

The Wellington Astronomical Society Christmas Party will be held on Wednesday 7th of December 2016 from 6:30 to 9:30 pm at the Wellington Collegians Cricket Club, Anderson Park, Botanical Gardens, Wellington



NGC 2264 is often referred to as the Christmas Tree Cluster with the Cone Nebula visible at the top of the tree.

The designation refers to both objects which are located in the Monoceros constellation. The nebula lies some 2600 light-years away from Earth. Wishing you all a Merry Christmas and a Happy New Year!

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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

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 / 021_253_4979)

Vice President: Duncan Hall (vice-president@was.org.nz)

Secretary/Telescope custodian: Chris Monigatti (secretary@was.org.nz / 021_890_222)

Treasurer: John Homes

Newsletter Editor: Gerard Coyle (editor@was.org.nz)

Membership Secretary: Janine Bidmead (membership@was.org.nz)

Website : John Homes & Peter Woods (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.



Join us for the
Wellington Astronomical Society
2016 Christmas Party

Wednesday 7 December
6:30pm - 9:30pm
Wellington Collegians Cricket Club, Anderson Park, Botanical Gardens

B.Y.O.T. (Bring Your Own Telescope - if you have one)
B.Y.O.B. (Bring Your Own Booze)
B.Y.O.D. (Bring Your Own Dish - potluck dinner)

We hope to see you there!

 **Wellington
Astronomical
Society**
www.waa.org.nz

President's Report - December 2016

Having completed my first year and re-elected for a second term as President of the Wellington Astronomical Society, I can confidently say that we as a Society achieved a number of the goals we set over a year ago. We are slowly improving our membership and bringing a younger generation into the Society. We have done most of this through our many public outreach events, involvement with other science and engineering groups, libraries and schools. We have attracted many new people to our meetings through our social media Facebook page and group where we have listed all our events and reported our activities including many photos and videos taken at these events.

The Council had a Strategic Planning meeting late in September where we talked about some actions we can take in next year or two. One thing we recognise is that the Society is about bringing people together who have common interests. If it was all just

learning more about astronomy then we all can do most of that using the internet. The Society is about getting to know one another, sharing our skills and experiences in astronomy with each other. With this in mind we are planning to have more social occasions such as star-parties and a solstice mid-winter dinner, and binocular and telescope training classes during our observing evenings.

We would like to introduce a kids programme as many parents at our outreach events have asked if we are doing anything for young children. We need the right kind of people and resources to achieve this. We will be working more collaboratively with other science and engineering groups like the highly successful Space and Science Fair held annually at Onslow College.

The Syd Cretney Bequest Committee is making good progress in developing the Gifford Observatory site as a test site for a remote access robotic obser-

vatory. We are hoping to have this operational by next October.

As we are now in December, 2016 is drawing close to an end. I would like take this opportunity to thank all of you that have come along and contributed to our Society even if it just to attend our monthly meetings. I wish you all a happy, relaxing, enjoyable festive season and a safe journey if you are traveling during the holidays. And if you want to start the new year with a bang, come along to the Central Star Party in the Hawkes Bay during Wellington Anniversary weekend where I plan to catch up with some warm sunny weather and clear night skies, observing through telescopes many of the wonderful objects visible at that time of the year.

Antony Gomez (WAS President)

Wellington Astronomical Society Financial Report

Members,

Any of you who looked carefully at the financial report published for the AGM may have noted that the accrual figures for 2015-16 appeared not to add up. As this was not queried at the meeting I presume no one did.

The issue is that one of the figures included in the total was hidden in the spreadsheet used to prepare the report, and so did not appear on the report. The hidden value is \$825.00, relating to the addition of new capital items to our inventory (and offsetting the payment made for purchase). Once this entry is included, the figures will be seen to be

correct.

I apologise for this, and will ensure it does not happen next year.

John Homes (WAS Treasurer)

New Life Member

At the last Wellington Astronomical Society Annual General Meeting on the 2nd November, Gordon Hudson was made a Life Member of the Society. We congratulate Gordon and thank him for his work, time and effort that he has put in our Society.

Gordon moved from Whangarei, where he was an active member of the Whangarei Astronomical Society, to Wellington in the 1980's. He became a member of Wellington Astronomical Society back then and would have been a member of WAS for 30 years or more.

Gordon has a large involvement with many amateur and professional astronomers up and down NZ, often helping with telescopes or equipment they would be using, as well as making his own astronomical measurements. He was part of an occultation group, which included the late Graham Blow, travelling up and down the country

making occultation measurements – he will have quite a few stories about these trips.

