken stuffed with grapes and herbs.

Spice-crusted roast beef with red wine gravy.

Yorkshire pudding

Roast potatoes

Blanched green vegetables

#### Second course

Custard trifle

Fruit salad

Cheese platter with dried fruit and crackers

BYO drinks. Water and juice will be available.

If you live in a certain area and would like to carpool/share a taxi to reduce travel costs, please email [membership@was.org.nz](mailto:membership@was.org.nz). Contacting us before the next WAS meeting will make it much easier for us to co-ordinate this.

If you have any questions at all, please don't hesitate to contact Janine at

[membership@was.org.nz](mailto:membership@was.org.nz).

We look forward to seeing you there!

To book please go our [website link](#), complete the form and make the payment of \$25 pp for members or \$30 pp for non-members into bank account 03-0502-0508656-00 (please put your name as a reference).

If you have any dietary requirements please record it under Additional Information on the form.

Bookings are limited and must be received by Wed 12 July 2017.

# Wellington Astronomical Society July 2017 Events

## WAS July Meeting

As humans, we don't like not knowing the reasons or causes of natural events. Our ancestors came up with amazing stories of a range of gods, to demigods, even to leopards in the Sun to explain natural events such as Earthquakes, Volcanoes, Lightening, etc.

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**Date:** Wednesday 5th July

**Time:** 7:30pm,

**Venue:** Space Place at Carter Observatory

## Society Observing Evenings

This month we have two for the price of one: one evening on Saturday July 1st and another on July 29th.

See many wonderful objects, star clusters, galaxies, dying stars and nebulae. We will be focusing on objects around the galactic centre like the Lagoon, Trifid, Swan and Eagle nebulae. Both Jupiter and Saturn will be visible from early evening.

We are keen to train up more people to use the Dobsonian telescopes and also to learn how to star-hop through the night sky to find astronomical objects.

Give Chris Monigatti a ring on 021\_890222 to check on conditions. Chris is often there on Friday evenings too so feel free to come along then as well.

**Dates:** Saturday 1st July and 29th July

**Time:** 7:00pm,

**Venue:** Tawa College

## WAS Midwinter Dinner

See Page 3 for the details.

## WAS Astrophotography group / Dark Sky Observing

We are hoping to get special access this site again both for astrophotography and dark sky observing. Please be at the gates by 7:15pm. The gates will be opened for cars to drive in and closed again at 7:30pm. There won't be anyone there to let you in if you

are late. Any updates will be posted on the [WAS Astrophotography Group](#) Facebook page closer to the time. For further details or cancellations contact Edward 021\_08304802 or Chris 021\_890222.

**Date:** Saturday 22nd July

**Time:** 7:30pm,

**Venue:** Brooklyn Hill Turbine

# WAS June Meeting Talk “Is the Universe a Hologram?” by Antony Gomez

The June meeting talk was given by Antony Gomez on the theory that our universe is a type of hologram

He began his talk by raising the question of how do we know that what we see is reality? For example, the temperature of an object may seem to be an inherent property of the object, but it is actually composed of the independent motions of the individual particles the object is made up from, all moving in different directions and velocities.

He then covered the two main theories of reality: General Relativity and Quantum Theory. Both of these have been successfully tested by experiment, and so far, they are both the best explanations for the observed results. Unfortunately, General Relativity treats space as curved, while Quantum Theory treats it as flat. The two theories are therefore incompatible with one another.

Antony briefly went through various attempts that have been made to reconcile the two (e.g. String theory, Quantum Loop Gravity) before getting on to his main topic. Basically, it may be possible to combine the General

Relativity with Quantum Mechanics, if we assume that the universe resembles a hologram.

A hologram is a 3-D image produced by light shining through an interference pattern on a flat piece of film. If we treat the 2-D boundary to the universe as similar to film used to produce a hologram, it is possible to model the behaviour that we see in our 3-D universe as the result of patterns and distortions of the 2-D boundary.

This may seem a little far-fetched, but this idea is similar to the latest theories about black holes. One of the major problems with black hole theory is what happens to the information associated with the objects that fall into it.

To summarise, it is impossible to deduce anything from the properties of the black hole about the objects that have previously fallen into it. This in turn would indicate that any information associated with an object is destroyed when the object falls into a black hole. The problem with this is that according to latest theory, it is not possible for information to be destroyed in this way.

To get around this, the latest theories

assume that the “missing” information is stored at the event horizon of the black hole (i.e. the surface of the black hole). The information therefore does not leave our universe by falling into the black hole, and is not destroyed. In addition, although nothing can ever leave a black hole, there is nothing to rule out the information stored in the event horizon having an effect on the interior of the black hole (although we would never be able to know what the results of the effects would be).

There is an obvious analogy between the above and the theory that our entire 3-D universe is a hologram created from its 2-D boundary. The question at the moment is how to obtain evidence that would either validate or disprove the theory.

Finally, Antony concluded his talk with the observation that if the hologram theory is true, it is possible that our 3-D universe itself is responsible for producing a hologrammatic universe in a higher dimension.

*Gerard Coyle*

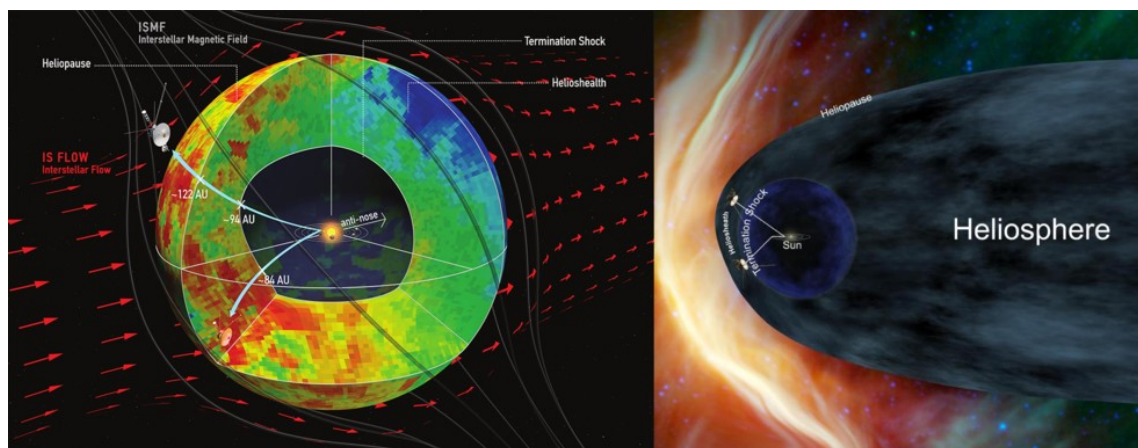
# The Shape of the Solar System



This article is provided by **NASA Space Place**.

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.

Visit **spaceplace.nasa.gov** to explore space and Earth science!



