

PRIME FOCUS

M A S J O U R N A L
S O C I E T Y

mas
macarthur
astronomical
society

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From the Editor's Desk

Welcome to the January 2012 edition of Prime Focus - "volume 17, edition 1".

Prime Focus is the Society's monthly electronic journal, containing information about Society affairs and on the subjects of astronomy and space exploration from both members and external contributors.

We are constantly seeking articles about your experiences as an amateur astronomer and member of MAS, on any astronomy-related topic about which you hold a particular interest. Please submit any articles to the Editor at editor@macastro.org.au at any time.

Both "print" (large high-quality PDF) and "screen" (small low-quality PDF) electronic versions of this January edition are now available at the "Members/Prime Focus/2012" menu link on our website at:

<http://www.macastro.org.au> for members to download at their leisure.

Other astronomical societies, as well as industry-related vendors, may request a copy of this edition of Prime Focus in electronic form by sending an email to secretary@macastro.org.au.

If amateur astronomy-related vendors would like to advertise in Prime Focus from next year, then please send an email to the Secretary with your details, and we will endeavour to come back to you with a suitable plan.

Please enjoy this January edition - our first for the new-look year 2012.

*Clear Skies!
Chris Malikoff*

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M.A.S. Hysteria!!!



Then-President outside "m a g n i t u d e" - 2010 - ImageCredit: Chris Malikoff

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Member profile - John Rombi

My interest in the Universe started at the age of three. When the skies were clear, my parents would find me looking at the sky searching for the moon, and staring at it for hours.

I have to say that my fascination for the Universe has not waned in the last 53 years!! I was a child of the "Space Race", and gathered as much information on the Gemini and Apollo flights of the time as I could. I even collected newspaper clippings that filled a large suit case, with the idea of keeping them as an historical record. Unfortunately (unbeknownst to me) my dad threw them all out. I was devastated!!

My first telescope was a Tasco 11VTE (\$14.95 in 1968) from Big W. This little table top scope with 50x40mm specification gave me my first "look" into deep space. Gaining knowledge and confidence, I purchased a Tasco 60mm refractor, but this was quickly sold when I spied in the window of Astro-Optical supply company (Crows Nest) a Unitron 60mm refractor, considered then and now as a premium instrument. It cost \$220 in 1970, a lot of money then!!

I enjoyed this scope so much that it is still in my possession. It was my only scope until 2000, when I was able to purchase a Unitron 4" AltAz. I dreamed as a teenager about owning one of these classics, and here it was in my lounge room.....It's bloody BIG!!

I had many enjoyable nights with this leviathan....until in mid 2005, when I spied Meade's upcoming truss range of reflectors. Up until then, a truss scope was only available in the very expensive price range - but now they would be available to the masses. So in March 2006, I was fortunate to purchase one of the first Meade 12" Lightbridge's in Australia.

Well, going from 2.4" to 4" and then a BIG leap to 12" made a huge difference in the brightness and type of objects I could observe, and may I say that this beauty continues to amaze me as it unfolds the universe in front of my eyes.....

That part of me that is the 3 year old still looks up to the sky each night with amazement and awe.

John

Recently we have been contacted by a couple of newcomers to the hobby with inquiries regarding purchases of telescopes. One for a scope already bought and one for information on what to buy. The MAS members always stand ready to help people as they start out on what can be a very frustrating journey if they feel they need a little extra guidance. This is why it is very nice to be asked to help overcome these obstacles. Also, just seeing people entering our hobby is very heartwarming.

As many of you would know, we have had Comet Lovejoy causing havoc for our members in their attempts to spot this sometimes elusive object. Some have seen it, some have photographed it and some have had no luck whatsoever. I myself am among the latter group. I have been up quite early of a morning trying to find a local spot from which to observe only to stand there in frustration. This Comet will be around a little longer, but it will be fading fast. Good luck with this one.

The decision on Australia's SKA bid will be made within the month. I have felt a tinge of excitement every time I think about such a telescope being here in our country ever since I first heard of it. Now, as the time approaches for the decision, I find it is on my mind more often. Australia has made a good bid and as far as I can tell, we are on a winner. Be ready to celebrate.

Before I finish this month, I would like to congratulate two of our members who have only recently started out into the field of astrophotography and yet, have made great strides forward. Please keep an eye on the Members Photography section of our website for the work of Boris Muratovic and Luke Williams.

Don't forget, the 20th/21st January for The Forest and the 28th January for Stargard.

Looking forward to doin' it with you in the dark...

Trevor



A reminder that current single issues of Prime Focus will be available for sale in hard-copy paper form, in limited numbers, at \$6 each on MAS Forum evenings. Back-issues are also available until sold out.

A happy new year to all members. Let's hope 2012 will be less cloudy than 2011 and that we will get more observing sessions than we have in the last few months, when so many of our scheduled observing nights have been cancelled because of the weather.

Our meetings for the first two months of 2012 will be held in the lecture theatre in Building 30 and I would like to acknowledge the support and cooperation of UWS in making this great facility available to us. From March we have been allocated the lecture theatre at Building 21 on a regular basis for the rest of the year.

Our November Macarthur Astronomy Forum was addressed by our Patron, Professor Bryan Gaensler. His topic coincided with the title of his best-selling astronomy book, *Extreme Cosmos*. It was a great talk and it's a great book. If you haven't yet bought a copy, I recommend you do so.

I reported in my last Column on the committee's aspirations to acquire a future observatory for the Society; and the suggestion that we investigate the potential use of the new Dharawal National Park as a proposed site. To date, a total of three meetings have been held with two of our local State MPs Bryan Doyle and Jai Rowell; and also a meeting with the Mayor of Campbelltown, Anoulack Chantivong, to promote this concept. Whilst it is early days, all three seemed very enthusiastic about supporting our endeavour.

We start the new year with a very healthy membership total of ninety-two, slightly ahead of this time last year and the committee is hoping to build on that total over the next twelve months. When we get asked by interested "outsiders" how many members we have, they are always very surprised to learn that we have over ninety enthusiastic members. We hope that you will all rejoin for the new financial year, which begins on 1st March and that we can boast a membership of over one hundred by the end of the year, for the first time.

Membership fees are due at the end of February and will remain at last year's levels. Treasurer Tony Law will be contacting all members this month with a reminder. He will also be seeking the return of the Membership Application/Renewal Form, which was distributed to members last month. The purpose of the form is to confirm all contact details and seek members responses to a questionnaire.

One of the great unwritten conventions of MAS is that most of what we do is available without charge. Our Macarthur Astronomy Forum is free. Stargard is free. Entry to our public observing nights, exhibitions and lectures is free. We do not charge for holding public outreach events at schools and other community enterprises unless it is a commercial organisation or we are offered a donation. We can all be proud of that tradition. We charge an annual membership fee but try not to otherwise have our members or guests dipping into their pockets all the time.

Unfortunately, we do have to charge members for admission to our premier dark-sky observing site at The Forest, but that is only because we need to recover most of the money we pay in hiring the cabin for a weekend.

Despite our need to build the finances in the pursuit of a potential future observatory, I hope that as many aspects as possible of what we do, as a Society, can remain as a free service, both to our members and to the general public, to advance the knowledge of astronomy amongst all sections of the community. Astonishing as it may seem, there are many people in our community who equate astronomy with either astrology or UFOs. There are many people who don't know that the Sun is a star (but close up); and that the stars are just suns (but far away). Too many people get sucked into hoaxes that tell them that Mars will appear as big as the Moon, or the World will end next December because of a near alignment of the Sun with the galactic centre, which actually happens every December.