Gordon has been a president of WAS a number of times as well as being on Council for many years. He has also been president of RASNZ and on its Council too. His involvement in both organisations has stretched over the years.

His knowledge and expertise will be invaluable in the establishment of the WAS remote-access observatory as he has built his own one in his backyard.

Gordon was also instrumental in NZ's first attendance at an International Olympiad of Astronomy and Astrophysics in 2014. Four student members of WAS went to Greece to participate with Gordon escorting them. All in all it was a good experience for the students though I don't think Gordon was thrilled with them when they gave him the slip a couple of times.

Finally what stands out also is his passion for the History of Astronomy in NZ and lighthouses! He has researched records, collected photographs and built up considerable knowledge about the history of astronomy in NZ giving many presentations at meetings and conferences. He is presently working through the RASNZ library archives deciding what to keep and what to throw out, recording important events as he goes along. He is also very passionate for old telescopes and astronomical instruments often finding and repairing them, bringing them back to their former glory.

Gordon has made a huge contribution to astronomy in general in NZ and especially to the Wellington Astronomical Society.

Antony Gomez (WAS President)



Wellington Astronomical Society December 2016 to January 2017 Events

WAS Christmas Party

Stargazing, Astronomy Quiz, Partying

B.Y.O.D. (Bring Your Own Dish - potluck dinner)

Date: Wednesday 7th Dec

Time: 6:30pm

B.Y.O.T. (Bring Your Own Telescope - if you have one)

We hope to see you there!

Venue: Wellington Collegians Cricket Club, Anderson Park, Botanical Gardens.

B.Y.O.B. (Bring Your Own Booze)



Astronomy Club Night

End of year bbq and observing night.

Date: Thursday, 8th December

Time: 7:00pm

Venue: Hutt International Boys School

WAS Society Observing Evening

Come along and see the many wonderful objects, star clusters, galaxies, dying stars and nebulae as well as Venus, Mars and the Moon. As well as using the telescopes, we will begin our binocular viewing classes on how to

find many interesting objects in the night sky. Bring along your own pair of binoculars if you have them otherwise there will be some available to use.

Date: Saturday 10th December

Time: 8:30pm

Venue: Tawa College

WAS Astrophotography Group

We will update the WAS Astrophotography Group page for any upcoming events during December 2016 to January 2017.

For further details contact Edward 021_0830_4802 or Chris 021_890_222.

Central Star Party 2017

Central Star Party has been established to hold annual star parties in the central North Island for the benefit of the astronomical community of the North Island of New Zealand. The goal of the organisers is to provide a fun social astronomical gathering laced with talks and activities.

The second Central Star Party is Thursday 19th to Mon 23rd January 2017 and be held at the Tuki Tuki Camp site in the Hawkes Bay. This is the site of many previous star parties.

There is a brand new hall, with two additional meeting rooms for alternate meetings, a new kitchen and three new dormitories. Accommodation is tenting, staying in the dormitories or using one of the six powered caravan sites.

There is always a good contingent of WAS members who regularly attend this event in the Tuki tuki area every January. If anyone has any questions, needs transport or willing to offer others a ride please contact Antony 021_253_4979

For more details and registration see www.censtar.party.

Dates: Thursday 19th - Mon 23rd January

Venue: Tuki Tuki Christian Camp, 70 Moore Rd, Haumoana, Hawkes Bay.

Dimming stars, erupting plasma, and beautiful nebulae



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Boasting intricate patterns and translucent colors, planetary nebulae are among the most beautiful sights in the universe. How they got their shapes is complicated, but astronomers think they've solved part of the mystery—with giant blobs of plasma shooting through space at half a million miles per hour.

