CASMAG

THE OFFICIAL MAGAZINE OF THE CANTERBURY ASTRONOMICAL SOCIETY INC.

Vol. 61 – No 6 **September 2010** **Issue Number 681**

Next meeting: Tuesday 21 September, 8:00 p.m.

Is the Tide Turning?

Steve Butler

(RASNZ Dark Skies Group Coordinator)

The Astronomy Picture of the Day (APOD) pays homage to a southern hemisphere favourite in this glittering image of the Jewel Box (NGC 4755 or Kappa Crucis). Its well known red supergiant is prominent towards the centre, in contrast to the many blue stars that surround it. The cluster lies about 6,400 light-years distant and contains just over 100 stars spanning spanning 20 light-years. It is estimated to be about 10 million years old. Source: http://apod.nasa.gov/apod/ap100817.html

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West Melton Observatory

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Public open nights for 2010 are held every Friday evening from 20 March to 2 October. To make a booking inquiry follow the *Open Nights* link on the CAS website to find out which nights are *available*. For all other inquiries and bookings please contact:

Steve Johnson	027-445-8443
or email	bookings@cas.org.nz

CAS Meetings

Monthly meetings are held on the 3rd Tuesday of each month except December & January at 7:45 pm, in Room 105 on the ground floor of the Law School, University of Canterbury. Meetings begin with tea/coffee, followed by a 45 minute talk from an invited speaker as advertised on the front cover of CASMag.

Meetings are preceded by **Practical Astronomy for All Ages**, from 7:00 -7:45 pm in Room 104 of the Law School, next door to the main meeting room. This is a friendly, informal meeting open to all interested people, with particular emphasis on new and beginning astronomers. Check the CAS website for details of the topic to be covered each month. Attendees are welcome and encouraged to stay for both meetings.

CAS Membership

Subscriptions (as listed below) are due 1 April. Fees for current members who renew before 31 May, and new members joining in 2009/10, will be discounted to the amount shown in brackets, i.e., there is a $10 discount for Adult members etc.

Financial year: April to March	
Adult (full) membership	$60 ($50)
Family membership	$90 ($75)
All other classes (Junior, Senior citizen, Tertiary student, Educational)	$30 ($25)

Contributions to CASMag

Member contributions to CASMag (e.g., letters, observing notes, articles, news) are most welcome. Please submit articles to The Editor, CASMag, PO Box 25-137, Christchurch 8144, or email to editor@cas.org.nz. **The deadline for the next (August) issue is 1 September**.

Small personal advertisements (less than 8 lines in a column) are free to financial members. Charges for larger items range from $5 to $40; email the editor for full details.

Disclaimer

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19	20	21	22	23	24	25
26	27	28	29	30		
Monthly meeting						

October 2010						
Su	Mo	Tu	We	Th	Fr	Sa
31			1	2	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
Family day/night						

November 2010						
Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				
Public open night						

Coming Events

Friday 10th September – Monday 13th September: Herbert Dark Sky Weekend

This year's Herbert event in on September 10-13 at Camp Iona 20 km south of Oamaru. Everyone welcome. Cost is $11 for 1 night; $22 for 2; and $25 for three nights. Bring your observing equipment, sleeping bag (there are bunkrooms aplenty), cutlery and food. Contact Phil Barker (phone 03-383-3683, phil.sonja@xtra.co.nz); Euan Mason (euan.mason@canterbury.ac.nz); or Ross Dickie (radickie@xtra.co.nz).

Last year's event was great with over 60 attending. Tell Phil Barker or Euan Mason if you want to give a talk. Peter Aldous of Geraldine will be talking about hunting supernovae with his C14 from home.

Saturday 18th September: International Observe the Moon Night:

Saturday September 18th is International Observe the Moon Night (InOMN), a worldwide event developed and promoted by Astronomers Without Borders (AWB). See Noticeboard (page 4) for more information.

Tuesday 21st September: Monthly Member’s Meeting and Practical Astronomy Meeting

The next Member’s Meeting will be held on 21 September at 8:00 pm. This month’s speaker is RASNZ Dark Skies Group Coordinator Steve Butler, who will give a talk entitled “Is the tide turning?”. Steve writes: “There are signs of change within New Zealand's outdoor lighting scene. New technologies are arriving from overseas and attitudes are changing. But still there is work to do. How do we win support for dark skies?”

Please make sure you come along and hear what Steve has to say on this vitally important topic. We have invited representatives from the Christchurch City Council and the Selwyn District Council, so a strong member turnout would be appreciated.

Saturday 25th September: Member’s Night, R.F. Joyce Observatory, West Melton

This is the last night before daylight saving kicks in for another year, so come along and make the most of it. The Moon will be two days past full, but does not rise until 21:27 (three hours after sunset) so conditions will be ideal for dark sky observing during the early part of the evening. Planet watchers will be able to enjoy Jupiter, just four days after opposition on 21st September, with Uranus a little over 1° to the north and easily visible in the same binocular or low power eyepiece field (see page 11 for further details).

Sunday 26th September: Daylight Savings begins

News and Events

Noticeboard

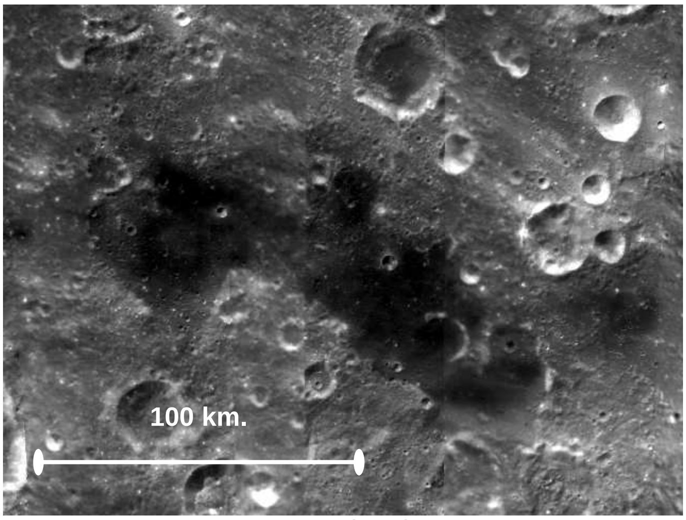
Supernova #10

Stuart Parker at Oxford has recently logged his 10th supernova in thirteen months, after recording his first discovery on 20 July 2009 (see CASMag 60(5), July 2009). His latest effort, on 11 August 10.61 UT, is supernova 2010gw in the galaxy IC 4992 in Pavo. The supernova was confirmed by Australian members of the Backyard Observatory Supernova Search team, and reported in IAU Central Bureau Electronic Telegram (CBET) 2410. The new object is at R.A.20h 23m 25s.31, Dec -71° 34' 04".9 (equinox 2000.0), and was red magnitude 16.6 at discovery. See http://parkdale-supernova-factory.webs.com/latestdiscoverynews.htm for more details.