The MAS public outreach programme is designed to educate people about astronomy and to remove the superstition. Bringing your telescope to a free public night or a school night is the best way you can help with that.

The committee is intending to make another approach to business organisations to sell advertising space on our website and in Prime Focus; and to seek sponsorship for some of our activities in 2012. Our efforts last year were without success - but we believe our very reasonable and negotiable prices will one day attract a discerning outfit who will see the benefits of associating themselves with the MAS 'brand', together with it's members and the public who read about us. Please contact a committee member if you know of such an organisation.

ROGER POWELL

Society Schedule

January 2012

16/1/2012

Macarthur Astro Forum

20/1/2012

The Forest

21/1/2012

The Forest

28/1/2012

Stargard

"In a Flat Spin"

Part 1

THERMODYNAMICS:
CAN YOU REALLY GET
SOMETHING FOR
NOTHING?

A SERIES OF ARTICLES BY
DAVY JONES

At some time in our lives, most of us have briefly speculated about the possibility of perpetual motion. Perhaps we have imagined a machine, driven by magnets or weights, capable of continuous self-propulsion - and maybe even capable of energy output. Such a machine could solve the world's power problems by providing access to 'free energy'. Surely, all one has to do in the first place is to be a bit creative - apply a little human imagination and originality. The end result could bring everlasting fame and fortune.

The long history of the dream of perpetual motion, is littered with the leftovers of such 'eureka' moments. Oddly, there is no record to be found of interest about such machines in Ancient Greece - the fount of so many early scientific concepts; rather, the idea seems to have originated in the Orient. Brahmagupta (c. 598-c. 670), was an important mathematician and astronomer of ancient India. In c. 624, he first illustrated how a perpetual motion machine might be made to work. Predictably perhaps, his creation involved a wheel of light timber and equally spaced, hollow spokes. Each spoke was to be half-filled with mercury - with a seal at the rim extremity. Once set in motion, the wheel would henceforth, theoretically, rotate forever. If you think that Brahmagupta was a bit of an old Indian oddball, consider this; it was he who

was responsible for the introduction of some extremely important ideas into basic mathematics. Not least among these concepts was the introduction of the digit - zero - and the use of algebra in describing and forecasting astronomical events.

What lay behind this curious obsession with perpetual motion and wheels is unclear; perhaps some tenuous link with the cyclic Indian philosophy of the natural world. What is clear, however, is the intensity with which this fascination preoccupied generations of theorists thereafter. Countless times references indicates the parallels between the fanatical alchemist's search for the Philosopher's Stone (lapis philosophorum) and the hunt for the legendary - perpetual motion.

Many years later, another Indian astronomer and mathematician, Lalla (c. 720-790 CE), wrote a famous commentary entitled - *Shishyadhividdhidatantra* - in which he describes yet another version of a perpetual wheel with hollow, mercury-filled spokes. Inevitably, later still, a similar device surfaces yet again, in ancient Arabic writings.

And so the years fled by; in the 13th century, Villard de Honnecourt (c. 1225-c. 1250), a French architect, created designs for an overbalanced wheel - see Villard's Wheel. This wheel sat in an upright frame; the wheel being fitted with equally spaced hinged mallets

around its rim. There is recent debate about some glaring irregularities in Honnecourt's imaginative sketches.

In the 15th century, Leonardo da Vinci - famous today for, amongst other things, his futuristic sketches - appears to have produced drawings of perpetual motion devices. There was a noticeable difference with da Vinci's sketches to earlier perpetual motion proposals, in that his devices seemed designed to 'do work', such as lifting water. To achieve this 'work', da Vinci combined the use of 'wheels' and the 'Archimedean Screw' - to produce what was termed - a 'recirculation mill'. There are a couple of points worth noting here in that:

1. water itself, was thought for many hundreds of years, to be endowed with mystical properties... and:
2. The basic concepts of force, energy and momentum were not developed until the early in the 19th century.

Around this same historical period, Mark Anthony Zimara, (1460-1523) published a paper on physics and metaphysics in which he described a machine that would allegedly work without the use of water or weights. What is interesting about this machine, as with da Vinci's water-wheel, it appears to be an early example of the "bootstrap principle". Today - we find the phrase, "bootstrap", linked with certain aspects of quantum physics.

Defining the "bootstrap principle" - is likely to produce an instant headache - however, to use a simple analogy, "if one falls into a hole - and then pulls one's-self out of the hole by one's own hair" - that action is essentially - "bootstrapping".

As the passage of history progressed, so too the exotic list of so-called perpetual motion machines continued to grow. The "Persian Wheel" - "De La Faye's Wheel" - the perpetual "perverted siphon" and "Fludd's Wheel" of 1618 - to name but a few.

One extremely controversial gentleman, with the illustrious name of Johann Ernst Elias Bessler (1680-1745), claimed to have tested three hundred diverse forms of perpetual motion apparatus; finally producing two successfully working machines between 1712 and 1719. Even today, there are avid Bessler devotees, who argue in favour of his work. It should be noted - Bessler was a very accomplished clockmaker - and naturally, tales abound relating to his possible fraudulent behaviour. Bessler's so-called, public demonstrations, left much to be desired in the

*"Oh, ye seekers after
perpetual motion, how many
vain chimeras have you
pursued? Go and take your
place with the alchemists."*

Leonardo da Vinci

area of scientific empirical transparency. He is often disparagingly compared to a stage illusionist.

While on the face of it, much of the labours that went into the development of these countless machines over the years seems to have been wasted effort - it should be remembered that the mechanical skills and scientific knowledge being developed in the process would eventually prove extremely useful. Jacob Leupold (1674-1727) is reported to have said: "All they have learned is that man cannot achieve more in mechanics than God allows, and that with one pound nothing more than one pound can be moved, but only kept in equilibrium..." (sic) Visionary words indeed for his time.

In the early 19th century, a politician and very productive inventor - Sir William Congreve (1772-1829) - created his adaptation of a perpetual motion contraption. This machine involved an bizarre sloping plane with a chain that was, theoretically, to move constantly over a chain of wet sponges and roller guides. The sponges absorbed water via capillary attraction, thus becoming heavy - causing a downward force. As the sponges 'cycled' through on the chain, they would be wrung out - as a result causing them to become lighter, and consequently repeating the cycle over and over again. Whilst the long departed Sir William published a pamphlet, defending his design - there is no evidence to suggest that he ever actually built the machine - nor, of course, that it worked.

Today, if one runs a quick search on the Internet - one will find many contemporary claims relating to the long refuted and discredited notion of perpetual motion. Astoundingly outrageous assertions proliferate - some I suspect 'revolve' more around generating

income, than generating perpetual motion! One site claims to have discovered the "core elements of perpetual motion...that include inner repelling magnets and rotating gears." The article ends with the statement that one doesn't need to be a physicist to construct such a machine. It closes with an offer of a DIY kit - complete with the necessary tools - to "create your own generator". Yet other sites demonstrate, via ambiguous video clips, apparently working models of a variety of Free Energy Generators.

Even after thousands of years - human naïveté in fact - remains the richest source of perpetually generated income.

To be continued...

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Image Credit: NASA

2013 Hawaiian Sojourn

MAS Field Trip

Tony Law

Another reminder to MAS members - we are arranging a trip to the 'Big Island' of Hawaii in 2013.

Planned itinerary is for 5 nights viewing on Mauna Kea, Hawaii (Hilo) and four days on Oahu (Honolulu). Hilo is the start point for visiting the major telescopes on the summit and observing from the Onikuza Visitors centre. A trip to the Kilauea Volcano is also envisaged.