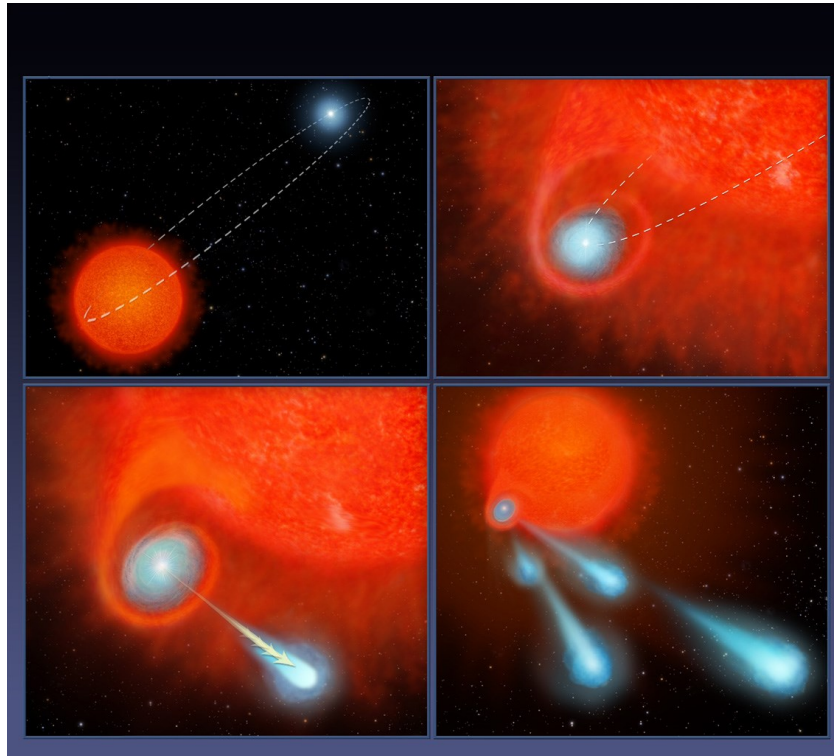
Planetary nebulae are shells of gas and dust blown off from a dying, giant star. Most nebulae aren't spherical, but can have multiple lobes extending from opposite sides—possibly generated by powerful jets erupting from the star.

Using the Hubble Space Telescope, astronomers discovered blobs of plasma that could form some of these lobes. "We're quite excited about this," says Raghvendra Sahai, an astronomer at NASA's Jet Propulsion Laboratory. "Nobody has really been able to come up with a good argument for why we have multipolar nebulae."

Sahai and his team discovered blobs launching from a red giant star 1,200 light years away, called V Hydrae. The plasma is 17,000 degrees Fahrenheit and spans 40 astronomical units—roughly the distance between the sun and Pluto. The blobs don't erupt con-

tinuously, but once every 8.5 years.

The launching pad of these blobs, the researchers propose, is a smaller, unseen star orbiting V Hydrae. The highly elliptical orbit brings the companion star through the outer layers of the red giant at closest approach. The companion's gravity pulls plasma from the red giant. The material settles into a disk as it spirals into the companion star, whose magnetic field channels the plasma out from its poles, hurling it into space. This happens once per orbit—every 8.5 years—at closest approach.



This four-panel graphic illustrates how the binary-star system V Hydrae is launching balls of plasma into space. Image credit: NASA/ESA/STScI

When the red giant exhausts its fuel, it will shrink and get very hot, producing ultraviolet radiation that will excite the shell of gas blown off from it in the past. This shell, with cavities carved in it by the cannonballs that continue to be launched every 8.5 years, will thus become visible as a beautiful bipolar or multipolar planetary nebula.

The astronomers also discovered that the companion's disk appears to wobble, flinging the cannonballs in one direction during one orbit, and a slightly different one in the next. As a result, every other orbit, the flying blobs block starlight from the red giant, which explains why V Hydrae dims every 17 years. For decades, amateur astronomers have been monitoring this variability, making V

Hydrae one of the most well-studied stars.

Because the star fires plasma in the same few directions repeatedly, the blobs would create multiple lobes in the nebula—and a pretty sight for future astronomers.

Marcus Woo

Occultations for December 2016 – January 2017

Total Lunar Occultations

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
16	Dec	5	9	29	26.2	D	3131	w	F0	5.5	5.3		29+	66		23	273
Double AB 5.5 13.0 51" 311.3, dT = -47sec																	
17	Jan	6	8	41	6.5	D	219	w	K4	4.8*	4.1		56+	97	-8	36	324
Double AB 5.0 12.0 211" 297.8, dT = -310sec																	
17	Jan	7	8	48	38.8	D	354	c	B7	5.5*	5.5v		67+	110	-9	36	338
Double 6.3 6.3 0.050" 46.0, dT = +0.17sec																	
17	Jan	7	9	33	55.3	D	360	S	F0	6.7*	6.5v		67+	110		32	326
Triple AC 6.7 11.8 60" 155.0, dT = +9sec : AB 6.7 8.3 74" 31.0, dT = +136sec																	

Although there aren't many lunar occultations over the December and January, they are all worth attempting as they're multiple stars:

- ZC3131 is occulted by the moon on Monday 5th December at approximately 10:30 NZSDT. The fainter component of the star ('B', at magnitude 13) is 51 arc-seconds away from the brighter component and so you should be able to see it as a separate star if you have a large enough telescope (12" say). It is predicted to disappear behind the lunar limb 47 seconds before the brighter component. The event takes place when the star is 25° above the horizon so it should be visible even if you live in a valley.
- ZC0219 is occulted by the moon on Friday 6th January at approximately 9:41 NZDST, which is during twilight. ZC0219 is a K4 spectral type which means it is a very red star, and so you may be able to improve the contrast between the star and the (bright twilight) sky by using a red filter. The fainter component ('B', at magnitude 12) is 211 arc-seconds away from the brighter component and disappears behind the lunar limb approximately 5 minutes (310 seconds) before component 'A' so again you should be able to resolve the individual components if you have a large enough telescope. The '*' next to the combined magnitude (4.8) listed in the table means the 'star' is also a variable star.
- ZC0354 is occulted the next night, on Saturday 7th January. This again happens during twilight but this time the star is too blue (being a B7 spectral type) to use a red filter. Both components are listed with the same magnitude (6.3), which means we don't actually know the brightness of the individual components. The 'fainter' component will disappear 0.17 seconds after the brighter component, which corresponds to 4 frames of a PAL video camera.
- Later the same night a triple star system (ZC0360) is occulted. With my (8") telescope I expect to be able to see the brightest component ('A', at magnitude 6.7) and component 'B' (at magnitude 8.3) disappear approximately 2 ¼ minutes (136 seconds) apart, but not the faintest component ('C', at magnitude 11.8).

Minor Planet Occultations

The following occultation takes place on Wednesday 11th January at UT 13:00:00, with the northern part of the shadow predicted to travel across Wellington. Although this is at a some-what uncivilised hour of 2 am NZDST on Thursday morning, if you're still on your Christmas holiday then you can have a sleep –in afterwards. The star is slightly brighter than 10th magnitude so you should be able to measure it with your video camera's gain turned to maximum using an 8" telescope. However it is only 17° above the horizon so it may disappear below a hill if you live in a valley. Further, there is a full moon only 10° away so I'd recommend using a pre-point star to find the target star;

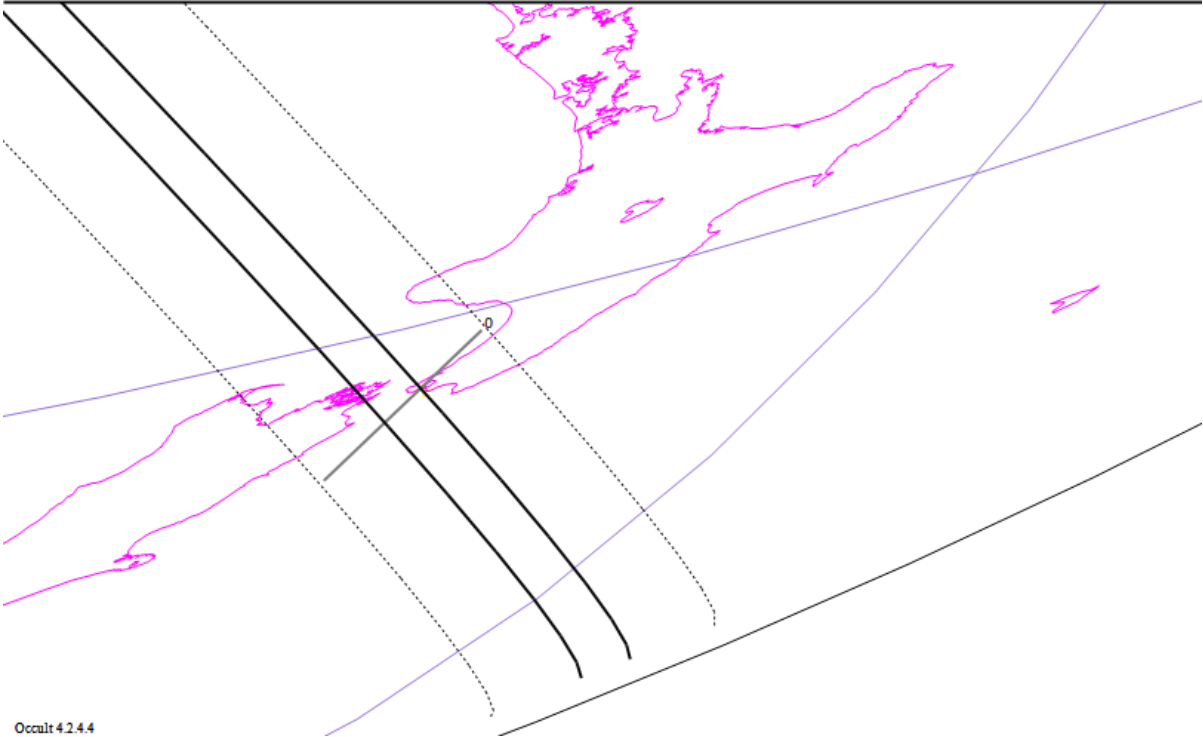
Point				J2000				Dec	
Time			Star	RA		Dec		Offset	SAO
h	m	s	mag	h	m	o	'	ArcMin	
12	07	29	1.7	5	26.3	28	36	-51.9	77168
10	47	59	5.2	4	06.6	27	36	6.7	76455
10	03	40	5.6	3	22.2	27	36	5.3	75892
09	31	31	3.6	2	50.0	27	16	25.6	75596
09	25	01	4.7	2	43.5	27	42	-1.3	75532