International Observe the Moon Night: 18th September

Saturday September 18th is International Observe the Moon Night (InOMN), a worldwide event developed and promoted by Astronomers Without Borders (AWB). The event web site provides a wealth of information, including suggestions for local astronomy clubs and societies interested in hosting events targeting the general public. The principal New Zealand contact for InOMN is AWB_NZ@xtra.co.nz, phone 021-100-7170.

The event takes place on the last full weekend before daylight saving commences, one week before the September Member's Night at the R.F. Joyce Observatory. The 79% lit Moon will be ideally placed for evening viewing, transiting at 20:50 p.m. at an altitude of 64° and setting at 3:41 a.m. on the morning of the 19th. To the north, Promontorium Laplace will be prominent at the eastern extremity of the Bay of Rainbows (Sinus Iridum), while the more heavily cratered regions to the south include less familiar but worthwhile targets such as Rimae Hippalus and the curiously shaped Lacus Timoris (Lake of Fear), a small (130 km long) dark mare lying about 3' west and a little north of the bright crater Tycho.



Lacus Timoris.

Albert Jones turns 90

World famous amateur astronomer Dr Albert Jones celebrated his 90th birthday on August 9. He is still recovering from a broken hip after he slipped on a dewy path some weeks back, but is reported to be making a good recovery and is champing at the bit wanting to get back to his beloved variable stars. The latest RASNZ newsletter quotes him as saying "… while there are no fresh observations to enter on computer, there are heaps of old estimates that have yet to be entered and sent to AAVSO as well as observations made without comparison star magnitudes - I can now get the mags through ASAS3. So that keeps me off the streets." Let's hope that others of us can be as active and technologically savvy at 90! *Source: RASNZ Newsletter No. 117, August 21 2010.*

Mackenzie Starlight Heritage Reserve Progress

New Zealand is right on track to create one of the world's first world heritage starlight reserve after a key meeting in Brasilia in early August. Former Cabinet minister Margaret Austin said the UNESCO world heritage committee approved support for monuments and sites, landscapes and cultural landscapes associated with astronomy to be recognised as part of human heritage. The NZ delegation, including two Department of Conservation staff, helped persuade the committee to approve a thematic study which argued stars and planets were part of natural heritage and the sky was a cultural resource common to natural heritage. However, Austin said from Brasilia today there was still a long road before protecting the world's starry nights with dark sky reserves.

She said New Zealand's contribution from the Royal Society of NZ, the Royal Astronomical Society of NZ and UNESCO NZ was acknowledged at the Brasilia meeting. "The thematic study was regarded as a cornerstone project of UNESCO´s International Year of Astronomy 2009. As a member of the New Zealand observer team I was able to make a brief intervention in support of the study."

"The World Heritage Committee has adopted a decision covering the astronomy and world heritage thematic study to disseminate the study among the member states. Consequently the first step on the long road to nomination is achieved. Now New Zealand must prepare a detailed document, providing the evidence of outstanding universal value, its integrity and authenticity for the site, obtain the approval of all the parties concerned and adoption by the New Zealand Government in order to eventually present the case for the Lake Tekapo Aoraki/Mt Cook initiative as a `window to the universe´."

Source: RASNZ Newsletter No. 117, August 21 2010.

New Members

Welcome to Terence Jones (Richmond, Christchurch) who has recently joined CAS.

Telescope For Sale

AstroNZ GS580 150 mm f8 Dobsonian, as new condition, includes two eyepieces. $400 o.n.o. Phone Margaret Sheppard 388-8247.

Heather's Obs.

Moonlight by Binos

Heather Skinner

Hello everyone. In my last article in the August Casmag (*Binos by Moonlight*) I talked about bright things you can see in moonlight. At the August Practical Astronomy Meeting we also talked about Lunar obs – along with several other things – so for this month I thought I would attempt to describe a few very basic features on the moon as seen through my 20 × 80 binos. I have deliberately kept it to just a few features as trying to describe stuff on the moon can get a little complicated – so here goes!

At the time of my obs the Moon was full, which shows up bright ray craters very nicely. Something which helps me – and you may find strange (but look who's writing it!) – is that I can make out the shape of a rabbit from some of the maria (the plural of the Latin mare, or seas). The left ear is Mare Fecunditatis, the right ear is Mare Nectaris, the rabbit's head is Mare Tranquillitatis, and the body is Mare Serenitatis. Like some constellations that have recognisable shapes to help you find them, I find a little imagination used for the moon also helps. The dark patch to the left of the left ear – Mare Crisium – is very easy to see, as are two prominent little craters within it: Peirce, and the larger Picard. Named after the captain of the Starship Enterprise of Star Trek? Of course it is![1]

Slightly to the lower right of Mare Tranquillitatis (the rabbit's head) is the lovely bright ray crater of Copernicus with terraced walls and central peaks. The other much smaller bright ray crater directly to its west is Kepler, with the southern highlands are dominated by Tycho, with its prominent rays extending in all directions. It is interesting to make out the central peaks, surrounding walls and light or dark flooring of the craters,and different details will be seen depending on how much of the Moon is illuminated at the time. Even when near full a lot of detail can be seen along the terminator, the line that divides the lit from the unlit part of the moon. Also interesting to look at, depending on how much of the moon is illuminated, are the lunar mountains.