On Oahu we will stay in Waikiki and visit Pearl Harbor, the Polynesian cultural centre, Pipeline (surf beach), etc However itinerary here is flexible, some may wish to go elsewhere from here, we will discuss closer to the time.

The anticipated total cost will be around \$1,250.00 for airfares, \$1,000 for accommodation and \$500.00 for food etc. Another couple of hundred for transport so about \$3,000.00 in total. Add a couple of hundred for incidental tours. We'll provide more details much closer to the time.

To help MAS Members save for this trip, we have set up a special bank account. You may pay in whatever and whenever you wish by direct debit or by cash over the counter. You must ensure that you include your name in the reference when you make the deposit so that it can be refunded if required. This is a non-interest-bearing account.

We look forward to hearing from all interested.

Call Tony on 0419 215199 if you have any questions or would like to know the bank account details.



Planned Itinerary

Depart: Sydney Tuesday 4th September 18.00

Arrive: Honolulu Tuesday 4th September 07.45 - we cross the dateline!

Depart: Honolulu Tuesday 4th September 11.48

Arrive: Hilo Tuesday 4th September 12.50

Accommodation: see <http://www.seasidehotelshawaii.com/HotelHilo.aspx>

Nights of 5-9th on Mauna Kea. See weather forecasts: <http://mkwc.ifa.hawaii.edu/forecast/mko/>

Thursday 6th September – Special visit to Gemini North and one of IRTF, CFHT, or the UH 2.2 meter, plus the Keck visitors observation room.

Saturday 8th and Sunday 9th September – drive Mauna Kea summit in convoy for night time viewing

Bus trip to Volcanoes National Park is 12 hours and costs \$179.00 - probably not advisable as we want to do MK each night! By Helicopter 1hour \$230.00. See <http://www.hawaiiactive.com/activities/bigisland-paradise-helicopter.html>

Depart: Hilo Monday 10th September 13.18

Arrive: Honolulu Monday 10th September 12.07

Accom: <http://www.outrigger.com/hotels-resorts/hawaiian-islands/oahu-waikiki/ohana-waikiki-east#tab-prop-detail-rooms>

Tuesday 11th: Pearl Harbour, Arizona, Missouri etc \$70.00

Wednesday 12th: Polynesian Cultural Centre, tour, dinner and show \$150.00

Thursday 13th: Shopping/sightseeing in Honolulu/Waikiki

Depart: Honolulu Friday 14th September 12.45 (or your own itinerary from here)

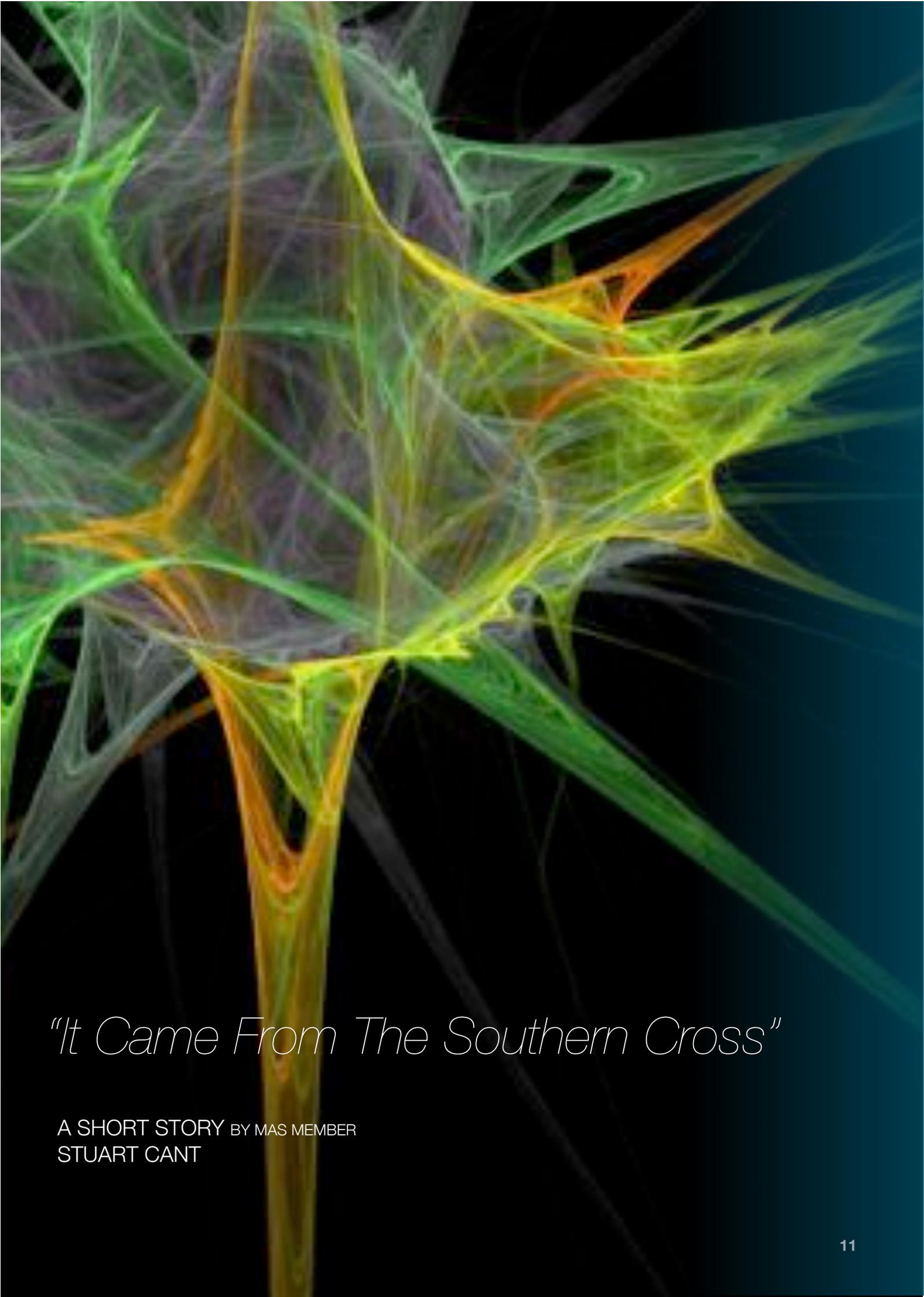
Arrive: Sydney Saturday 15th September 19.30 -dateline crossed!

Tentative total:

Flights	\$ 1200.00
Accom.	\$ 500.00 based on twin share
Heli tour	\$ 230.00 optional
Pearl Hbr.	\$ 70.00 optional
PCC	\$ 150.00 optional
Meals	\$ 400.00
Veh Hire Hilo	\$ 100.00

Total Cost \$2650.00 excluding discretionary shopping!!!

In order for MAS Members to save for this trip we have set up a special bank account. You may pay in whatever and whenever you wish by direct debit or by cash over the counter. Account is at the Commonwealth Bank, name is Macarthur Astronomical Society BSB 062656 a/c no. 10243417. You must ensure that you include your name in the reference when you make the deposit. Please advise me when you make your initial deposit so that we can start a spreadsheet with all those making payments.



"It Came From The Southern Cross"

A SHORT STORY BY MAS MEMBER
STUART CANT

Moving into a new house is a hectic business, and I was glad when we were settled in.

After a few days, our neighbour greeted me over the back fence. "Hi, I'm Heinrich Grüber."

I noticed a strong German accent, although his English was fluent.

"I'm Peter Todd," I responded, and we shook hands over the fence.

"Like to come over for a cup of tea und ein bier or two?"