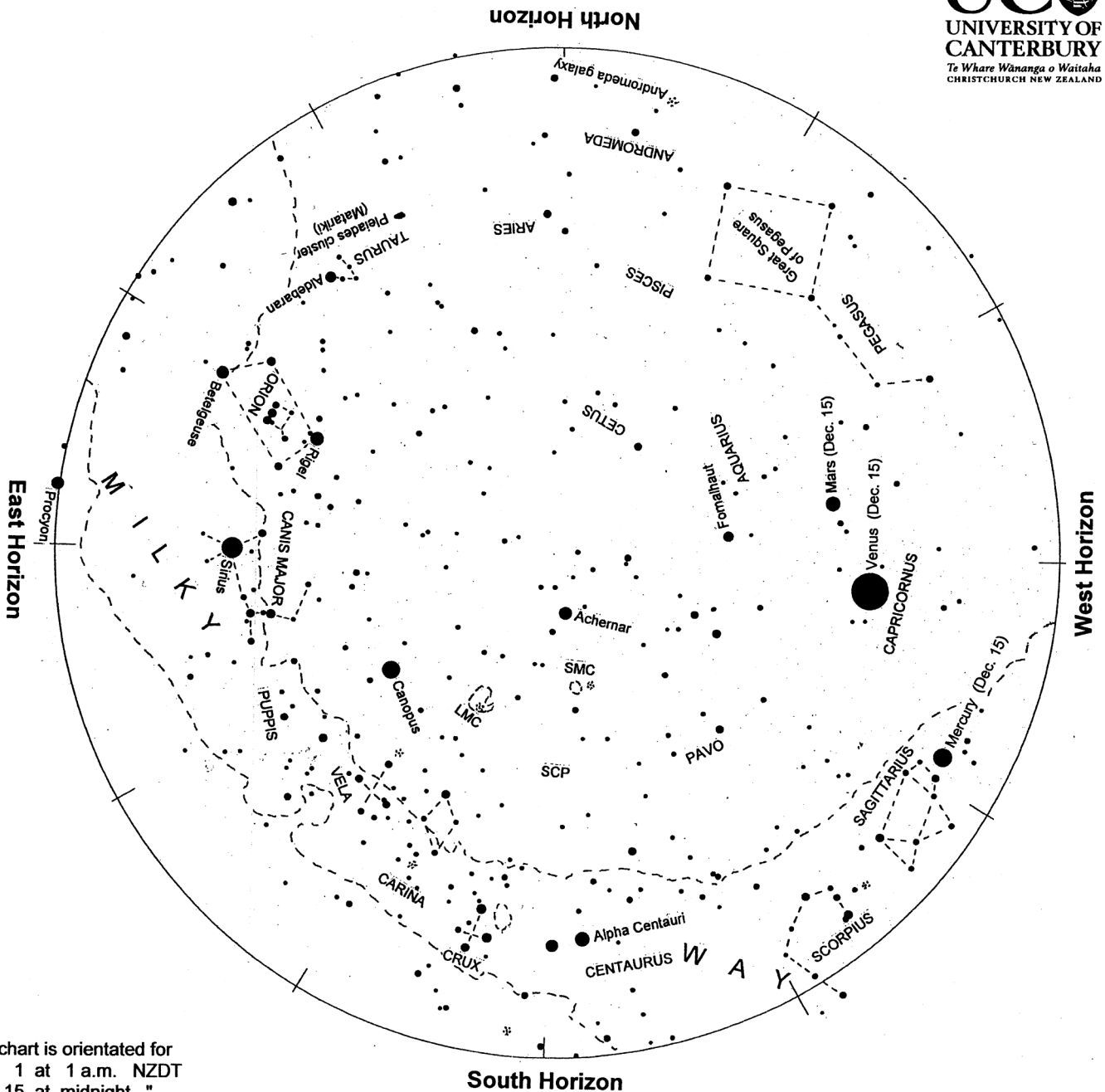
323 Brucia occults TYC 1886-01019-1 on 2017 Jan 11 from 13h 0m to 13h 16m UT