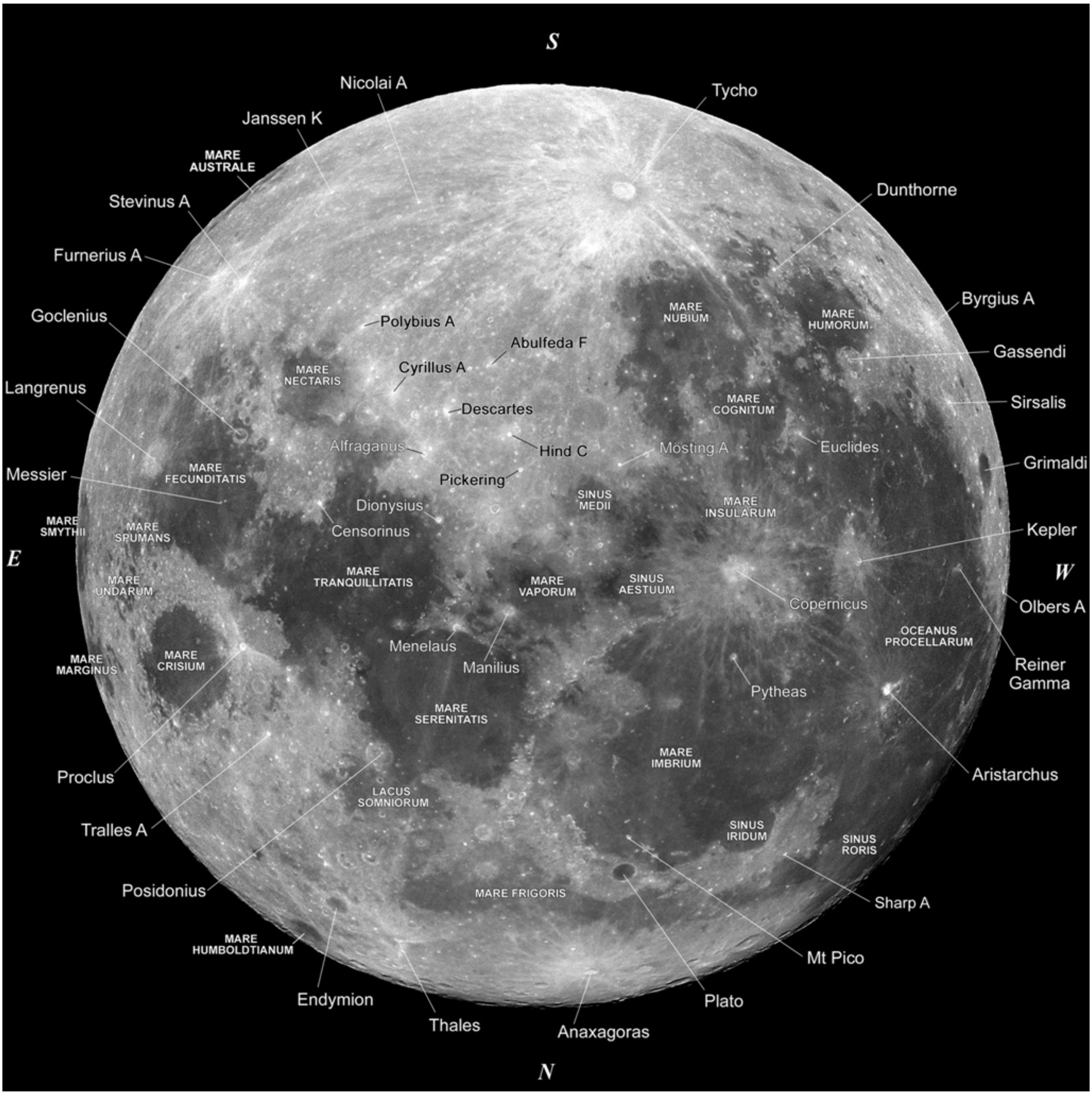
These are just some very basic objects to see, described in terms of the way the Moon was oriented at the time I was viewing it. To southern hemisphere observers the Rabbit will always have its ears pointing up. If you are interested in looking at the moon the best thing is to get a moon-map. I have a very good one

[1] In between voyages on the Starship Enterprise, the French astronomer and geodesist Jean-Felix Picard (1620-1682) made fundamental contributions to geodesy and spherical astronomy. He was the first person to measure the size of the Earth to a reasonable degree of accuracy, obtaining a polar radius (6328.9 km) within 0.44% of the modern value. He also developed the standard method for measuring the right ascension of a celestial object by recording its time of meridian transit, and travelled to Tycho's Uraniborg observatory to assess its position accurately so that Tycho's readings could be compared to others. His collaborators included Newton, Huygens, Rømer, and Cassini.

which is a big poster, like the one at the observatory. I have had it laminated so it's good to take outside, where I can lay it out on the card table I use to spread my gear out on. Anything used to view the moon is good - sometimes I use binos, and sometimes my scope. A moon filter is good on my scope, while an orange filter also blocks out glare very nicely but still allows you to see detail. The way I have explained some of this is probably as clear as mud, but I hope some of you may be able to find some stuff from it, and for those totally uninterested in looking at the moon, I'm sorry to have bored you!

For something fun to look at, find the three prominent stars of Aquila, then shift your view north and a little west to the faint but distinctive constellation of Sagitta (the Arrow). Go to the blunt end of the arrow – the two widely spaced stars α Sga and β Sga, and sweep a little further to the southwest towards the rather more inconspicuous Vulpecula (the Fox). What do you see? Brocchi's cluster – a.k.a. the Coat Hanger! To us it is the right side up, and looks exactly like a coat hanger. It is a must for binos, which allow you to get it all in the same FOV.

So, hope you got something out of all that lot! Bye for now, and Happy Hunting from Heather. ☽



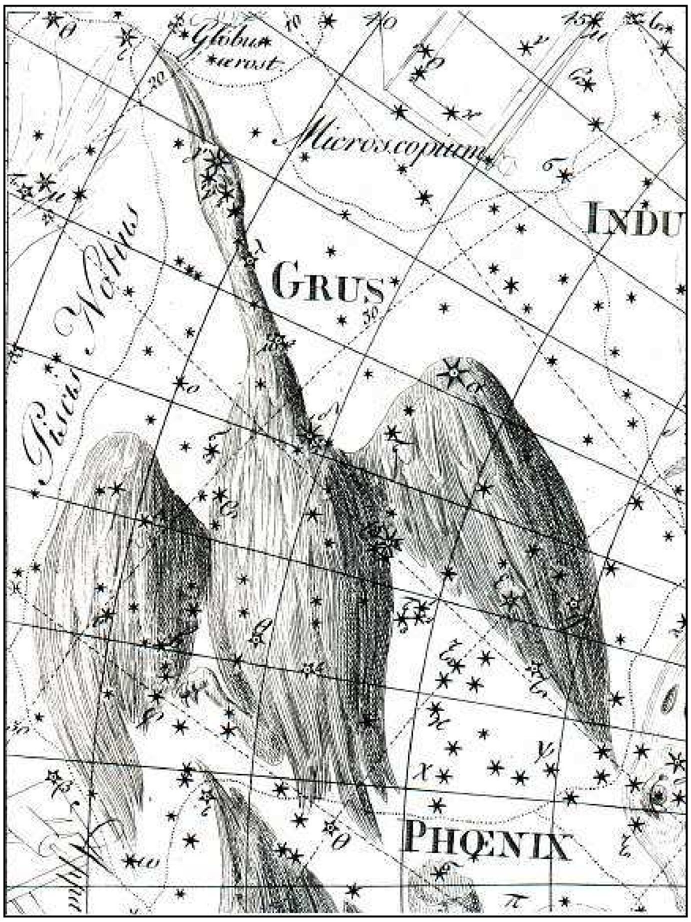
The full Moon, showing the dark maria and bright rayed craters which are best seen under these conditions. Heather's rabbit is rotated approximately 90° antic lockwise, with its left ear lying just a little south of due east. The crater Picard lies just above the "E" in Mare Crisium, while Peirce is just to the right of the "M" in Crisium.

Spring constellations

Flight of the Crane

The southern constellation of Grus is a modern incarnation of an old star pattern. Arab astronomers were well familiar with its brightest stars, some of which bear Arabic names: Al Na'ir (α Gru, the bright one); Al Phaulkah (β Gru, the grazing or skimming one); Al Dhanab (γ Gru, the tail). However, these stars, along with the modern delta, theta, iota, and lambda Gru, were associated with its northern neighbour Piscis Austrinus rather than being seen as a separate constellation.