While we waited for the kettle to boil, Heinrich took two stubbies of beer out of the refrigerator and gave me one.

"How long have you been in Australia?" I asked him.

"Oh, about sieben, I mean seven, years."

We began to talk about our work and hobbies. Heinrich was an amateur astronomy enthusiast.

"Come and see my telescope" he said, and led the way to the shed in his backyard. I did not understand what he was saying as he moved the telescope out of the shed. It sounded like gobbledegook to me, as he told me what I assumed to be the technical specifications of his exotic toy, although I heard him say something about it being a "Dobsonian". I did not know what a Dobsonian was.

I began to understand when he set it up on the lawn. "The Dobsonian mounting is simpler than a tripod," Heinrich explained, drawing my attention to what appeared to be a turntable on the ground, on which the telescope sat. Bearings also allowed up and down movement. He went on to explain its optical principles.

Being daytime, Heinrich could not show me any of the wonders of the night sky, but he told me his astronomical club was having a viewing night at the sports field a few kilometers out of town, and he invited me along.

"Yes, I'll come," I replied, "I'll bet it will be cloudy and we won't see a thing."

"Let's hope you are wrong. We can't control the weather, so we can never be sure."

We were lucky with the weather, there was not a cloud in the sky. As we left the town behind us the sky was very dark and the stars were brilliant. A crescent moon, low in the West, gave so little light that the stars shone at their full brilliance.

"Here we are," Heinrich remarked as he turned off the road and through the gate into the sports field. Some of the club members were already there with their telescopes set up in a row across the field. Others were arriving while I helped Heinrich take his telescope out of his car and set it up in line with the others.

"Before the moon sets, let me show you some of its craters and mountains," said Heinrich. I was intrigued to see the Lunar features, the rings of Saturn, the Great Red Spot on Jupiter, which in most amateur telescopes appeared as only a "Tiny Red Dot". He called my attention to four tiny points of light that he said were Jupiter's largest moons.

Next he turned his telescope to a bright star in the southern sky.

"That is Alpha Centauri," he told me. "It is the closest star to the Earth, except for the sun. You will notice it's a double."

As I looked I could see that what I thought was a single star was actually a pair. He explained that a very dim star orbited the other two, taking a million years to make one orbit.

"Oh yes! I see it!" I exclaimed.

"Are you sure? You shouldn't be able to see something so faint with this telescope. Let me have a look." After a brief scan, he let out a shout of astonishment. "Hey guys!" he called out across the darkened field, "Do you see anything unusual near Alpha Centauri?"

I did not understand the rest of what he said, which described the exact co-ordinates of the mysterious object in scientific terminology. All the telescopes on the field turned to the south. After a moment of silence I heard a few gasps of surprise.

"What is it?" I asked, puzzled.

"We don't know yet. You have discovered an unknown asteroid or comet, or something," came a voice from the darkness.

"If it is an asteroid, you have the right to name it, subject to approval by the International Astronomical Union" Heinrich told me.

"If it is a comet, it will be known as Comet Todd," another disembodied voice in the darkness added.

"Maybe it's a new planet?"

"Not likely. We'd know about it if it had always been there"

"Maybe a UFO?"

"You've been reading too much science fiction!"

"Possibly it's a supernova?"

Hearing all these unknown voices all around discussing what I had seen left me confused and befuddled. I found it hard to believe that a man like me with no knowledge of science could make a startling discovery. I understood very little of the excited chatter that ensued.

On the way home, Heinrich explained that many comets, asteroids, and supernovas are discovered by amateurs.

"Professionals are busy with long-term projects, and haven't time to watch the whole sky all at once. Comets and supernovas appear unexpectedly at any time or place, and will be spotted by someone who happens to be looking in that direction at that time" he explained.

Next day, the phone rang. It was the president of the local astronomical society.

"What you saw last night was a comet. It's the custom to name comets after their discoverers, so unless someone saw it before you did, it will be named "Comet Todd", and the International Astronomical Union will approve the name and give it a catalogue number."

About two weeks later, Heinrich took me to a meeting of the Astronomical Society in the assembly hall at the local high school. I felt a little self-conscious about being the centre of attention. Another comet? There are lots of comets in space, what was special about this one? With no knowledge of astronomy, I had difficulty understanding the lecture presented by the guest speaker - something about Black Holes, I think. Heinrich tried to explain it on way home as simply as he could.

Next day he loaned me some books.

"This one should be the best one to start with", he said as he handed me "A Childrens' Guide to the Night Sky". "This was given to me on my eleventh birthday by relatives in England, which explains why it is in English, not German. These other books are more adult but easy to understand. I have other books at home, but they are too technical for beginners."

I was beginning to understand the basics by the next monthly meeting. After having accidentally discovered one, I had paid close attention to the chapters on comets in Heinrich's books.

"Professionals all around the world are tracking your Comet" the president told me. " It will come very close to Earth."

"How close?"

"Possibly closer than the Moon."

Having read my borrowed books, I knew the Moon was four hundred thousand kilometers away, so I replied, "That's a long way!"

"Oh, no. Space is so vast, that's almost a direct hit."

"Gee whizz! Is there any chance of it hitting us?" I asked nervously.

"I hope not. Just remember that the Earth is only a tiny dot in the vastness of space, like one grain of sand on a beach."

A few days later the comet appeared on the edge of the Southern Cross. About then, the coma and tail formed as the warmth of the sun vaporised frozen gasses, forming a spectacular glowing cloud around the nucleus. Astronomers all over the world were surprised how close it was.

"It is going to come awfully close to us," Heinrich told me. "In fact, it might even graze the edge of the atmosphere."

"Nothing has come anywhere near that close since the end of the age of the dinosaurs," I said in surprise.

"You are wrong about that," Heinrich argued. "A comet, or maybe an asteroid, crashed into a remote region of Siberia in 1908 with the force of an atomic bomb - and in 1972, a nine thousand ton asteroid actually touched the edge of the atmosphere before returning to space. If it had hit the ground, it would have created an explosion five times more powerful than the Hiroshima bomb. We were extremely lucky, It missed us by a hair's breadth."

What a sobering thought that was. I was shocked when he added that Comet Todd would come even closer than the 1972 asteroid.

Every night the comet with my name on it grew brighter as it came closer. Its tail stretched across the sky, and the nucleus (now close enough to be clearly visible) was surrounded by a huge cloud of glowing gas and dust. All the world's astronomers 'were beginning to fear that my comet might even hit the ground. Every night it came yet closer. Its glowing coma now covered a large part of the night sky and its light began to rival that of the full moon.

The comet hit the edge of the atmosphere shortly after sunset. I saw the gigantic fireball almost directly overhead, like a nuclear explosion with a long trail of fire behind it. It was much

brighter than daylight and the heat was unbearable. Fire alarms went off all over town, and I heard fire engines and police cars hurrying to more emergencies than they could handle.

A loud bang and a deep roar could be heard all over the world when the shock wave hit the ground. I was horrified to see fires breaking out all over town. Would

the comet hit the ground and destroy the world? Where would it hit?

It did not hit. The world was saved from destruction. Only a few minutes after entering the atmosphere, it hurtled back into space. Its closest approach to the ground had been less than thirty kilometers. The damage caused during those few minutes was incalculable. Fires broke out all over the world, and the heat began to melt large volumes of ice in Antarctica and Greenland.

In the moonlight I could see the enormous trail of steam left behind by vaporised ices from the comet. In the morning, the air was full of smoke from numerous fires, which raged for days.