Star:
Mv = 9.8 Mp = 11.1 Mr = 9.1
RA = 6 18 57.8384 (J2000)
Dec = 27 45 52.335
[of Date: 6 20 3, 27 45 14]
Prediction of 2016 Nov 13.0

Max Duration = 3.2 secs
Mag Drop = 2.2 (2.5r)
Sun : Dist = 162 deg
Moon : Dist = 10 deg
: illum = 99 %
E 0.086"x 0.076" in PA 90

Asteroid:
Mag =11.9
Dia = 37km, 0.049"
Parallax = 8.424"
Hourly dRA =-2.909s
dDec = 40.58"





The chart is orientated for
Nov. 1 at 1 a.m. NZDT
Nov. 15 at midnight "
Dec. 1 at 11 p.m. "
Dec. 15 at 10 p.m. "

Evening sky in December 2016

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 also shows a small extra clockwise rotation each night as we orbit the sun.

Venus is the brilliant 'evening star, setting near midnight. Below it, till mid-month, is Mercury. Above Venus is orange Mars. Sirius, the brightest star, is due east, twinkling like a diamond. Left of it is Orion, with 'The Pot' at its centre. Further left is Taurus and the Pleiades/Matariki/Seven Sisters star cluster. The Pointers and Crux, the Southern Cross, are low in the south. Right of Canopus, the second brightest star, are the Clouds of Magellan (LMC and SMC on the chart), two nearby galaxies. The Great Square of Pegasus covers the lower northern sky with the Andromeda Galaxy below and right of it.

The Night Sky in December

Venus is the brilliant 'evening star' appearing due west at sunset and setting toward the southwest after midnight. Above and right of Venus, and much fainter, is orange Mars. Below and left of Venus is Mercury, setting about 90 minutes after the Sun till mid-month. After the 15th Mercury sinks into the twilight as it passes between the Earth and the Sun. None of these planets is of much interest in a telescope. Venus looks like a tiny gibbous Moon. Mars and Mercury appear very small. The very thin crescent moon will be below and right of Mercury on the 1st, below Venus on the 3rd, and below Mars on the 5th.

The brightest true stars are in the east and south. Sirius, the brightest of all the stars, is due east at dusk, often twinkling like a diamond. Left of it is the bright constellation of Orion. The line of three stars makes Orion's belt in the classical constellation. To southern hemisphere skywatchers they make the bottom of 'The Pot'. The faint line of stars above and right of the three is the Pot's handle. At its centre is the Orion Nebula, a glowing gas cloud nicely seen in binoculars. Rigel, directly above the line of three stars, is a hot blue-giant star 770 light years* away. Orange Betelgeuse, below the line of three, is a cooler red-giant star 430 light years away.

Left of Orion is a triangular group making the upside down face of Taurus the bull. Orange Aldebaran is the brightest star in the V shape. Aldebaran is Arabic for 'the eye of the bull'. Still further left is the Pleiades / Matariki/Subaru cluster, a tight grouping of six naked-eye stars impressive in binoculars. It is 440 light years away.

Canopus, the second brightest star, is high in the southeast. Low in the south are the Pointers, Beta and Alpha Centauri, and Crux the Southern

Cross upside down at this time of the year. In some Maori star lore the bright southern Milky Way makes the canoe of Maui with Crux being the canoe's anchor hanging off the side. In this picture the Scorpion's tail, just setting, can be the canoe's prow and the Clouds of Magellan are the sails.

The Milky Way is wrapped around the horizon. The broadest part is in Sagittarius low in the west at dusk. It narrows toward Crux in the south and becomes faint in the east below Orion. 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 nearby outer edge is the faint part of the Milky Way below Orion. A scan along the Milky Way with binoculars will show many clusters of stars and a few glowing gas clouds.

The Clouds of Magellan, LMC and SMC, high in the southern sky, are two small galaxies about 160 000 and 200 000 light years away, respectively. They are easily seen by eye on a dark moonless night. The larger cloud is about 1/20th the mass of the Milky Way galaxy, the smaller cloud 1/30th but that is still many billions of stars in each.

Very low in the north is the Andromeda Galaxy seen in binoculars in a dark sky as a spindle of light. It is a bit bigger than our Milky Way galaxy and nearly three million light years away.