New data from NASA's Cassini and Voyager show that the heliosphere — the bubble of the sun's magnetic influence that surrounds the solar system — may be much more compact and rounded than previously thought. The image on the left shows a compact model of the heliosphere, supported by this latest data, while the image on the right shows an alternate model with an extended tail. The main difference is the new model's lack of a trailing, comet-like tail on one side of the heliosphere. This tail is shown in the old model in light blue. Image credits: Dialynas, et al. (left); NASA (right)

When Stamatis (Tom) Krimigis was selected for the Voyager mission in 1971, he became the team's youngest principal investigator of an instrument, responsible for the Low Energy Charged Particles (LECP) instrument. It would measure the ions coursing around and between the planets, as well as those beyond. Little did he know, though, that more than 40 years later, both Voyager 1 and 2 still would be speeding through space, continuing to literally reshape our view of the solar system.

The solar system is enclosed in a vast bubble, carved out by the solar wind blowing against the gas of the interstellar medium. For more than half a century, scientists thought that as the sun moved through the galaxy, the inter-

stellar medium would push back on the heliosphere, elongating the bubble and giving it a pointy, comet-like tail similar to the magnetospheres—bubbles formed by magnetic fields—surrounding Earth and most of the other planets

"We in the heliophysics community have lived with this picture for 55 years," said Krimigis, of The Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland. "And we did that because we didn't have any data. It was all theory."

But now, he and his colleagues have the data. New measurements from Voyager and the Cassini spacecraft suggest that the bubble isn't pointy after all. It's spherical.

Their analysis relies on measuring high-

speed particles from the heliosphere boundary. There, the heated ions from the solar wind can strike neutral atoms coming from the interstellar medium and snatch away an electron. Those ions become neutral atoms, and ricochet back toward the sun and the planets, uninhibited by the interplanetary magnetic field.

Voyager is now at the edge of the heliosphere, where its LECP instrument can detect those solar-wind ions. The researchers found that the number of measured ions rise and fall with increased and decreased solar activity, matching the 11-year solar cycle, showing that the particles are indeed originating from the sun.

If the heliosphere were comet-shaped, atoms from the tail would take longer

It's a discovery more than four decades in the making. As Cassini ends its mission this year, the Voyager spacecraft will continue blazing through interstellar space, their remarkable longevity

Marcus Woo

Want to teach kids about exoplanets? Go to the NASA Space Place and see our video called, “Searching for other planets like ours”: <https://spaceplace.nasa.gov/exoplanet-snap/>

## Total Lunar Occultations

There are only two other worthwhile lunar occultations during July, both on the same night:

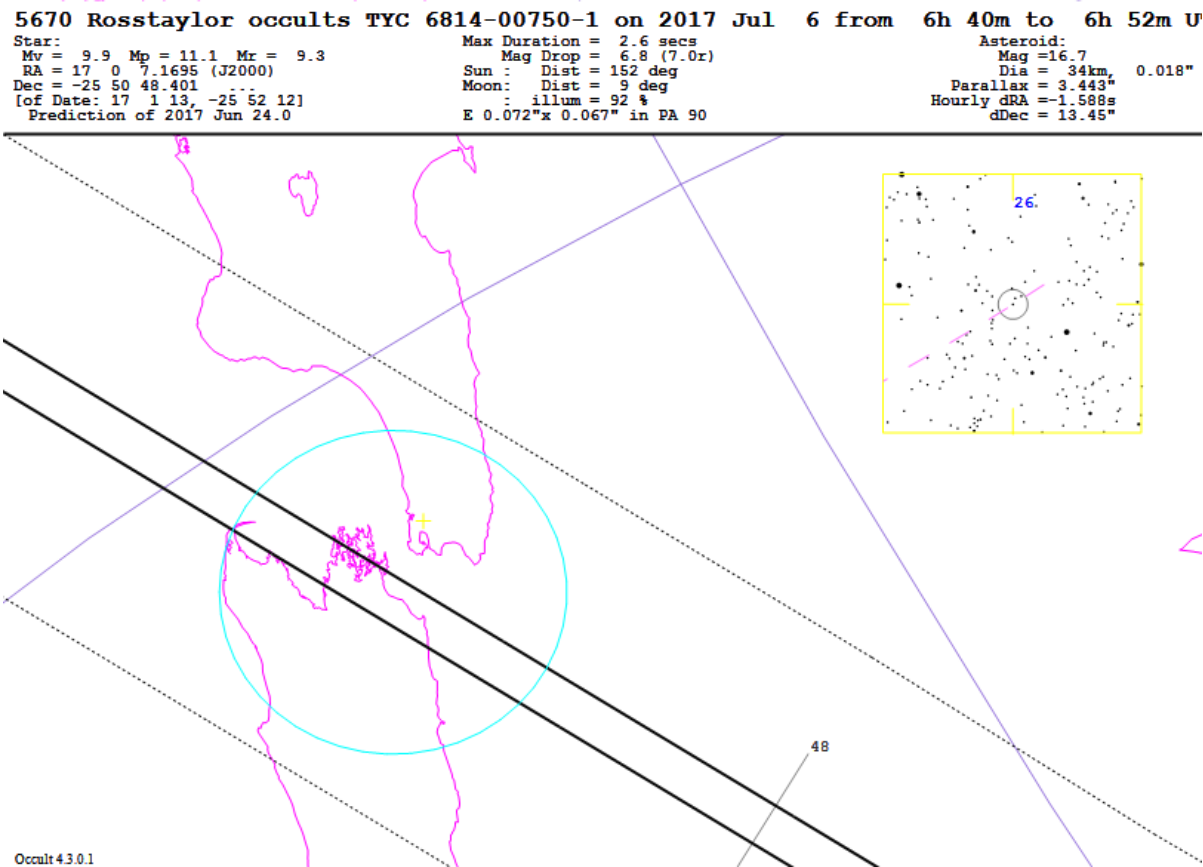
- The first event for the month is on Monday 31 July at 07:08pm. The star (and moon) are at a reasonable altitude ( $60^\circ$ ), so there should be any problems seeing it even if you live in a valley. The moon is only half illuminated (56%) and the star disappears behind it well away from the terminator, so there should be any problems with glare from the moon. The star is a suspected double, so your observation could be the one that proves it is a double.
- The next event is about twenty minutes later on the same night. It is a triple star but the B & C components are at least 4 magnitudes fainter than the A component – this is larger than the dynamic range of most video cameras so I doubt you'll be able to see any of the fainter components unless you saturate your image of the brighter component.

day			Time			P	Star		Sp	Mag	Mag		%	Elon	Sun	Moon	
y	m	d	h	m	s		No	D		v	r	V	ill		Alt	Alt	Az
17	Jul	13	19	24	33.5	r	Nept			7.8	7.8		80-	127	-4	33	291
17	Jul	31	07	08	00.1	D	2137	c	A1	6.6	6.6		56+	097		60	348
Double: ** 7.2 7.2 0.050" 350.0, dT = -0.11sec : ZC2137 = 17 Librae																	
17	Jul	31	07	32	50.9	D	2141	M	K3	5.9	5.2		56+	097		58	336
Triple AB 6.0 9.8 19.9" 038.9, dT = +19sec :																	
AC 6.0 11.4 175" 42.3, dT = +194sec ZC2137 = 18 Librae																	

# Minor Planet Occultations

The first minor planet occultation for July is on Thursday 6th at 06:48:24UT – a very civilised hour in the evening nearly two hours after sunset. At magnitude 9.9, it should be easy to record through an 8” telescope. As the minor planet is fairly small (approximately 34 km diameter), the event will be quite short (at most 2.6 seconds). The difficulty will be with the moon – it is nearly full (92% illuminated) and close to the star (9° away). Fortunately there are several bright pre-point stars that can be used between sunset and the time of the occultation.