The modern Grus is one of the 12 constellations introduced at the end of the 16th century by the Dutch navigators Pieter Dirkszoon Keyser and Frederick de Houtman. Five of these constellations represent birds: Apus (the Bird of Paradise), Pavo (the Peacock), Phoenix (the Phoenix), Tucana (the Toucan), and Grus (the Crane). Many of Keyser and de Houtman's creations (such as Chamaeleon and Indus) are notoriously obscure, but Grus is a welcome exception. Resembling a slightly distorted Cygnus, it lies immediately south of Piscis Austrinus and is easily recognised by the magnitude 1.74 Al Na'ir, and a well defined chain of 3rd and 4th magnitude stars curving gently from ε Gru (mag. 3.49; due south of Fomalhaut) to γ Gru (mag. 3.01) 15° to the northwest. It is not hard to visualise a bird with a long neck, oriented more or less north to south, with the western wing tip marked by Al Na'ir and the eastern tip by θ Gru and ι Gru.



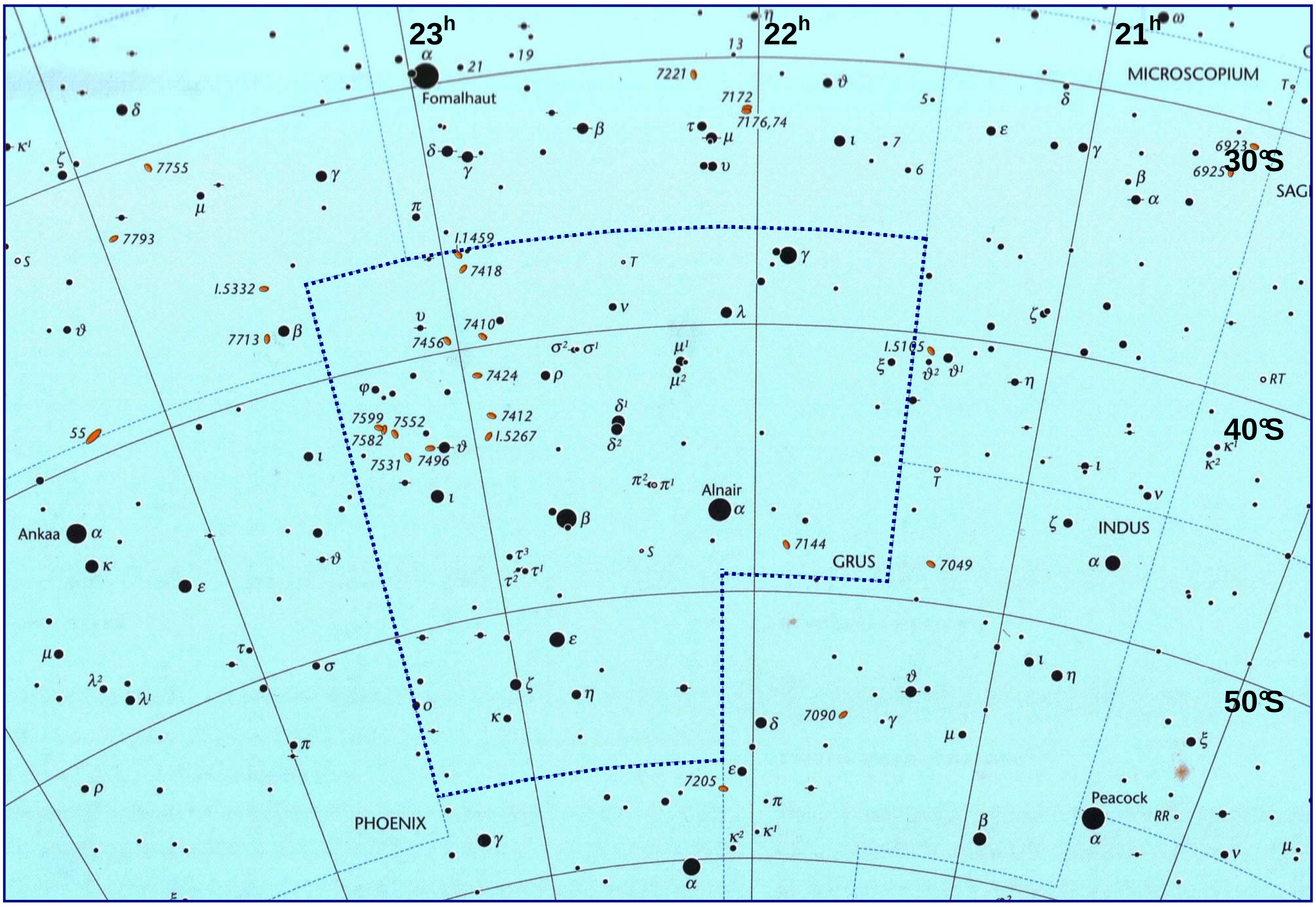
Grus as depicted in the Uranographia of Johann Bode.

Grus spans 20° of declination, from 36° 20' S to 56° 20' S, so that from the latitude of Christchurch the centre of the constellation culminates at the zenith. Midnight culmination occurs on 29 August, making the constellation ideally placed for late winter and spring evening viewing. The southern portion is circumpolar, with Al Na'ir just clearing the southern horizon (by less than 30') at inferior culmination.

Several of its brighter stars serve as pointers to some of its more obscure neighbours. Extending the curve of the body and neck to the northwest leads to a chain of 5th magnitude stars which is the most recognisable part of Microscopium (including α, β, and ε); a line connecting θ Gru to Al Na'ir and extended about one and half times as far again to the west will locate the 3rd magnitude α Indi; a line from δ Gru to Al Na'ir and extended four times to the southwest picks out α Pavonis (mag. 1.9); and α Tucanae (mag. 2.9) lies 14° due south of Al Na'ir – roughly the span of your outstretched hand. It is also worth noting that Fomalhaut, Al Na'ir, and Ankaa (α Phoenicis; mag. 2.4) form an almost perfect equilateral triangle.

Grus: Vital Statistics

Genitive: Gruis
Abbreviation: Gru
English name: The Crane
Origin: Keyser/de Houtman, 1603
Constellation family: Bayer
Bordered by: Piscis Austrinus, Microscopium, Indus, Tucana, Phoenix, Sculptor
Area: 366.51 square º (45th in size)
Centroid right ascension: 22h 27.39'
Centroid declination: -46º 21.11'
Culminates at midnight: 29 August
Brightest star: Al na'ir (mag 1.73)



Grus has several attractive doubles, including the wide (4') optical double π^1, π^2 Gru, both components of which are true binaries. It lies too far south to have attracted Messier's attention, but – being far from the galactic plane – it lacks both open and globular clusters, and contains no Caldwell objects. It has one large (2') annular planetary nebula IC 5148, faintly visible with 15 cm and estimated to be roughly 2 900 ly distant. However, it contains numerous galaxies, particularly towards its eastern border with Sculptor, several of which are readily visible with 15 cm or more. One of the brightest is NGC7213, described by

Two prominent deep sky objects in Grus: the planetary nebula IC5148 (left; image width 5'), and the face on Sa spiral NGC 7213 (right; image width 30'). Source: http://messier45.com/.