Jupiter (not shown) is the brightest 'star' in the morning hours, shining with a steady golden glow. It rises due east before 4 a.m. at the beginning of the month and before 2 a.m. by the New Year. A small telescope will show Jupiter's disk and its four large moons lined up on either side of the

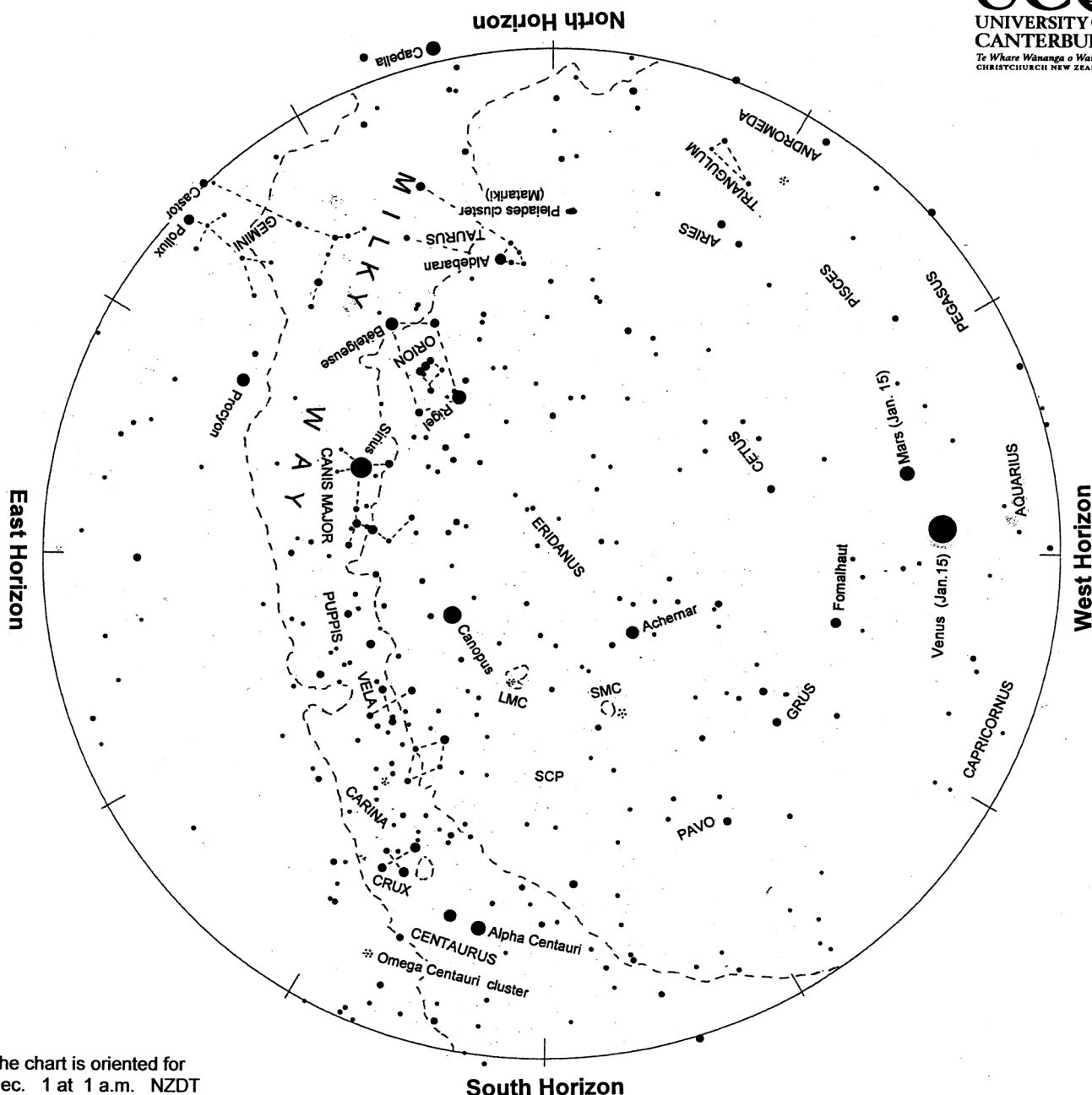
planet. Good binoculars, held steadily, will sometimes show one or two of the moons.

*A light year (l.y.) is the distance that light travels in one year: nearly 10 million million km or 10¹³ 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.

Notes by Alan Gilmore, University of Canterbury's Mt John Observatory, P.O. Box 56, Lake Tekapo 7945, New Zealand.

www.canterbury.ac.nz



The chart is oriented for
Dec. 1 at 1 a.m. NZDT
Dec. 15 at midnight "
Jan. 1 at 11 p.m. "
Jan. 15 at 10 p.m. "

Evening sky in January 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 or westward rotation from night to night as we orbit the sun.