Point			J2000		Dec	
Time	Star	RA	Dec	Offset	SAO	
h m s	mag	h m	o ' "	ArcMin		
06 17 46	1.1	16 29.4	-26 26	35.9	184415	
06 09 34	2.9	16 21.2	-25 36	-14.3	184336	
05 51 46	5.0	16 03.3	-25 52	2.4	184068	
05 47 17	2.9	15 58.9	-26 07	17.5	183987	
05 39 26	4.6	15 51.0	-25 45	-4.1	183854	

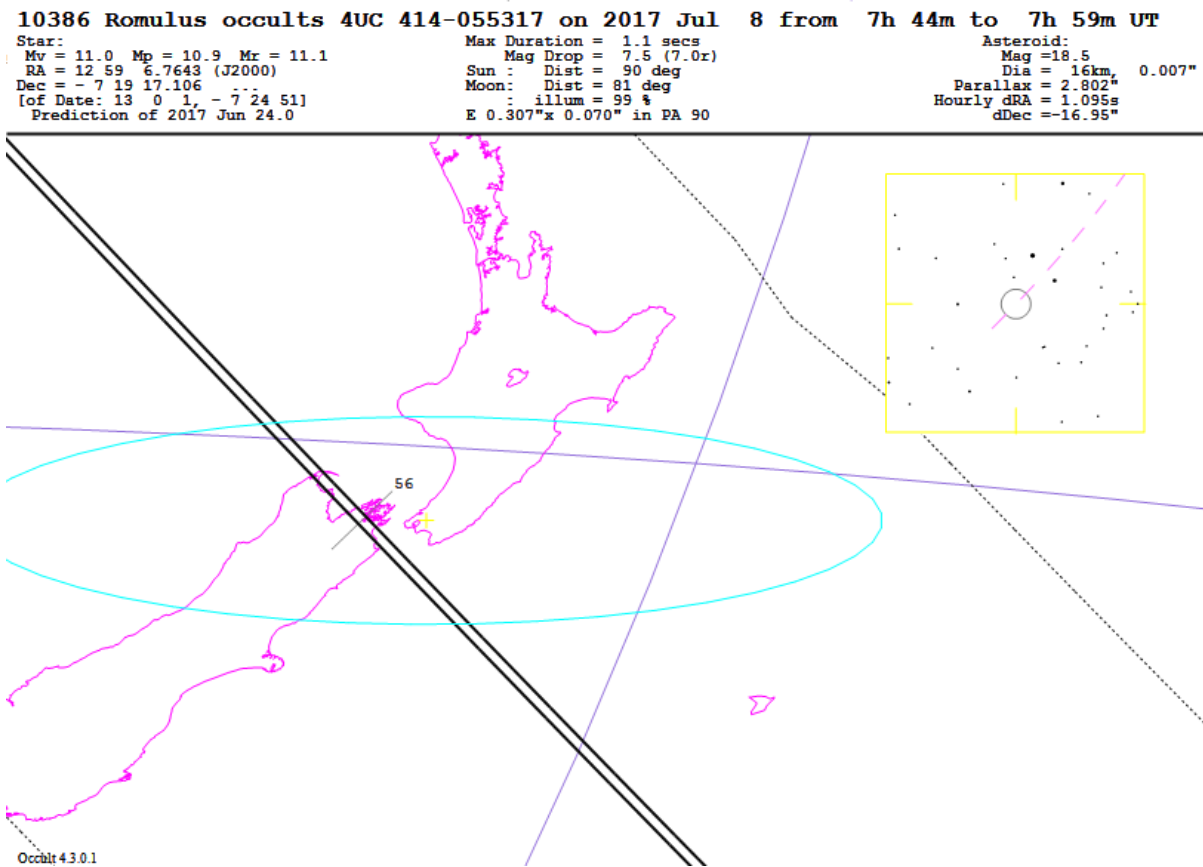


The next occultation is a few days later, on Saturday 8th at 07:56:06 UT. The moon is now full (99% illuminated) but is further away this time (81°). There is a very large uncertainty in the prediction, which appears to be due to uncertainty about the star's position (various star catalogues give considerably different coordinates) – so a positive observation of this event would dramatically improve our knowledge of the star's coordinates. None of the pre-point stars that evening are very bright, and the earliest bright pre-point star the previous evening is not until 13:35 UT.

Point			J2000				Dec	
Time			Star	RA	Dec	Offset	SAO	
h	m	s	mag	h	m	o	'	ArcMin
07	20	14	7.0	12	23.2	-	7 18	-1.2 138747
06	46	21	7.0	11	49.2	-	7 22	2.5 138424
06	07	29	6.8	11	10.2	-	7 23	4.1
05	08	42	6.2	10	11.3	-	7 19	-0.7 137400

Previous evening;

18	34	42	6.4	23	35.5	-	7 28	-2.9 146795
17	51	55	3.7	22	52.6	-	7 35	4.2 146362
17	25	57	6.9	22	26.6	-	7 23	-7.7 146087
17	08	55	6.5	22	9.5	-	7 33	2.8
15	15	14	6.9	20	15.5	-	7 32	3.7 144221
15	03	49	6.7	20	4.0	-	7 28	0.2 144038
14	40	36	7.0	19	40.8	-	7 31	3.3 143674
14	35	22	6.3	19	35.5	-	7 28	0.3 143564
14	22	59	6.3	19	23.1	-	7 24	-3.0 143340
14	10	58	6.7	19	11.0	-	7 26	-1.1 143106
13	42	19	6.9	18	42.3	-	7 20	-5.8 142518
13	35	15	3.9	18	35.2	-	8 15	48.8
11	00	09	6.6	15	59.7	-	7 18	-3.9 140882



The third planet occultation for July is on Friday 14<sup>th</sup> at 16:01:54 UT (4:02am Saturday morning). The star is quite faint (magnitude 11.1) and so will require an 8" telescope with an integrating video camera, or a larger telescope for a non-integrating camera. It is at a convenient altitude (41°) above the horizon and the 72% illuminated moon is 61° away. Although the minor planet is quite small (estimated as 15 km diameter), the maximum duration of the occultation is fairly long (2.3 seconds). There is a good number of possible pre-point stars - I plan to use the 07:09 UT star at the beginning of the evening and then sleep until just before the event time.