Hartung as *a bright round hazy object about 1.5' across, rising much to the centre with the edges fading away so that it looks like a remote globular cluster … 7.5 cm shows it dimly but quite definitely. The bright … star Al Na'ir is only 16' northeast and interferes with observation*. Located some 72 M ly distant, Hα and H I images show it to be a highly disturbed Seyfert system, suggesting a past merging event (see http://iopscience.iop.org/1538-4357/546/2/L97/005596.text.html).

By far the most spectacular deep sky target in Grus is a triplet of three spiral galaxies about 2° east and 1° north of θ Gru. All three – NGC 7582, 7590, and 7599 – lie within an area about 15' across, and are said by Hartung to be visible with 10.5 cm. A fourth spiral, NGC 7552, lies about 30' further southwest, more or less on a line leading back to θ Gru. A wide field eyepiece will show all four in the same field of view. These four galaxies (known as Grus Quartet) are the most prominent members of a cluster of some 15 galaxies about 60 M ly distant. The galaxies are close enough to each other that tidal interactions should be significant, and at least two of them (7552 and 7582) appear to be experiencing high starburst activity. Further evidence of interaction comes from radio observations of the 21 cm line of the neutral hydrogen atom, which shows one tidal tail extending from NGC 7582 towards the neighbours in the east, and another towards NGC 7552 (for further information and images see http://www.atnf.csiro.au/people/bkoribal/ngc7582/grus_hi.html).

The three eastern most members of the Grus Quartet, showing (left to right) NGC 7599, 7590, and 7582. The image scale is 24.5' × 16.6'. The inset at lower left shows these three objects in relation to the fourth member of the quartet, NGC 7552. Sources: http://www.capella-observatory.com/images/Galaxies/NGC7582.jpg (main); http://www.daviddarling.info/encyclopedia/G/Grus_Quartet.html (inset).

Keyser and de Houtman's inspiration for Grus is said to be drawn from Ancient Egypt, where the crane symbolized a stargazer because of its high flight. An alternative name for this constellation, **Phoenicopterus** (Latin for flamingo), was used briefly in England during the 17th century.

Note for trivia buffs and grammarians: The English word *pedigree* derives from the French phrase *pie (pied) de gru*, meaning "foot of a crane". The pedigree symbol (/|\)used in showing lines of descent in genealogical charts resembles the branches coming out of a crane's foot. ☽

Planet Watching

The Solar System mid September to October **Brian Loader**

Sunrise, transit and sunset times for Christchurch. At transit the Sun is due north and at its highest. It is the time of local solar midday.

Date	11 Sep	18 Sep	25 Sep
Rise	06:39 am	06:27 am	06:14 am
Transit	12:26 pm	12:23 pm	12:21 pm
Set	06:13 pm	06:20 pm	06:28 pm
Date	2 Oct	9 Oct	16 Oct
Rise	07:01 am	06:49 am	06:37 am
Transit	01:18 am	01:16 am	01:15 am
Set	07:36 pm	07:45 pm	07:53 pm

The southern spring equinox is on 23 September, with the Sun being on the celestial equator at about 3.10 pm NZDT. The interval between sunrise and sunset is 12 hours three days earlier on September 20.

New Zealand Daylight Time, NZDT, starts on the morning of September 26, when clocks should be put forward one hour, strictly at 2 a.m. which advances to 3 p.m. New Zealand will then be 13 hours ahead of UT (GMT). Local solar time for Christchurch will then be about 90 minutes behind clock time, on average, i.e., local solar midday will be near 1:30 p.m. The actual time varies by several minutes either side of this.

Lunar phenomena mid September - mid October

September

14 40% lit moon 2.4° from Antares.
15 Furthest south, so highest in southern skies.
15 First quarter 5:50 pm.
21 At apogee, furthest from Earth, 406 168 km.
23 Full moon 9.17 p.m., NZST. Moon about 7° below Jupiter and 6° from Uranus, early evening.
30 Furthest north, so lowest in southern skies.

October

1 Last quarter 4:52 p.m., NZDT.
5 Crescent moon 3.5° above Regulus, low in morning sky.
7 At perigee, closest to Earth, 359 456 km.
8 New moon 7:45 a.m., NZDT.
9 3% lit crescent moon 7.5° below Venus.
10 9% lit crescent moon just over 4.5° above Mars.
11 17% lit moon 5° below Antares.
12 Furthest south, highest in southern skies.
15 First quarter 10:27 a.m., NZDT.
19 At apogee, furthest from Earth, 405 433 km.

The Planets, mid September to mid October

Venus and Mars remain visible in the early evening, although Venus will slip behind Mars and set earlier by mid October. Jupiter is at opposition on September 21 and so will become visible all evening. Mercury and Saturn are too close to the Sun to observe.

MERCURY is in the dawn sky but, at the most, will rise no more than half an hour before the sun making it unobservable. The planet is at superior conjunction with the Sun on October 17, marking its return to the evening sky.

VENUS remains an easy object in the evening, although it will get noticeably lower after the beginning of October. By mid October it will set about an hour earlier than in September. From being ahead and above Mars in September, Venus will drop back to fall behind and below Mars by mid October.

Venus is stationary on October 8, after which the direction of its apparent motion through the stars will reverse as the planet heads back towards the Sun, resulting in it setting earlier each night. The following night, October 9, a very thin crescent moon, only 3% lit, will be 7.5° below Venus.

MARS, like the tortoise in the fable, will keep plodding along to get back in front of Venus early in October. As it does so, Mars will pass close to the wide double star alpha Librae. At their closest on October 7, the planet and pair of stars will be only 40 arc-minutes apart, a distance only a little more than the diameter of the full Moon. With a separation of nearly 4 arc-minutes, the pair of stars forming alpha Lib are the widest true double star (apart from Proxima Centauri which is very faint). The two stars of alpha Lib should be visible as a pair to the unaided eye, but the difference in magnitudes, 2.7 and 5.2 makes the fainter star difficult. They are easily split with binoculars. Assuming the two stars are really orbiting one another, the period must be at least half a million years and their true separation at least one-tenth of a light year.

On October 10, Mars and alpha Lib will be joined by the crescent moon which will be 4.5° above Mars. By then the planet will be 2° above alpha Lib. With Venus a few degrees away to their left, this will form another pleasing group in the western early evening sky.

JUPITER and **URANUS** are at opposition on September 21, when they will rise close to the time of sunset and set close to the time of sunrise. This will result in the planets being readily visible to the east from mid evening, and all evening by mid October. A couple of nights before opposition, on the 19th, Jupiter and Uranus will be in conjunction. The two will be 50 arc-minutes apart, with Uranus to the left of and slightly lower than Jupiter in the evening. At magnitude 5.7 it is an easy binocular object and brighter than any star to the immediate left of Jupiter.

The near full moon will be 7° below Jupiter on the night of the equinox, September 23.

SATURN is at conjunction with the Sun on October 1. As a result it will be too close to the Sun to observe until about the end of October. After conjunction Saturn will move into the morning sky.