Each day the remains of the comet travelled further from the Earth. Every astronomer in the world tracked its movement. What a relief! Soon it would be gone forever.

A week later we were horrified to learn that it would not be gone forever.

"It will be back," Heinrich told me.

"But didn't you say it was traveling too fast to be captured by the Earth's gravity?"

"Yes, it was. At that speed our gravity would have very little effect on its path, but flying deep into our atmosphere slowed it down to below escape velocity. As it climbs away from Earth, it will slow down until it reaches its furthest point outside the orbit of the Moon. By then it will be traveling too slowly to remain at that distance, and will then fall back to Earth and gain speed until it re-enters the atmosphere at about the same height and speed as before."

"How soon will it be back?"

"In just under a month," Heinrich informed me.

The world had not recovered from the comet's closest approach when it returned. This time of its ice had boiled away during its previous encounter with our atmosphere. However, it was nearly as spectacular and devastating as it had been the first time - again the brilliant fireball and the rumble of its shock wave. What a relief when it left the atmosphere for the second time!

Having been slowed by its second entry into the atmosphere, the comet's furthest distance was only half that of its first orbit, and it returned again in less than a fortnight. After a few circuits of the Earth, the comet no longer had the speed to climb away, but now circled it a few times at the edge of the atmosphere until all its ice had turned to steam.

Unfortunately that was not the end of the emergency, it was only the beginning of the end. Even though the comet was mostly frozen gasses and ice, it

also contained a lot of rubble - thousands of tons of it. Over the next few days the whole world saw the most spectacular meteor showers ever seen. Thousands of rocks fell from the sky. Some were as big as houses and hit the ground with the force of atomic bombs. There was no telling where the next one would fall. People all over the world trembled in terror.

It took much longer for the climate to return to normal. Evaporation from the oceans and steam from the comet saturated the atmosphere with moisture, and the resulting storm clouds led to extremely heavy rainfall. There were even reports of flash floods in the Sahara Desert for the first time since the human race began.

When life returned to normal, Heinrich and I looked at the casualty figures in the newspapers.

"We are lucky to have survived," I remarked.

"Jawohl, mein freund. It is a very dubious honour to have your name on the comet that caused so much death and destruction. I didn't like to say so before, but "tod" is the German word for death."

Herschel and Spitzer See Nearby Galaxies' Stardust

This new image shows the Large Magellanic Cloud galaxy in infrared light as seen by the Herschel Space Observatory, a European Space Agency-led mission with important NASA contributions, and NASA's Spitzer Space Telescope.

Image credit: ESA/NASA/JPL-Caltech/STScI



PASADENA, Calif. – The cold dust that builds blazing stars is revealed in new images that combine observations from the Herschel Space Observatory, a European Space Agency-led mission with important NASA contributions; and NASA's Spitzer Space Telescope. The new images map the dust in the galaxies known as the Large and Small Magellanic Clouds, two of the closest neighbors to our own Milky Way galaxy.

The new images are available at the following links:
http://www.nasa.gov/mission_pages/herschel/multimedia/pia15254.html
http://www.nasa.gov/mission_pages/herschel/multimedia/pia15255.html

The Large Magellanic Cloud looks like a fiery, circular explosion in the combined Herschel-Spitzer infrared data. Ribbons of dust ripple through the galaxy, with significant fields of star formation noticeable in the center, center-left and top right (the brightest center-left region is called 30 Doradus, or the Tarantula Nebula, for its appearance in visible light). The Small Magellanic Cloud has a much more irregular shape. A stream of dust extends to the left in this image, known as the galaxy's "wing," and a bar of star formation appears on the right.

The colors in these images indicate temperatures in the dust that permeate the Magellanic Clouds. Colder regions show where star formation is at its earliest stages or is shut off, while warm expanses point to new stars heating dust surrounding them. The coolest areas and objects appear in red, corresponding to infrared light taken up by Herschel's Spectral and Photometric Imaging Receiver at 250 microns, or millionths of a meter. Herschel's Photodetector Array Camera and Spectrometer fills out the mid-temperature bands, shown in green, at 100 and 160 microns. The warmest spots appear in blue, courtesy of 24- and 70-micron data from Spitzer.

"Studying these galaxies offers us the best opportunity to study star formation outside of the Milky Way," said Margaret Meixner, an astronomer at the Space Telescope Science Institute, Baltimore, Md., and principal investigator for the mapping project. "Star formation affects the evolution of galaxies, so we hope understanding the story of these stars will answer questions about galactic life cycles."

The Large and Small Magellanic Clouds are the two biggest satellite galaxies of our home galaxy, the Milky Way, though they are still considered dwarf galaxies compared to the big spiral of the Milky Way. Dwarf galaxies also contain fewer metals, or elements heavier than hydrogen and helium. Such an environment is thought to slow the growth of stars. Star formation in the universe peaked around 10 billion years ago, even though galaxies contained lesser abundances of metallic dust. Previously, astronomers only had a general sense of the rate of star formation in the Magellanic Clouds, but the new images enable them to study the process in more detail.

The results were presented today at the 219th meeting of the American Astronomical Society in Austin, Texas.

Herschel is a European Space Agency cornerstone mission, with science instruments provided by consortia of European institutes and with important participation by NASA. NASA's Herschel Project Office is based at NASA's Jet Propulsion Laboratory, Pasadena, Calif. JPL contributed mission-enabling technology for two of Herschel's three science instruments. The NASA Herschel Science Center, part of the Infrared Processing and Analysis Center at the California Institute of Technology in Pasadena, supports the United States' astronomical community.

JPL manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center at Caltech. Caltech manages JPL for NASA.

For more information about Herschel, visit <http://www.herschel.caltech.edu>, <http://www.esa.int/SPECIALS/Herschel/index.html>

For more information about Spitzer, visit <http://spitzer.caltech.edu/> and <http://www.nasa.gov/spitzer> .

This new image shows the Small Magellanic Cloud galaxy in infrared light from the Herschel Space Observatory a European Space Agency-led mission with important NASA contributions, and NASA's Spitzer Space Telescope. Image credit: ESA/NASA/JPL-Caltech/STScI

Manned **Chinese** Space Program



COMPILED BY
TONY LAW

Nie Haisheng exits the re-entry capsule of Shenzhou 6



As the Space Race between the two superpowers reached its climax with the conquest of the Moon, Mao Zedong and Zhou Enlai decided on July 14, 1967 that the PRC should not be left behind, and therefore initiated China's own crewed space program. The top-secret Project 714 aimed to put two people into space by 1973 with the Shuguang spacecraft. Nineteen PLAAF pilots were selected for this goal on March 1971. The Shuguang-1 spacecraft to be launched with the CZ-2A rocket was designed to carry a crew of two. The program was officially cancelled on May 13, 1972 for economic reasons, though the internal politics of the Cultural Revolution likely motivated the closure.

The short-lived second crewed program was based on the successful implementation of landing technology (third in the World after USSR and USA) by FSW satellites. It was announced a few times in 1978 with the open publishing of some details including photos, but then was abruptly canceled in 1980.

A new crewed space program was proposed by the Chinese Academy of Sciences in March 1986, as Astronautics plan 863-2. This consisted of a crewed spacecraft (Project 863-204) used to ferry astronaut crews to a space station (Project 863-205). In September of that year, astronauts in training were presented by the Chinese media. The various proposed crewed spacecraft were mostly space planes. Project 863 ultimately evolved into the 1992 Project 921.

Project 921

Shenzhou program - The name is variously translated as "Divine Craft", "Divine Vessel" or similar, but is also a reference to a literary name for China with the same pronunciation (literally "Divine Land").