Point			J2000		Dec	
Time	Star	RA	Dec	Offset	SAO	
h m s	mag	h m	o '	ArcMin		
15 58 47	5.3	19 40.7	-16 18	0.0	162883	
15 25 02	6.0	19 6.9	-16 14	-3.1	162201	
15 13 43	5.6	18 55.5	-16 23	6.1	161984	
13 56 00	3.5	17 37.6	-15 24	-50.7	160700	
13 36 47	6.3	17 18.3	-16 19	4.6	160440	
13 28 52	2.4	17 10.4	-15 43	-30.4	160332	
11 30 37	6.7	15 11.8	-16 10	-1.6	159085	
11 25 25	5.2	15 6.6	-16 15	4.3	159028	
11 09 43	2.8	14 50.9	-16 3	-8.3	158840	

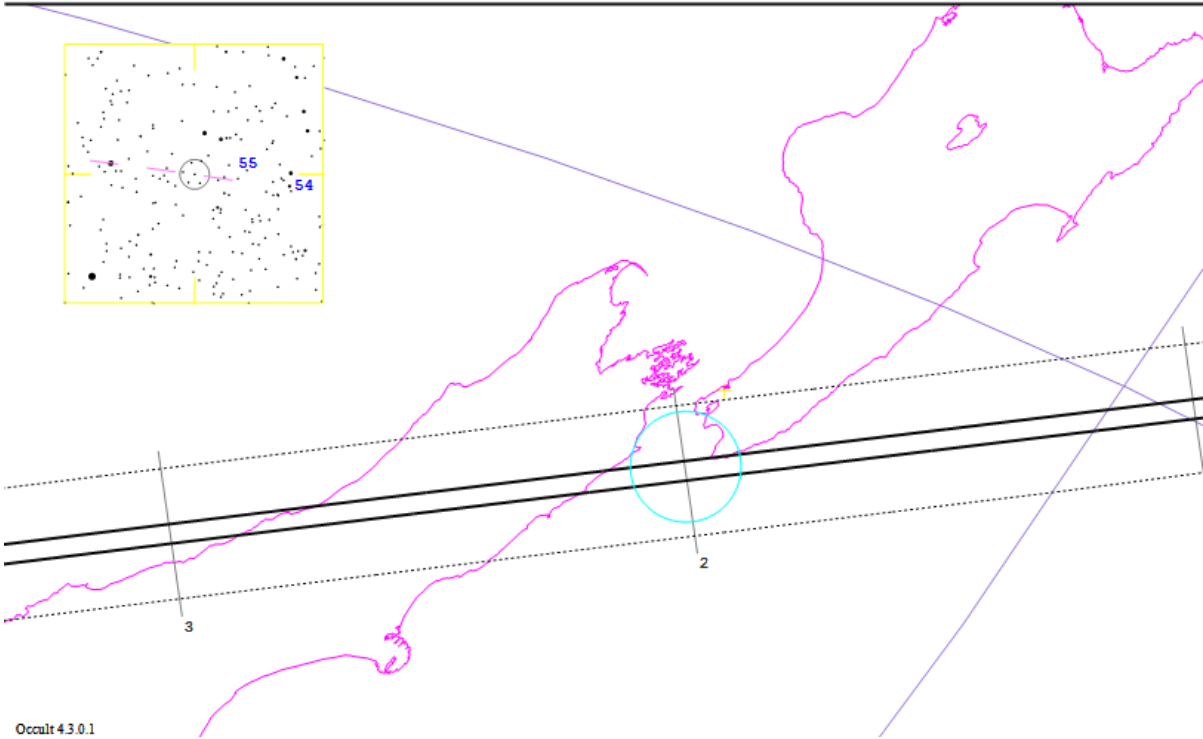
Point			J2000			Dec	
Time	Star		RA		Dec	Offset	SAO
h m s	mag		h m		o ' "	ArcMin	
10 42 51	6.7		14 24.0		-16 6	-4.3	158539
10 29 46	4.9		14 10.8		-16 18	7.9	158401
10 03 29	5.6		13 44.5		-16 11	0.9	158131
09 31 07	5.0		13 12.1		-16 12	2.4	
08 51 13	4.3		12 32.1		-16 12	2.4	
08 49 01	2.9		12 29.9		-16 31	21.6	
07 53 21	7.0		11 34.1		-16 3	-6.5	156754

2276 Warck occults TYC 6299-1100-1 on 2017 Jul 14 from 15h 57m to 16h 23m UT

Star:  
Mv = 11.1 Mp = 11.1 Mr = 11.1  
RA = 19 43 50.6244 (J2000)  
Dec = -16 17 42.192  
[of Date: 19 44 51, -16 14 59]  
Prediction of 2017 Jun 6.0

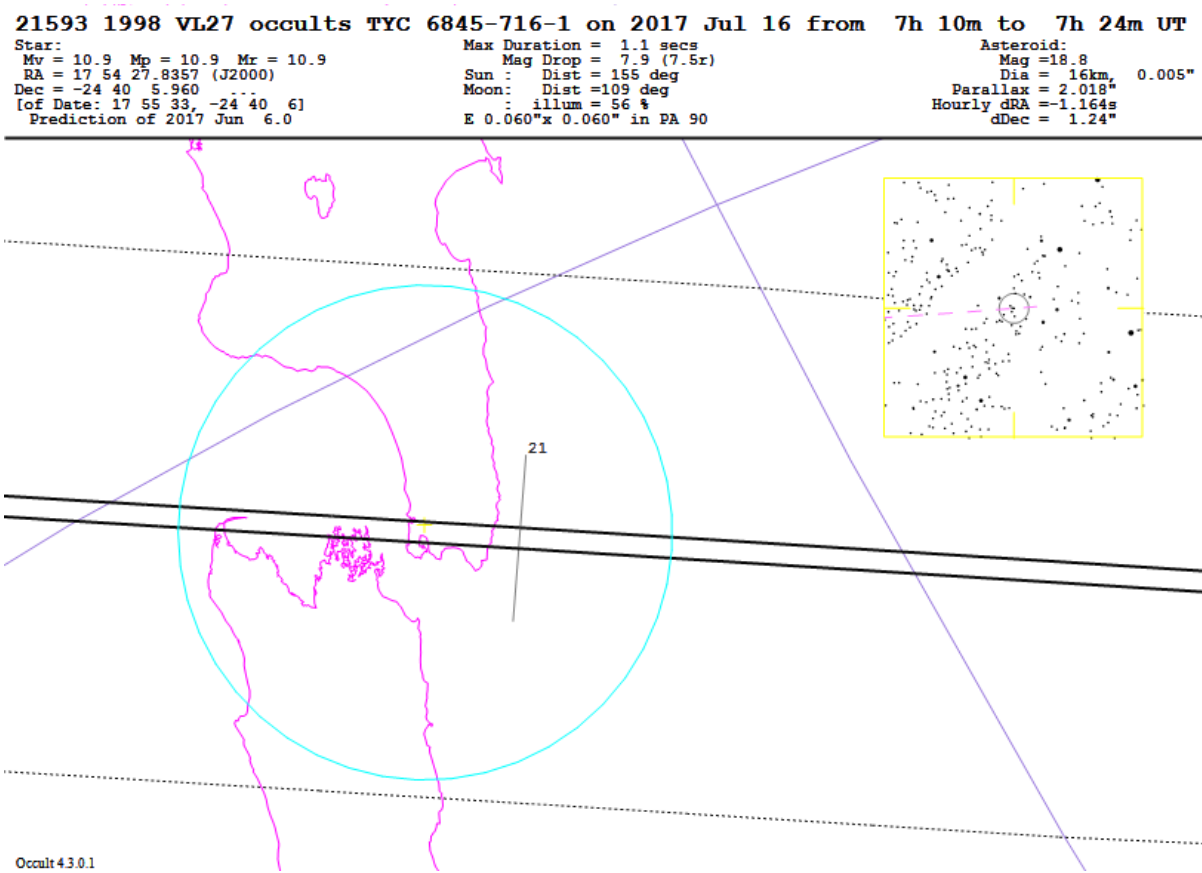
Max Duration = 2.3 secs  
Mag Drop = 3.5 (3.1r)  
Sun : Dist = 174 deg  
Moon: Dist = 61 deg  
: illum = 72 %  
E 0.060"x 0.060" in PA 90