The comet, **103P/Hartley 2** may brighten to become a naked eye object in October. But it will be very low in our skies. By October 20 it will be barely 5° above the horizon to the north when at its highest, about 5 am NZDT. ☽

Lunar Occultations

Brian Loader

The list on the next page shows some occultations of brighter stars visible from Christchurch from mid August to mid September 2010. The occultations should mostly be observable using a telescope with an aperture of no more than 100 mm. Those with an upper case D or R should be observable using 50 mm binoculars. Times are for the square in Christchurch. Actual times at other places in Christchurch will differ a little, usually (but not always) a few seconds earlier to the west and a few seconds later to the east. Times are NZST up to September 20 and then NZDT from September 26. Some events are just after midnight, when the hours are shown a 0 for 12 am. The date for these is the NZ calendar date for the time, so for example the event on Oct 14 at 0:01:15 occurs just after midnight on the night of October 13/14.

Date	Time	P	Star	Mag	%ill	alt	CA	Notes
	NZST							
15 Sep	7:08:19	d	S185442	8.5	50+	69	88N	
16 Sep	8:06:04	d	S186800	8.0	61+	67	51N	
16 Sep	9:32:06	d	ZC 2675	7.0	61+	56	67N	
17 Sep	6:58:56	d	S187920	7.4	70+	64	72N	
17 Sep	8:27:48	d	ZC 2821	8.4	70+	67	66N	
17 Sep	10:43:41	d	ZC 2829	6.7	71+	50	82N	
19 Sep	1:04:11	d	ZC 2952	7.5	80+	32	22N	
19 Sep	11:41:57	d	ZC 3072	6.6	87+	50	56S	
20 Sep	10:31:38	D	ZC 3185	5.1	92+	56	65N	
20 Sep	10:34:36	d	ZC 3184	7.0	92+	55	54N	
	NZDT							
26 Sep	3:26:47	R	ZC 221	3.8	-95	30	76S	ZC 221 is double: AB 3.83 7.51 0.53" 64.2
26 Sep	3:57:26	r	S 92487	7.5	-95	29	54N	
29 Sep	1:40:27	r	ZC 598	5.5	-76	8	46S	
02 Oct	5:40:12	r	ZC 1078	6.0	-44	17	58S	
10 Oct	8:18:02	d	S183209	8.0	8+	26	14N	
11 Oct	8:58:05	d	S184189	7.8	16+	30	53N	
11 Oct	9:18:02	d	S184201	9.0	16+	27	75N	
12 Oct	8:36:32	d	S185074	8.1	25+	45	77N	
12 Oct	9:10:20	d	S185098	8.6	25+	39	89N	

Date	Time	P	Star	Mag	%ill	alt	CA	Notes
12 Oct	11:35:31	d	S185189	8.2	26+	14	28S	
13 Oct	9:38:41	d	ZC 2615	7.6	34+	43	35N	
14 Oct	0:01:15	d	S186478	7.1	35+	18	69S	
14 Oct	11:22:22	d	S187649	7.4	45+	32	28N	
15 Oct	1:31:18	D	ZC 2797	2.9	46+	10	32S	
18 Oct	1:28:19	d	S145483	7.9	74+	27	44N	
18 Oct	10:16:41	d	S145957	7.9	81+	52	73N	
18 Oct	10:37:55	d	S145965	7.8	81+	51	56S	
18 Oct	11:06:17	d	S145973	7.8	81+	49	74N	
19 Oct	0:32:39	D	ZC 3272	5.8	81+	39	81S	

Key: *Date/time*: New Zealand date/time, times NZST; *P*: phenomenon (D/d = disappearance, R/r = reappearance); *Star*: catalogue number (S = SAO, ZC = Zodiacal Catalogue); *Mag*: magnitude of the star; *%ill*: percentage of Moon sunlit; *Alt*: lunar altitude in degrees at the time of the event; *CA*: cusp angle of the event, the angle round the dark edge of the Moon from the lit cusp at which the star disappears or reappears. N means measured from the north cusp (lower as seen from NZ), S from the south (upper) cusp.

Events take place at the unlit limb of the Moon, unless otherwise noted. All reappearances are on the west side of the Moon, disappearances are on the east side. More information about observing these interesting events can be obtained from Brian Loader, or the web site http://occsec.wellington.net.nz. ☽

Astronomy news

Sharpest Image Yet of the Antennae

The Antennae galaxies in Corvus (see wide field view at right) provide one of the nearest and most spectacular examples of an ongoing galaxy collision. The two nuclei can be glimpsed with as little as 150 mm of aperture, and larger instruments will show the curving and highly extended tails of tidally disrupted stars which give the pair their common name. Until a few years ago most estimates placed the distance to the pair at around 65 Mly, but a 2008 study of old red giant branch (RGB) stars imaged with the Hubble Space Telescope stars has now reduced that to 45 Mly. The previous larger distance required astronomers to invoke some quite exceptional physical characteristics to account for the spectacular system: very high star-formation rates, supermassive star clusters, ultraluminous X-ray sources etc. The new smaller distance came as something of a relief to theorists, as it makes the pair less energetic and therefore less extreme in terms of the physics needed to explain its observed behaviour.