Venus is the 'evening star' appearing low in the west soon after sunset. Mars is a red 'star' above and right of Venus at the beginning of the month; above Venus at the end. Sirius, the brightest true star, is high in the east at dusk. Left of it is Orion, containing 'The Pot', with Taurus and the Pleiades/Matariki star cluster further left toward the north. Canopus, the second brightest star after Sirius, is southeast of the zenith. Crux, the Southern Cross, and the Pointers are low in the south. Jupiter (not shown) is in the morning sky. Mars is by Neptune on the 1st but one needs a telescope to see Neptune.

The Night Sky in January

Brilliant Venus is the 'evening star', appearing due west after sunset. It sets around 11:30 at the beginning of the month, 10:30 by the end. Nearby, but much fainter, is reddish Mars. It is right of Venus and a bit higher in the sky at the beginning of the month. The gap closes so Mars is just above Venus by the 31st. In a telescope Venus looks like a tiny first-quarter Moon. It is 100 million km away at mid-month, catching up on Earth. Mars is 260 million km away, on the far side of the Sun; a tiny disk in a telescope. The Moon is near Venus on the 2nd and 31st, and Mars on the 3rd.

Mars passes the faint blue planet Neptune on New Year's Day but one needs a telescope to see it. Neptune is about 1/10th of a full-moon width (4') below and left of Mars. Neptune is 4.6 billion km from us. Mars moves on quickly. The Mars-Neptune gap is 1½ moon-widths (48') on the 2nd.

Sirius, the brightest true star, appears high in the east at dusk. Called 'the Dog Star' it marks the head of Canis Major the big dog. A group of stars to the right of it make the dog's hindquarters and tail, upside down just now. Sirius is the brightest star in the sky both because it is relatively close, nine light years* away, and 23 times brighter than the sun. Procyon, in the northeast below Sirius, marks the smaller of the two dogs that follow Orion the hunter across the sky.

Left of Sirius as the sky darkens are Rigel and Betelgeuse, the brightest stars in Orion the hunter.

Between them, but fainter, is a line of three stars making Orion's belt. Rigel is a bluish supergiant star, 70 000 times brighter than the sun and much hotter. It is 800 light years away. Orange Betelgeuse, below Orion's belt, is a red-giant star, cooler than the sun but hundreds of times bigger: a ball of ex-

tremely thin hot gas. To southern hemisphere star watchers, Orion's belt makes the bottom of 'The Pot' or 'The Saucepan'. A faint line of stars above and right of the belt is the pot's handle or Orion's sword. It has a glowing cloud at its centre: the Orion Nebula.

Left of Orion is the V-shaped pattern of stars making the face of Taurus the Bull. The V-shaped group is called the Hyades cluster. It is 150 light years away. Orange Aldebaran, Arabic for 'the eye of the bull', is not a member of the cluster but on the line of sight, half the cluster's distance.

Left again, toward the north and lower, is the Pleiades/Matariki/Seven Sisters/Subaru star cluster. Pretty to the eye and impressive in binoculars, it is 440 light years from us. From northern NZ the bright star Capella is on the north skyline. It is 90,000 times brighter than the sun and 3300 light years away.

Low in the south are Crux, the Southern Cross, and Beta and Alpha Centauri, often called 'The Pointers'. Alpha Centauri is the closest naked-eye star, 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 is also very luminous and distant: 13 000 times brighter than the sun and 300 light years away.

The Milky Way is in the eastern sky, brightest in the southeast toward Crux. It can be traced towards the north but becomes faint below Orion. The Milky Way is our edgewise view of the galaxy, the pancake of billions of stars of which the sun is just one. Binoculars show many star clusters and a few glowing gas clouds in the Milky Way, particularly in the Carina region.

The Clouds of Magellan, LMC and SMC are high in the southern sky and easily seen by eye on a dark moonless night. They are two small galaxies about 160 000 and 200 000 light years away.

Jupiter, not shown, rises in the east around 12:30 a.m. mid-month. It is the brightest 'star' in the morning sky and shines with a steady golden light. Saturn is low in the eastern dawn sky below orange Antares. Mercury appears lower and right of Saturn but brighter.

*A light year (l.y.) is the distance that light travels in one year: nearly 10 million million km or 10¹³ 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.

Notes by Alan Gilmore, University of Canterbury's Mt John Observatory, P.O. Box 56, Lake Tekapo 7945, New Zealand.

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