Asteroid:  
Mag =14.6  
Dia = 15km, 0.021"  
Parallax = 9.001"  
Hourly dRA =-2.303s  
dDec = -4.80"



There is another occultation on Sunday 16<sup>th</sup> at 07:21:06 UT. The shadow is predicted to pass over the Hutt Valley, but the uncertainty of the prediction is so large that any WAS observer could see it from their home observatory. Fortunately there are two bright pre-point stars between sunset and the time of the occultation;

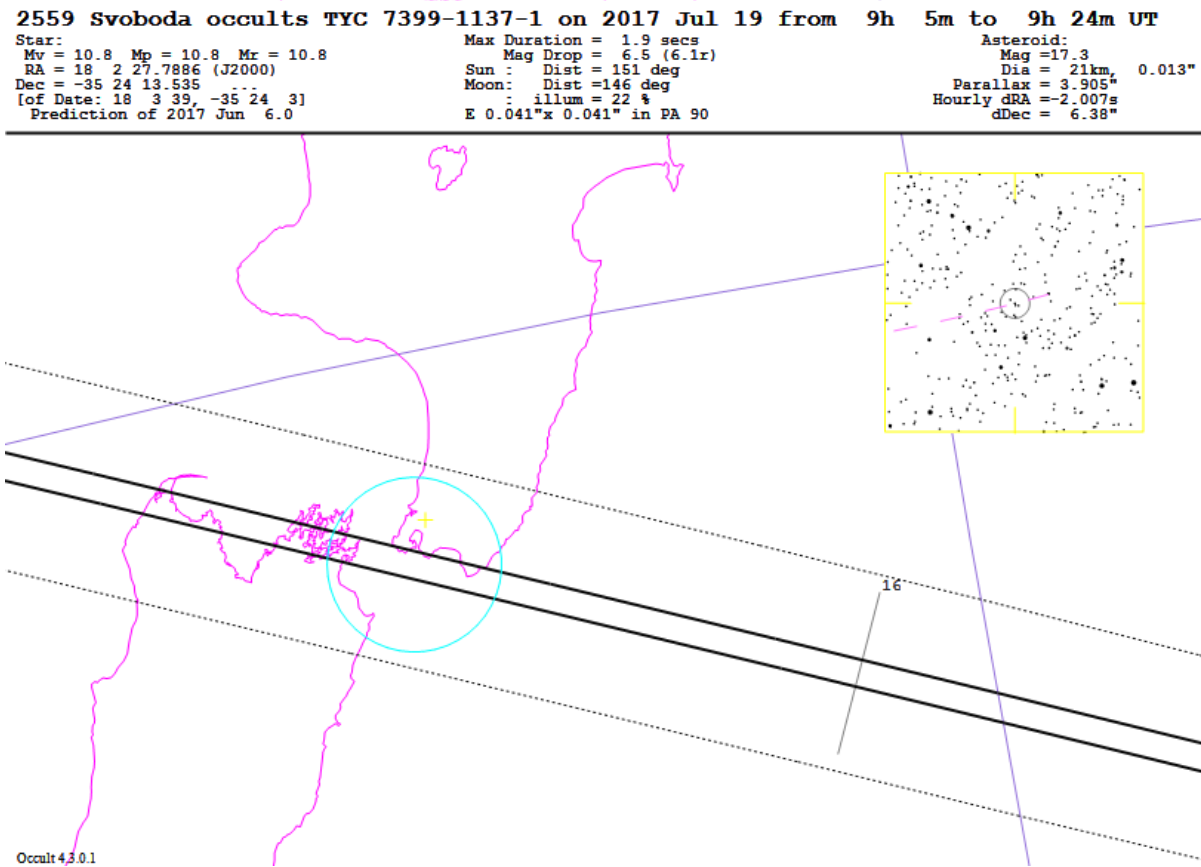
Point			J2000		Dec		
Time	Star	RA	Dec	Offset	SAO		
h m s	mag	h m	o '	ArcMin			
06 48 44	3.3	17 22.0	-25 0	20.7	185320		
06 16 33	6.7	16 49.7	-24 38	0.0	184683		
05 48 04	2.9	16 21.2	-25 36	57.8	184336		
05 37 04	6.6	16 10.2	-24 35	-2.6	184182		
05 30 50	6.2	16 03.9	-24 44	6.2	184075		