In 1992, authorisation and funding was given for the first phase of Project 921, which was a plan to launch a crewed spacecraft. The Shenzhou program had four uncrewed test flights and two crewed missions. The first one was Shenzhou 1 on November 20, 1999. On January 9, 2001 Shenzhou 2 launched carrying test animals. Shenzhou 3 and Shenzhou 4 were launched in 2002, carrying test dummies. Following these was the successful Shenzhou 5, China's first crewed mission in space on October 15, 2003, which carried Yang Liwei in orbit for 21 hours and made China the third nation to launch a human into orbit. Shenzhou 6 followed two years later ending the first phase of the Project 921. Missions are launched on the Long March 2F rocket from the Jiuquan Satellite Launch Center.

The second phase of Project 921 started with Shenzhou 7, on 25 September 2008 – three-man crew with Zhai Zhigang (who conducted China's first spacewalk), Liu Boming and Jing Haipeng. Then, two crewed missions are planned to the first Chinese space laboratory. The PRC initially designed the Shenzhou spacecraft with docking technologies imported from Russia, therefore compatible with the International Space Station (ISS). On September 29th, 2011, China launched Tiangong (Heavenly Palace) 1. This target module is the first step to testing the technology required for a planned space station.

On October 31, 2011, a Long March 2F rocket lifted the Shenzhou 8 uncrewed capsule which docked twice with the Tiangong 1 module. Two manned missions are planned for 2012/13 designated Shenzhou 9 and Shenzhou 10. The Tiangong 1 target module is then expected to be de-orbited.

A second space lab, Tiangong 2 will be launched in 2013. This will be larger than Tiangong 1 at some 20



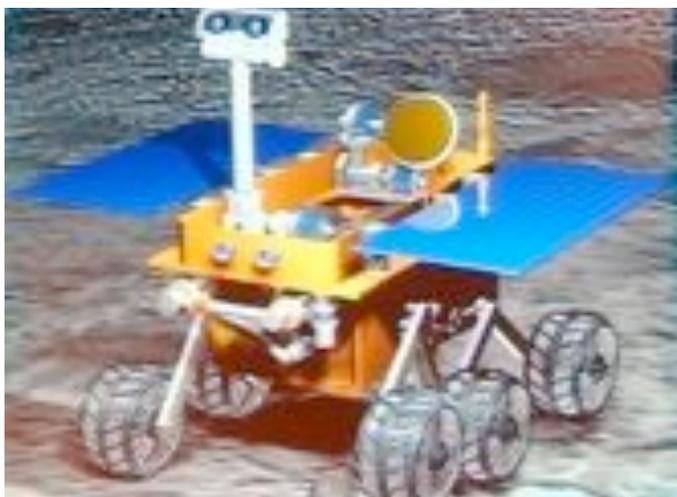
Shenzhou 5 re-entry module

tons and 14.4 m length. This will be visited by future Shenzhou missions though exact details are not yet available.

Tiangong

A larger basic permanent space station would be the third and last phase of Project 921. This will be a modular design with an eventual weight of around 60 tons, to be completed sometime before 2020. The first section, designated Tiangong 3, is scheduled for launch in 2015. Tiangong 3 will weigh 22 tons and be 18.1 m long. Additional modules will be connected over several missions to build the space station.

This could also be the beginning of China's crewed international cooperation, which existence was officially disclosed for the first time after the launch of Shenzhou 7.



Chang'e-3 Chinese Lunar Rover

The Chinese space station is scheduled to be completed in 2020, just as the International Space Station is scheduled to retire. See: <http://www.space.com/11592-china-space-station-tiangong-details.html>

Proposed lunar exploration

In February 2004, the PRC formally started the implementation phase of its un-crewed Moon exploration project. According to Sun Laiyan, administrator of the China National Space Administration, the project will involve three phases: orbiting the Moon; landing; and returning samples. The first phase planned to spend 1.4 billion renminbi (approx. US\$170 million) to orbit a satellite around the Moon before 2007, which is ongoing. Phase two involves sending a lander before 2010. Phase three involves collecting lunar soil samples before 2020.

On November 27, 2005, the deputy commander of the crewed spaceflight program announced that the PRC planned to complete a space station and a crewed mission to the Moon by 2020, assuming funding was approved by the government. Towards that end it intended to perfect space walking and docking by 2012.

On December 14, 2005, it was reported "an effort to launch lunar orbiting satellites will be supplanted in 2007 by a program aimed at accomplishing an un-crewed lunar landing. A program to return un-crewed space vehicles from the moon will begin in 2012 and last for five years, until the crewed program gets underway" in 2017, with a crewed Moon landing some time after that.

On June 22, 2006, Long Lehao, deputy chief architect of the lunar probe project, laid out a schedule for China's lunar exploration. He set 2024 as the date of China's first moonwalk. In September 2010, it was announced that the country is planning to carry out explorations in deep space by sending a man to the Moon by 2025. China also hopes to bring a moon rock sample back to Earth in 2017, and subsequently build an observatory on the Moon's surface. Ye Peijian, Commander in Chief of the Chang'e program and an academic at the Chinese Academy of Sciences, added that China has the "full capacity to accomplish Mars exploration by 2013."

As indicated by the official Chinese Lunar Exploration Program insignia, denoted by a calligraphic Moon ideogram (月) in the shape of a nascent lunar crescent, with two human footsteps at its centre, the ultimate objective of the program is to establish a permanent human presence on the Earth's natural satellite. Yang Liwei declared at the 16th Human in Space Symposium of International Academy of Astronautics (IAA) in Beijing, on May 22, 2007 that building a lunar base was a crucial step to realise a flight to Mars and farther planets.

According to practice, since the whole project is only at a very early preparatory research phase, no official crewed Moon program has been announced yet by the authorities. But its existence is nonetheless revealed by regular intentional leaks in the media. A typical example is the Lunar Roving Vehicle that was shown on a Chinese TV channel during the 2008 May Day celebrations.

Info in this article from Wikipedia, Chinese Space Agency and various other 'Googled' sources.

Jupiter - 30th December 2011
2200hrs AEDT (1100 UT)



Magnitude: -2.84
 Altitude: 144.0
 Azimuth: 412.27 04°
 Equipment used: Skywatcher ED110, Orion 10mm Guide Scope,
 10:1 Crawford Focuser, 2x Barlow, UV/IR Filter, SPCC006C,
 5000 frames stacked w/Registar 6.1.
 Location: Murrumbidgee Fields, NSW, Australia.
 A - Great Red Spot.

Io
 Europa

L. Williams

Jupiter - 30th December 2011
2200hrs AEDT (1100 UT)



Magnitude: -2.84
 Altitude: 144.0
 Azimuth: 412.27 04°
 Equipment used: Skywatcher ED110, Orion 10mm Guide Scope,
 10:1 Crawford Focuser, 2x Barlow, UV/IR Filter, SPCC006C,
 5000 frames stacked in Registar 6.1
 Location: Murrumbidgee Fields, NSW, Australia.
 A - Great Red Spot.

Io

L. Williams

Saturn - 30th January 2012
2400hrs AEDT (1300 UT)



Magnitude: 0.44
 Altitude: 40.89
 Azimuth: 14.34 17°
 Equipment used: Skywatcher ED110, Orion 10mm Guide Scope,
 10:1 Crawford Focuser, 2x Barlow, UV/IR Filter, SPCC006C,
 5000 frames stacked with Registar 6.1.
 Location: Murrumbidgee Fields, NSW, Australia.