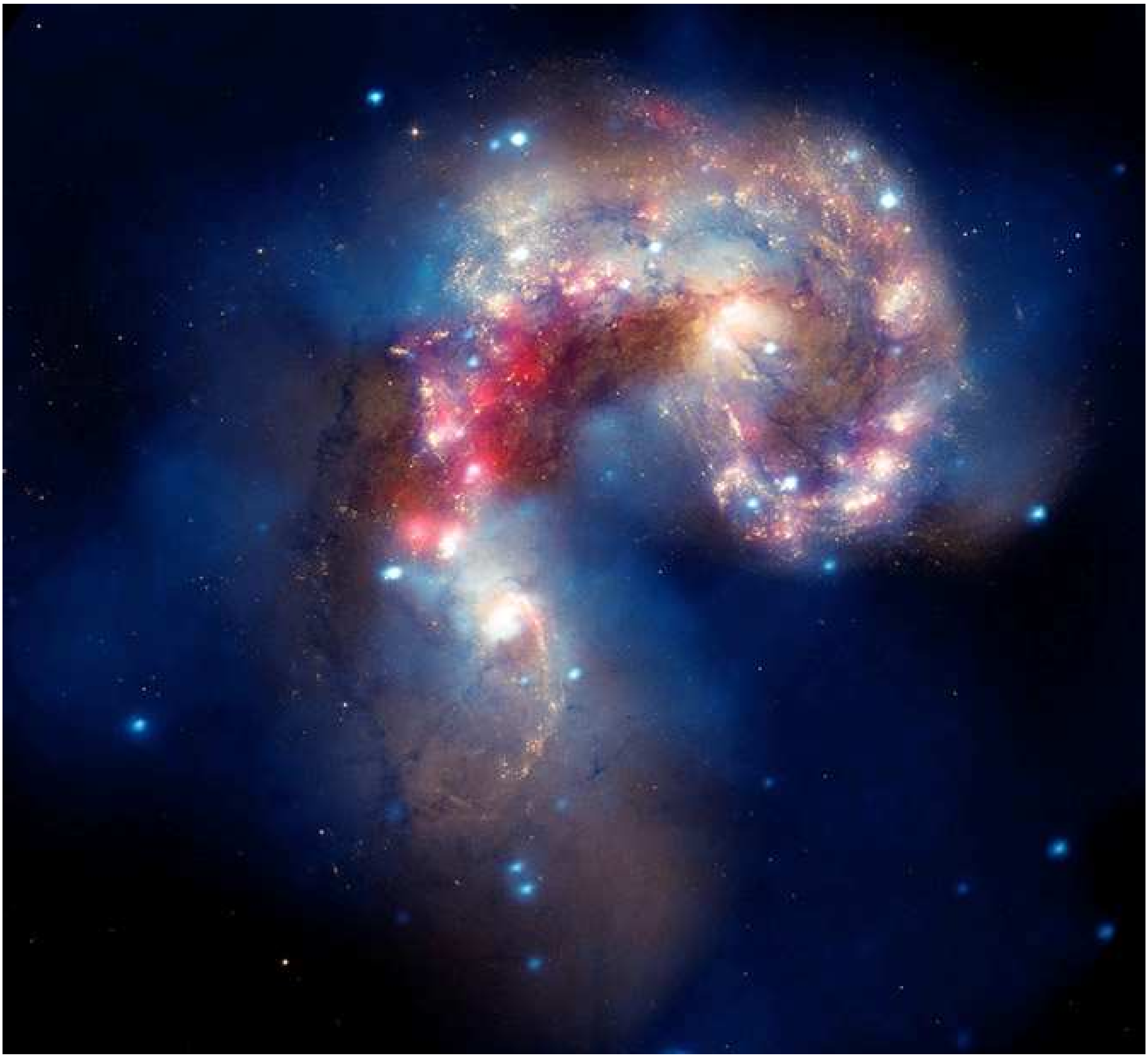
A recently released NASA image (see next page) combines data from Hubble, the Chandra X-ray Observatory, and the Spitzer Space Telescope to show the collision in unprecedented detail. The X-ray image from Chandra (diffuse blue regions) shows huge clouds of hot, interstellar gas, which have been injected with rich deposits of elements from supernova explosions. This enriched gas includes elements such as oxygen, iron, magnesium and silicon, and will be incorporated into new generations of stars and planets. The bright blue point-like sources are produced by material falling onto black holes and neutron stars. Some of these black holes may have masses that are almost one hundred times that of the sun.

The Spitzer data (red) show infrared light from warm dust clouds heated by newborn stars, with the brightest clouds lying in the overlap region between the two galaxies. The Hubble optical image (gold and brown) reveals old stars and star-forming regions in gold and white, while filaments of dust appear in brown. Many of the fainter objects in the optical image are clusters containing thousands of stars.

About 1.2 billion years ago the Antennae were two separate galaxies. NGC 4038 was a spiral galaxy and NGC 4039 was a barred spiral galaxy, with NGC 4039 believed to have been larger than NGC 4038. They began to approach one another 900 million years ago, looking similar to the [interacting pair NGC 2207 and IC 2163] as we see them now. By 600 million years ago the Antennae galaxies had passed through each other, and would have looked like the [Mice Galaxies]. Some 300 million years ago the Antennae's stars began to be released from both galaxies, forming the two streamers of ejected stars that we see today, extending far beyond their original host galaxies.

After a further 400 million years the Antennae's nuclei will collide again, and are expected to merge into a single core with stars, gas, and dust around it. Observations and simulations of other collisions suggest that the Antennae Galaxies will eventually form an elliptical galaxy. The image gives us a sneak preview of what may happen when the Milky Way collides with the neighboring Andromeda galaxy several billion years from now. ☽

Sources: http://www.nasa.gov/mission_pages/chandra/multimedia/antennae.html (main story and image); http://www.wired.com/wiredscience/2010/08/colliding-galaxies, http://en.wikipedia.org/wiki/Main_Page.



Astronomy on your PC

Einstein@Home

Many CAS members will be familiar with, and may have even contributed to, SETI@Home. First released in May 1999, SETI@home is a volunteer computing project using the connectivity of the Internet to harness otherwise idle processing time on home PCs to analyse radio signals collected by the Search for Extraterrestrial Intelligence, or SETI.

SETI@Home has yet to produce any evidence of ETI signals. However, a second and equally important goal of the project was to prove the viability and practicality of the volunteer computing *concept, and from this perspective it is generally considered to have been completely successful. A measure of this success is that* distributed computing *– a system consisting of multiple autonomous computers that communicate through a computer network, working collectively to achieve a common goal – is now a well-established internet phenomenon. As of August 2010, Wikipedia lists over 60 distributed computing projects, in fields as diverse as protein structure, prime number factorisation, climate modelling, and astronomy, which are either active or under development*[2].

One astronomy flavoured project which exploits the power of distributed computing is Einstein@Home, which searches for gravitational waves from pulsars using data from the Laser Interferometer Gravitational Wave Observatory (LIGO) gravitational wave detector, and for radio pulsars in binary systems using data from the Arecibo Observatory in Puerto Rico. The programme gained a flurry of media coverage in early August, when it announced the discovery of a new pulsar in the Arecibo data.

General relativity tells us that we live in a universe full of gravitational waves generated by exploding stars, colliding black holes and other violent events that create waves in space time. Barring an extremely rare chance event such as a merger of two orbiting black holes in our immediate galactic neighbourhood, the strongest gravitational waves we are likely to encounter on Earth create spacetime distortions of about one part in 10^{17}. Detecting such waves demands a precision of measurement equivalent to detecting a change in the distance from the earth to the sun equal to the width of one atom. Remarkably, technology has now reached the point that instruments such as LIGO, and the German-English Gravitational Wave Detector (GEO 600) at Hannover in Germany, can realistically expect to attain this level of precision.

Einstein@Home breaks the enormous amounts of data collected by LIGO and GEO 600 into small sets that can be processed by individual PCs. Each PC gets a chunk of data corresponding to a specific area of sky and a specific time interval, together with a model of the expected form for a pulsar signal from that part of the sky. Essentially, the analysis involves looking for a signal with the appropriate characteristics amongst the cacophony of noise, local disturbances, and perhaps other astronomical signals unrelated to the pulsar search. To carry the musical analogy a little further, the task is a little like trying to extract the sound from a single musical instrument – let's say a flute – from a recording of an orchestra playing at full strength. The mathematical trick that makes this feasible is known as *Fourier analysis*, after the French mathematician and physicist Jean Baptiste Joseph Fourier (1768 –1830), and is probably one of the most important and widely used analytical techniques in astronomy[3].