Occult 43.0.1

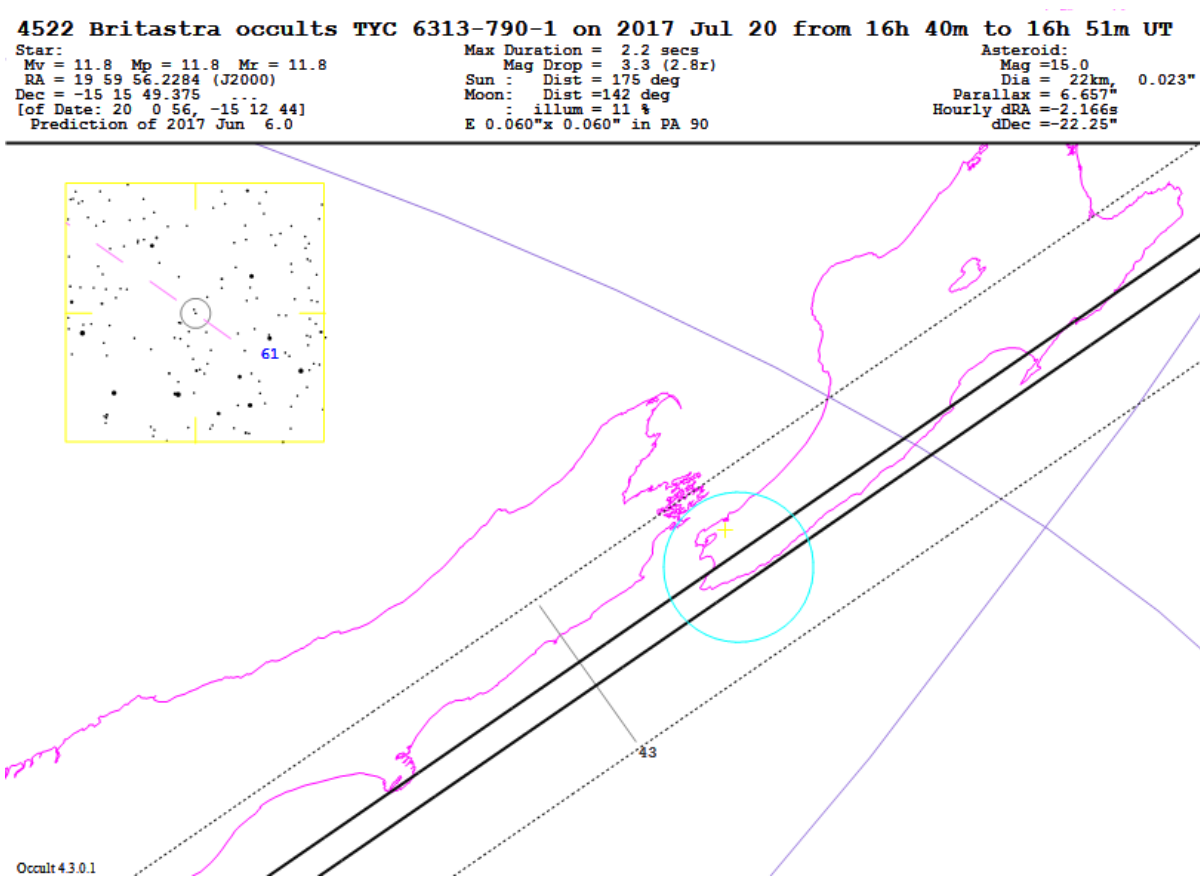
The penultimate occultation for the month is on Wednesday 19<sup>th</sup> at 09:16:30 UT. This is another faint star (magnitude 10.8) and short event (the maximum duration is 1.9 seconds). Fortunately the moon is not very bright (only 22% illuminated) and is some distance away (146°). There are two bright pre-point stars (SAO 207814 & 206552) before the event;

Point			J2000			Dec	
Time	Star		RA	Dec	Offset	SAO	
h m s	mag		h m	o '	ArcMin		
08 57 31	6.9		17 43.4	-35 18	-5.9	209180	
08 20 39	6.2		17 6.5	-35 27	4.3	208410	
07 50 38	4.2		16 36.4	-35 15	-6.7	207814	
07 33 35	6.6		16 19.3	-35 29	7.8	207551	
06 36 14	3.6		15 21.8	-36 16	55.3	206552	
06 12 01	7.0		14 57.6	-35 23	3.1	206128	
05 52 55	6.8		14 38.4	-35 17	-3.0	205789	
05 42 02	6.9		14 27.5	-35 27	7.4	205574	



The last event for July is on Thursday 20<sup>th</sup> at 16:42:48 UT (4:42 am Friday morning). Although the shadow's path is predicted to miss Wellington, a small shift to the west would mean it runs the length of the South and North Islands. At magnitude 11.7, you will need to use an integrating camera to see the star with an 8" telescope. This (the integration time) has to be balanced against the short duration of the occultation (at most 2.2 seconds). My plan is to use the pre-point star at 08:03 UT then get some sleep until just before the event time;

Point			J2000				Dec		SAO
Time			Star	RA		Dec		Offset	
h	m	s	mag	h	m	o	'	ArcMin	
16	22	48	6.7	19	39.9	-15	10	-5.3	162862
15	44	35	6.3	19	1.6	-15	17	2.5	162097
15	04	11	6.9	18	21.0	-15	14	0.4	161370
14	20	51	3.5	17	37.6	-15	24	11.6	160700
13	59	35	6.5	17	16.3	-15	13	1.6	160413
13	53	43	2.4	17	10.4	-15	43	31.9	160332
12	26	58	6.3	15	43.4	-15	03	-7.0	159461
12	19	06	3.9	15	35.5	-14	47	-22.1	159370
12	06	38	6.5	15	23.0	-15	08	-1.1	159212
11	34	34	2.8	14	50.9	-16	03	53.9	158840
09	33	45	7.0	12	49.8	-15	05	-2.4	157536
08	27	38	6.9	11	43.5	-15	03	-4.5	156853
08	03	31	3.6	11	19.3	-14	47	-20.4	
07	31	58	7.0	10	47.7	-15	07	-0.7	156238
06	06	59	6.7	09	22.5	-15	14	5.8	155130
05	59	53	6.3	09	15.4	-15	01	-7.0	155032



The final occultation in this newsletter is actually in August, but occurs before our August meeting so I’ve included it here. It takes place on Tuesday 1<sup>st</sup> August at 06:26:24 UT, which is just after twilight. There is only one pre-point star that even- ing, which is not very bright. Nor are any of the pre-point stars for the previous evening very bright but at least then you won’t be rushing to beat the clock before the occultation;

Point			J2000		Dec		
Time	Star	RA	Dec	Offset	SAO		
h m s	mag	h m	o ' "	ArcMin			
06 07 12	5.9	19 52.2	-19 3	-4.9	163060		
Previous evening;							
18 40 47	6.9	08 24.1	-19 8	6.8	154213		
18 12 12	6.8	07 55.5	-19 3	0.8	153591		
17 41 38	6.2	07 24.8	-19 1	-2.0	152837		
17 39 01	4.9	07 22.2	-19 1	-1.8	152776		
17 10 14	6.1	06 53.4	-18 56	-7.5	152056		
17 10 11	5.7	06 53.3	-19 2	-1.5	152055		
16 53 36	4.0	06 36.7	-19 15	11.4	151702		