Saturn - 30th January 2012
2400 hrs AEDT (1300 UT)



Magnitude: 0.48
 Altitude: 40.89
 Azimuth: 14.34 17°
 Constellation: Virgo
 Equipment used: Skywatcher ED110, Orion 10mm Guide Scope,
 10:1 Crawford Focuser, 2x Barlow, UV/IR Filter, SPCC006C,
 5000 frames stacked in Registar 6.1
 Location: Murrumbidgee Fields, NSW, Australia.



Lunar composite - James Scott



Star Trails at the Forest - Chris Malikoff



The Sun - Tony Law



Large Magellanic Cloud - Roger Powell

Musings

Ursula Braatz

“Earth-like planets & other astronomical discoveries”

It is wonderful that astronomers have not only found extrasolar planets, they have now also found Earth-like planets. I hope that one day, still in my life time (I am 78 years old now), there will be evidence that on one planet there is organic life. Maybe it will be difficult to find out if this organic life is primitive, or if there are dinosaurs or intelligent beings.

It is interesting that astronomers always find something new, but the riddle of dark matter is still not solved. I did read a lot about astronomy, but I did not have time around Christmas to write for Prime Focus. I read articles in ABC science, Spaceflight Now, PhysicsWorld and Spiegel Online Nachrichten, a German magazine. There are a lot strange things happening in the universe: “Super-massive black holes smash all the records”. Two black holes are equivalent to ten billion suns and could easily swallow five whole solar systems. These are in the bellies of two elliptical galaxies – NGC 3842 in constellation Leo, 320 light years away, and the other NGC 4889 in the Coma Cluster 336 light years away. Next time I will write more of these wonderful things in Astronomy.



Biggest in the World



The European Southern Observatory's plan to begin construction of the world's largest telescope — the European Extremely Large Telescope — will take a big step forward in 2012 now that early funding for the project has been secured.

The European Southern Observatory (ESO) governing body approved the 2012 budget, which paves the way for preparatory work to begin at the planned site of the [European Extremely Large Telescope](#) (E-ELT) at the Cerro Armazones mountain in the central part of Chile's Atacama Desert.

The telescope, which represents a joint collaboration between 15 countries, will be the world's largest ground-based optical telescope. Builders selected the observatory's location in Chile because of the optimal weather conditions in the area, where skies are clear overhead roughly 320 nights of the year, ESO officials have said.

The E-ELT's primary mirror will be a staggering 138 feet (42 meters) wide. For comparison, the Keck Observatory in Hawaii has a mirror that measures 33 feet (10 meters) wide, and the Subaru telescope, also in Hawaii, has a primary mirror that is 27 feet (8.2 m) wide.

This architectural concept rendering of ESO's planned European Extremely Large Telescope (E-ELT) shows the world's largest planned optical telescope gazing heavenwards.

CREDIT: Swinburne Astronomy Productions/ ESO

The ESO governing council's approval of the 2012 budget includes funding for some initial work on the E-ELT project, such as the development of access roads to the telescope site and early construction efforts on one of the telescope's five mirrors. This work is expected to begin in early 2012, ESO officials said in a statement.

"The E-ELT is starting to become reality," ESO Director General Tim de Zeeuw said in a statement. "However, with a project of this size it is expected that approval of the extra expenditure will take time. Council at the same time recognizes that preparatory work must start now in order for the project to be ready for a full start of construction in 2012."

The ESO governing body is expected to make a final approval decision for the entire E-ELT project in mid-2012.

Plans for the E-ELT have seen steady progress over the past few months, ESO officials said. In October, ESO reached an agreement with the Chilean government that culminated in support for the project and the donation of land for the mega-observatory.

In that same month, an external review confirmed that the E-ELT could feasibly be built within the proposed budget of about \$1.43 billion (1.082 billion Euros). Previous reviews also confirmed that the telescope's design is technically sound, ESO officials said.

Several ESO member states are already financially committed to the project, and funding is expected to be agreed upon between all members by mid-2012, which will enable the council to make its approval decision at that time, ESO officials said.

The E-ELT is expected to be operational early in the next decade, they added.

ESO already has three observatories in Chile, including the Paranal Observatory, which houses the Very Large Telescope, and the La Silla Observatory, which hosts the New Technology Telescope.



Hubble Solves Mystery on Source of Supernova in Nearby Galaxy



This image of Type Ia Supernova Remnant 0509-67.5 was made by combining data from two of NASA's Great Observatories. The result shows soft green and blue hues of heated material from the X-ray data surrounded by the glowing pink optical shell, which shows the ambient gas being shocked by the expanding blast wave from the supernova.

**Credit: NASA, ESA, and B. Schaefer and A. Pagnotta (Louisiana State University, Baton Rouge)
Image Credit: NASA, ESA, CXC, SAO, the Hubble Heritage Team (STScI/AURA), J. Hughes (Rutgers University)**

Hubble Solves Mystery on Source of Supernova in Nearby Galaxy...

Using NASA's Hubble Space Telescope, astronomers have solved a longstanding mystery on the type of star, or so-called progenitor, which caused a supernova seen in a nearby galaxy. The finding yields new observational data for pinpointing one of several scenarios that trigger such outbursts.

Based on previous observations from ground-based telescopes, astronomers knew the supernova class, called a Type Ia, created a remnant named SNR 0509-67.5, which lies 170,000 light-years away in the Large Magellanic Cloud galaxy.

Theoretically, this kind of supernova explosion is caused by a star spilling material onto a white dwarf companion, the compact remnant of a normal star, until it sets off one of the most powerful explosions in the universe.

Astronomers failed to find any remnant of the companion star, however, and concluded that the common scenario did not apply in this case, although it is still a viable theory for other Type Ia supernovae.

"We know Hubble has the sensitivity necessary to detect the faintest white dwarf remnants that could have caused such explosions," said lead investigator Bradley Schaefer of Louisiana State University (LSU) in Baton Rouge. "The logic here is the same as the famous quote from Sherlock Holmes: 'when you have eliminated the impossible, whatever remains, however improbable, must be the truth.'"

The cause of SNR 0509-67.5 can be explained best by two tightly orbiting white dwarf stars spiraling closer and closer until they collided and exploded.

For four decades, the search for Type Ia supernovae progenitors has been a key question in astrophysics. The problem has taken on special importance during the last decade with Type Ia supernovae being the premier tools for measuring the accelerating universe.

Type Ia supernovae release tremendous energy, in which the light produced is often brighter than an entire galaxy of stars. The problem has been to identify the type of star system that pushes the white dwarf's mass over the edge and triggers this type of explosion. Many possibilities have been suggested, but most require that a companion star near the exploding white dwarf be left behind after the explosion.

Therefore, a possible way to distinguish between the various progenitor models has been to look deep in the center of an old supernova remnant to search for the ex-companion star.

In 2010, Schaefer and Ashley Pagnotta of LSU were preparing a proposal to look for any faint ex-companion stars in the center of four supernova remnants in the Large Magellanic Cloud when they discovered the Hubble Space Telescope already had taken the desired image of one of their target remnants, SNR 0509-67.5, for the Hubble Heritage program, which collects images of especially photogenic astronomical targets.

In analyzing the central region, they found it to be completely empty of stars down to the limit of the faintest objects Hubble can detect in the photos. Schaefer suggests the best explanation left is the so-called "double degenerate model" in which two white dwarfs collide.

The results are being reported today at the meeting of the American Astronomical Society in Austin, Texas. A paper on the results will be published in the Jan. 12 issue of the journal *Nature*.