If your PC happens to find a match, it sends a message back to the central server and the data is re-analysed again by two other computers. If all three computers agree, your signal will be further analysed by comparing it to data from other detectors, so as to determine whether the signal is from a gravitational wave or a local disturbance. If your analysis doesn't match the model, your PC sends that message back to the central server. The same data are analysed by at least one other computer to check for mistakes, but if none are found then the data will not be processed any further.

Setting up and running Einstein@Home on your PC is straightforward. Communication between your PC and the project is handled by a middleware programme created by the Berkeley Open Infrastructure for Network Computing (BOINC). This was originally developed to support SETI@home, and now serves as

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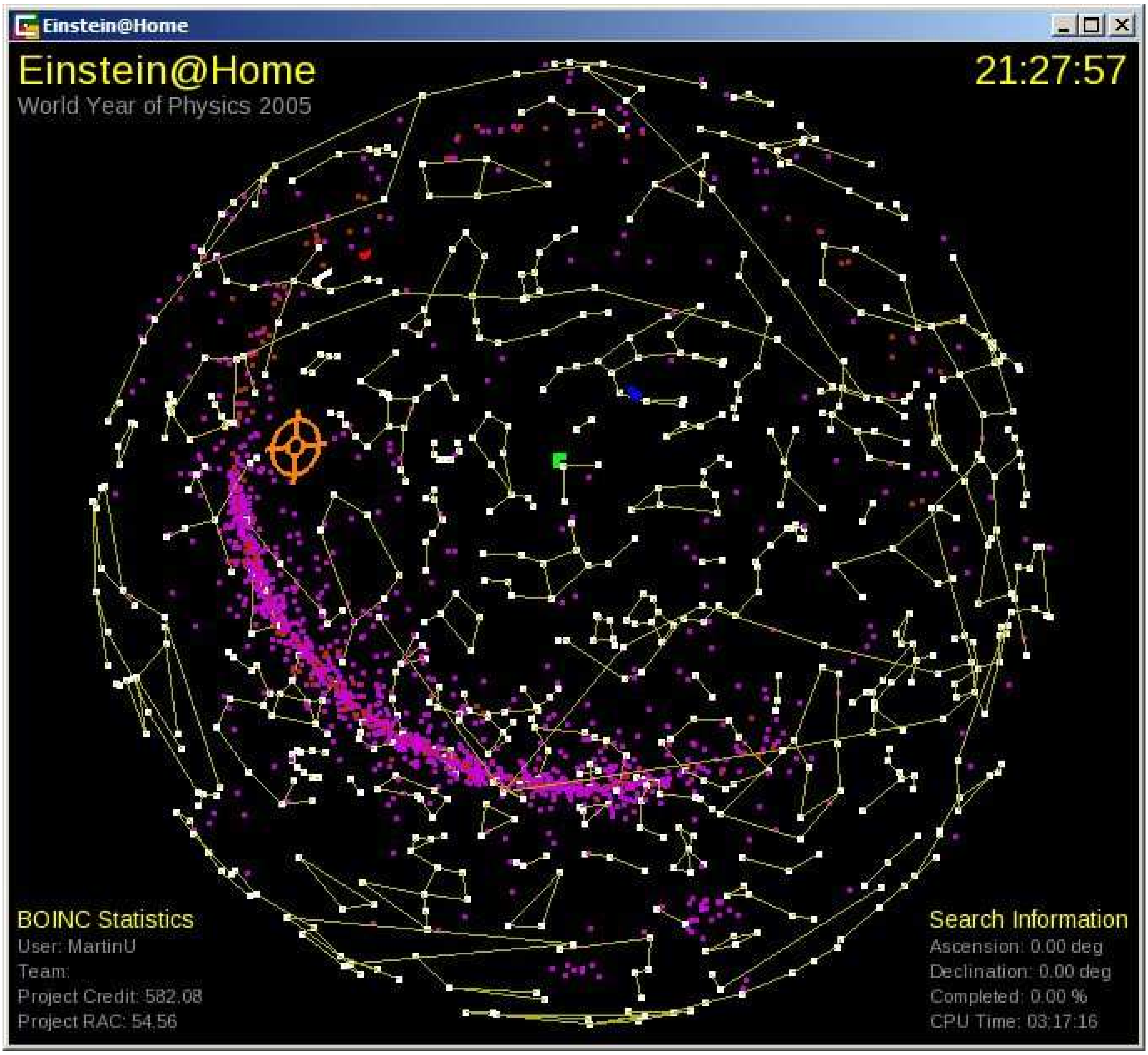
[2] http://en.wikipedia.org/wiki/List_of_distributed_computing_projects

[3] In fact, Fourier transforms are fundamental to almost any scientific or technological application which involves signal processing. When your PC displays the latest .jpg file you have taken on your digital camera, it uses Fourier's mathematics.



Einstein@Home includes an optional screen-saver, which displays a rotating celestial sphere showing the location of known pulsars (purple dots), the current zenith points for the LIGO and GEO 600 detectors (blue, green, and red symbols), and the current search area (orange cross-shaped symbol).

a platform for many distributed applications. Once you have installed BOINC (a 7 MB download from http://boinc.berkeley.edu/), you simply tell the BOINC manager which project(s) you want to attach to. You can control how much of your PC's disk space and memory to allocate to your chosen project, and can also set options such as whether you want it to run continuously in the background while you are working on other tasks, or only when your PC has been idle for a specified time (e.g., 10 minutes).

The much shorter odds of detecting a gravitational wave or pulsar signal relative to the odds of detecting an ETI signal may well make Einstein@Home a more satisfying prospect for amateur astronomers, as the prospect of a tangible result is that much closer: the August 2010 discovery has already generated a publication in the journal *Science* (see http://xxx.lanl.gov/PS_cache/arxiv/pdf/1008/1008.2172v1.pdf). And if gravitational waves do not appeal, you could try one of several other BOINC supported astronomy projects. These include MilkyWay@Home, which uses data from the Sloan Digital Sky Survey to determine the structure of the Milky Way galaxy; Cosmology@Home, which matches various cosmological models against the available data (Beta test version); or Orbit@home, which monitors the impact hazard posed by near-Earth objects (Alpha test version). This list is almost certain to grow, and it's not hard to imagine that – when the Square Kilometre Array (SKA) starts to generate its expected exabytes of daily data – a distributed network of home PCs will not be too far behind. ☽

Canterbury Astronomical Society Inc.

APPLICATION FOR MEMBERSHIP

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Canterbury Astronomical Society Inc.
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Applicant's name in full (block letters): ____

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____

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eMail: ____ Date of birth (if under 18) ____________________

Occupation: ____

Membership Category (*tick; subscription must accompany application. Discounted if paid by 31 May.*)

	Category	Discounted	Full
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☐	Family (two or more persons living at the same address) §	$90	$105
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§ If family membership, please list the other persons involved.

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All CAS members receive CASMag, a monthly newsletter. Would you prefer to receive this (please tick):

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I, the undersigned declare that the information given herein is true.

Signature: ____ Date: _____________________

Proposer: ___________________________________ Seconder: _______________________________

Address: __________________________________ Address: _________________________________