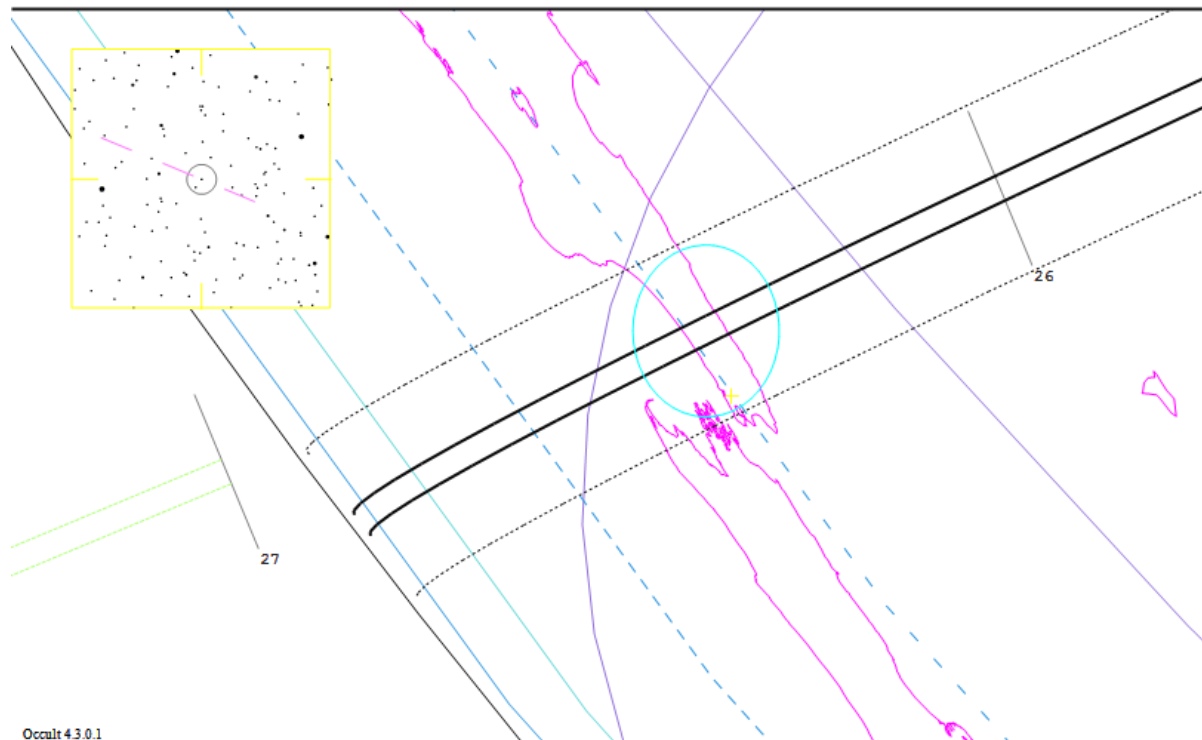
Point			J2000			Dec	
Time	Star		RA	Dec	Offset	SAO	
h m s	mag		h m	o '	ArcMin		
16 34 42	6.7		06 17.7	-19 11	6.9	151323	
16 24 41	5.3		06 7.7	-19 10	5.3	151142	
12 24 35	6.4		02 6.9	-19 8	-1.5	148210	
11 40 22	6.4		01 22.5	-19 5	-5.5	147767	
10 35 37	6.5		00 17.5	-19 3	-7.7	147205	
09 12 27	6.4		22 54.1	-19 11	0.0	165365	
07 48 37	6.6		21 30.0	-19 9	-0.7	164433	
07 26 12	6.7		21 7.5	-19 5	-3.9	164152	
07 21 28	7.0		21 2.8	-19 15	5.8	164087	
07 18 19	6.3		20 59.6	-19 2	-6.9	164043	
07 12 17	6.8		20 53.5	-19 7	-2.1	163954	
07 06 59	6.8		20 48.2	-19 16	6.8	163887	
06 38 14	5.3		20 19.4	-19 7	-1.1	163445	

**1104 Syringa occults TYC 6323-00891-1 on 2017 Aug 1 from 6h 9m to 6h 27m UT**

Star:  
 Mv = 10.5 Mp = 13.3 Mr = 9.0  
 RA = 20 11 27.6801 (J2000)  
 Dec = -19 8 3.929  
 [of Date: 20 12 29, -19 4 43]  
 Prediction of 2017 Jun 24.0

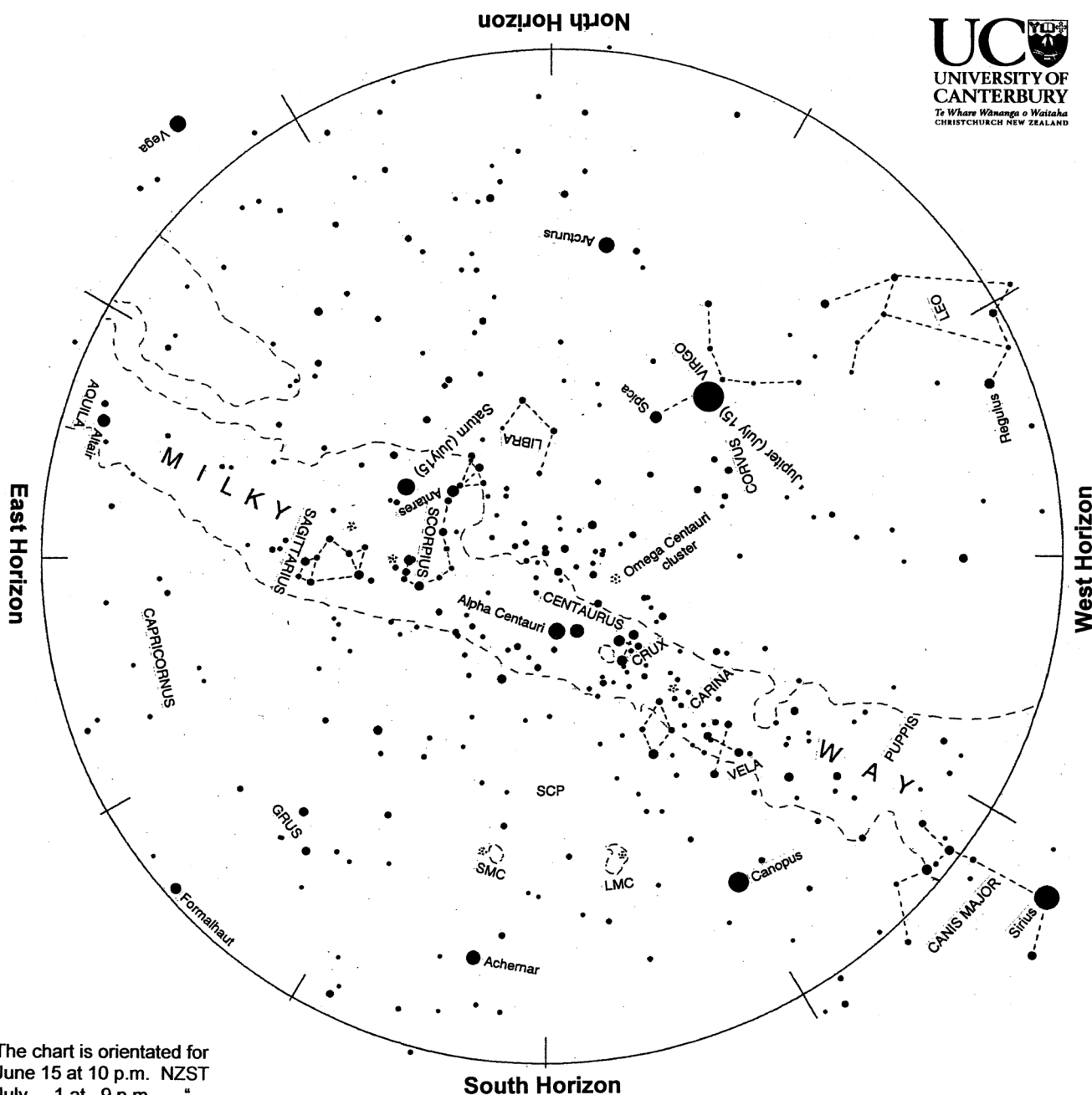
Max Duration = 1.7 secs  
 Mag Drop = 5.0 (6.1r)  
 Sun : Dist = 172 deg  
 Moon: Dist = 64 deg  
 : illum = 65 %  
 E 0.052"x 0.061" in PA 90

Asteroid:  
 Mag = 15.5  
 Dia = 20km, 0.019"  
 Parallax = 5.906"  
 Hourly dRA = -2.509s  
 dDec = -14.82"



Occult 4.3.0.1

Murray Forbes



The chart is orientated for  
June 15 at 10 p.m. NZST  
July 1 at 9 p.m. "  
July 15 at 8 p.m. "  
Aug. 1 at 7 p.m. "

### Evening sky in July 2017

To use the chart, hold it up to the sky. Turn the chart so the direction you are looking is at the bottom of the chart. If you are looking to the south then have 'South horizon' at the lower edge. As the earth turns the sky appears to rotate clockwise around the south celestial pole (SCP on the chart). Stars rise in the east and set in the west, just like the sun. The sky makes a small extra clockwise rotation each night as we orbit the sun.

Golden Jupiter is the 'evening star', appearing in the northwest soon after sunset and setting around midnight. Saturn is northeast of the zenith with orange Antares above it. Low in the north is orange Arcturus, the same brightness as Saturn. The Pointers and Crux, the Southern Cross, are south of the zenith. Sirius, the brightest true star, sets in the southwestern twilight, sparkling colourfully. Canopus, the second brightest star, is low in the southwest. It swings down to the southern horizon later. Vega rises in the northeast around 9 p.m.

# The Night Sky in July

Golden Jupiter is the bright 'evening star' appearing in the northwest sky soon after sunset. Above it is bluish Spica. Orange Arcturus is midway down the north sky. Cream-coloured Saturn is northeast of the zenith with orange Antares, somewhat fainter, above it. Sirius, the brightest star but fainter than Jupiter, sets in the southwest as twilight ends, twinkling like a diamond. Canopus, the second brightest star, is also in the southwest at dusk. It swings south later. South of the zenith are 'The Pointers', Beta and Alpha Centauri. They point to Crux the Southern Cross on their right. Vega rises in the northeast around 9 pm.

Mercury (not shown on the chart) begins an evening sky appearance early in the month, setting steadily later. In the first week of July it is in the northwest, setting an hour after the sun. By the end of the month it sets at 8 p.m. a little north of due west. Mercury, Regulus and the Moon will be close together on the 25th.

Any telescope will show the oval disk of Jupiter with its four 'Galilean' moons lined up on either side. Larger telescopes show dark stripes parallel to Jupiter's equator. These are caused by temperature differences in the clouds. Jupiter is 820 million km from us mid-month. The Moon is near Jupiter on the 1st and the 29th. Jupiter sets around 1 a.m. at the beginning of the month, reducing to 11 p.m. by the end.

Saturn is always worth a look in any telescope. A small telescope shows Saturn's ring, now at its greatest tilt. Saturn's biggest moon Titan looks like a star about four ring-diameters from the planet. Larger telescopes show smaller moons as faint stars closer to the rings. Saturn is around 1370 million km away in July. It sets in the southwest near dawn. The Moon is near Saturn on the 7th.

Alpha Centauri is the third brightest star. It is also the closest of the naked eye stars, 4.3 light years\* away. Beta Centauri, like most of the stars in Crux, is a blue-giant star hundreds of light years away. Canopus swings down to the southern skyline before

midnight then moves into the southeast sky in the morning hours. It is a 'circumpolar star': it never sets. Crux and the Pointers are also circumpolar. Canopus is a truly bright star: 13 000 times the sun's brightness and 300 light years away.

Arcturus, in the north, is the fourth brightest star and the brightest in the northern hemisphere sky. It is 120 times the sun's brightness and 37 light years away. It twinkles red and green when setting in the northwest around midnight. It is an orange colour because it is cooler than the sun; around 4000°C.

East of the zenith is the orange star Antares, marking the body of the Scorpion. The Scorpion's tail, upside down, is stretched out to the right of Antares making the 'fish-hook of Maui' in Maori star lore. Antares is a red giant star: 600 light years away and 19 000 times brighter than the sun. Below Scorpius is 'the teapot' made by the brightest stars of Sagittarius. It is also upside down in our southern hemisphere view.

The Milky Way is brightest and broadest in the east toward Scorpius and Sagittarius. In a dark sky it can be traced up past the Pointers and Crux, fading toward Sirius. The Milky Way is our edgewise view of the galaxy, the pancake of billions of stars of which the sun is just one. The thick hub of the galaxy, 30 000 light years away, is in Sagittarius. The actual centre is hidden by dust clouds in space. A scan along the Milky Way with binoculars shows many clusters of stars and some glowing gas clouds.

The Large and Small Clouds of Magellan, LMC and SMC, look like two misty patches of light low in the southern sky. They are easily seen by eye on a dark moonless night. They are galaxies like our Milky Way, but much smaller. The Large Cloud is 160 000 light years away and 5% of the mass of the Milky Way. That is still many billions of stars. The Small Cloud is 200 000 light years and 3% of the Milky Way's mass.

Brilliant Venus rises in the northeast after 4 a.m. At the beginning of the

month it is above the Pleiades/Matariki star cluster with orange Aldebaran to the right of the cluster. The stars creep higher in the sky through the month while Venus sinks lower. It is between Matariki and Aldebaran around the 11th.

\*A light year (l.y.) is the distance that light travels in one year: nearly 10 million million km or 10<sup>13</sup> km. Sunlight takes eight minutes to get here; moonlight about one second. Sunlight reaches Neptune, the outermost major planet, in four hours. It takes four years to reach the nearest star, Alpha Centauri.

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