There are no recorded observations of the star exploding. However, researchers at the Space Telescope Science Institute in Baltimore, Md. have identified light from the supernova that was reflected off of interstellar dust, delaying its arrival at Earth by 400 years. This delay, called a light echo of the supernova explosion also allowed the astronomers to measure the spectral signature of the light from the explosion. By virtue of the color signature, astronomers were able to deduce it was a Type Ia supernova.

Because the remnant appears as a nice symmetric shell or bubble, the geometric center can be determined accurately. These properties make SNR 0509-67.5 an ideal target to search for ex-companions. The young age also means that any surviving stars have not moved far from the site of the explosion.

The team plans to look at other supernova remnants in the Large Magellanic Cloud to further test their observations.



January's Meeting

No speaker planned

Apologies, but we won't be having a speaker attend our January meeting. In lieu of this, we'll do our best to make the night as entertaining and informative as we are able - with several telescopes set up and a couple of highly-educational videos to show. Bring along a few stories of your own!

Location: UWS - Building 30, Room 213.

Date: Monday 16th January at 7.30 pm.



Our Merchandise Officer, Stewart Grainger, currently has the following official MAS merchandise items on sale:

'Astronomy 2011' is a must have book - available now. \$25.00 (members \$20.00).

MAS coffee mugs: now available for \$12.00 (members \$10.00).

m a g n i t u d e]]: Our second DVD - \$14 (members \$10)

MAS polo shirts: available in navy, black or white (mens or ladies, various sizes): \$40.00 (Members \$35.00).

MAS baseball caps: \$25.00 (Members \$20.00).

MAS beanies: \$20.00 (Members \$15.00).

MAS sew-on badges: (105 mm x 60 mm) available in white on black and black on white: \$10.00.

'Ice In Space '2009 Compendium': a timeless compilation of astrophotographs by members of IIS in an 80-page coffee table book - (retails \$50) \$25

Starwheels: ("Planispheres") large \$25.00 and small \$15.00.

'Heaven's Above - A Binocular Guide to the Southern Skies': a top-selling book by MAS member Bob Bee: available on public nights for \$18.00.

'Emu Dreaming': a book about the interpretation of the southern sky as seen by the Aboriginals: was \$15.00 - now reduced to only \$10.00.

'Prime Focus' is our flagship publication - available now. Back-issues available until sold out. \$6.00 at meetings.

These items are on sale at general meetings, or by arrangement. Please contact Merchandise Officer Stewart Grainger - either by Private Message via the website forum or by email to:

merchandise@macastro.org.au

Let him know what you want to buy and make arrangements to pick it up from him. Please note, it is not possible for Stewart to bring every stock item to every meeting.



Heavens Above!

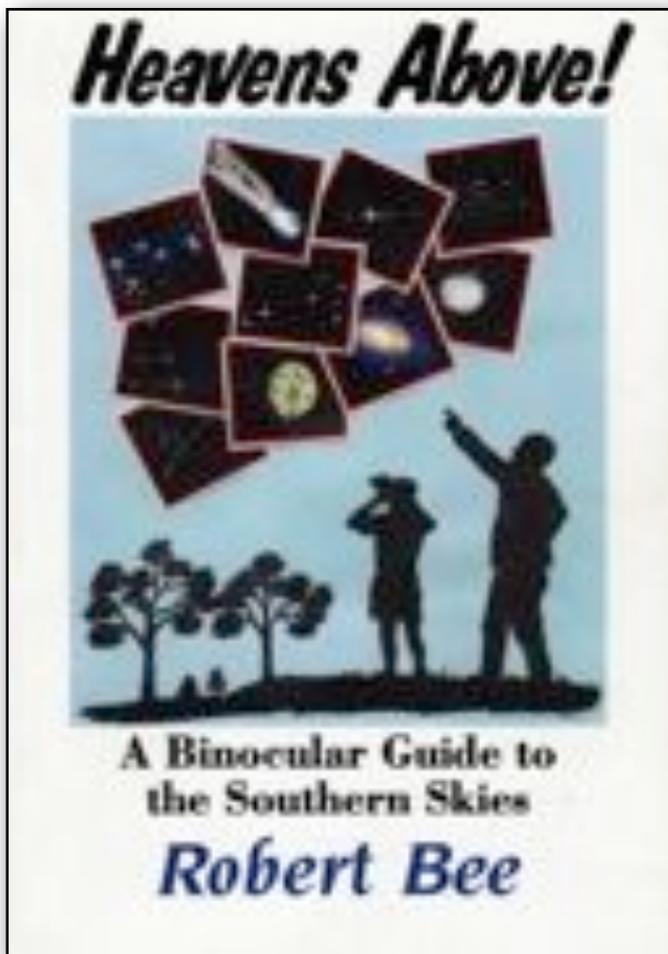
Advertisement

It is a very common misconception by people on the fringe of amateur astronomy that you absolutely need a telescope to "see anything interesting".

This book comprises 158 pages and contains over 80 diagrams of the sky viewed from the Southern Hemisphere

In the book, the author takes you through all the constellations visible from the Southern Hemisphere which have objects visible through binoculars.

The planets and many globular clusters, open clusters, gaseous nebulae, galaxies, double stars and



asterisms can be found with your humble field glasses.

This book contains:-

- charts showing 56 of the 88 constellations with the locations of binocular objects they contain and description and details of each object.
- maps of each month of the year showing the location of the constellations in the sky to the north and south

This is an excellent introduction to observational astronomy for beginners of all ages.

To purchase your copy of this excellent book please forward your cheque or postal order (made out to Robert Bee) for AU\$19.50 to the author at the address below.

This includes postage and handling (within Australia).

Please contact Robert Bee at rmbec99@hotmail.com for more details about the book or Direct Deposit information.

Robert Bee,

8 Joseph Banks Court,

MOUNT ANNAN, NSW, 2567

About the Author:

Robert Bee lives at Mount Annan on the south-west outskirts of Sydney, NSW.

Robert's passion for astronomy began in his teens and has deepened over the ensuing years. With degrees in Electrical Engineering and Science, he enjoys both observing the starry sky and understanding the physical laws behind what he sees.

Robert is a member of the Macarthur Astronomical Society (MAS) and has edited and contributed to the Society's monthly journal "Prime Focus" since it commenced in 1996 up to 2006. He has carried several positions within the Society during that time.

He shares his passion for astronomy with the people of the Macarthur Region through a fortnightly column called "Heavens Above!" in the Macarthur Chronicle newspaper. This column commenced in 1998 and is aimed at those with no background in science or astronomy, just a sense of curiosity and a willingness to step outside the back door and have a look at the sky.

Robert also enjoys writing fiction, with a preference for science fiction and fantasy, and has had a number of short stories published in periodical magazines and successes in short story literary competitions. He currently has a children's science fiction novel, with an astronomy theme of course, in progress.

Robert enjoys talking to the public about astronomy and guiding them around the sky, both at public nights run by MAS and also at clubs, societies and schools.

Members Observing Nights

Make sure you remember to bring your cardigan.

It can still cool down at night!

On observing nights, at any venue, you must arrange your own transport and please try to arrive well before sunset, to enable you to familiarise yourself with the surroundings before darkness sets in. If arriving later, make sure that your approach to the final gate is only with parking lights and ask someone to guide you into the observing area from the gate. It is essential - for your own safety and that of others - that you bring a red torch with you to observing nights. If weather conditions look doubtful, please check the website "What's On" page before leaving home. If Stargard is cancelled, sometimes an unscheduled observing night will be held later that week.

During the course of the evening, please consider the needs of others around you, especially when using laser pointers, camera screens, computer monitors, car boot lights etc. Please read our Field Etiquette page on our website for reference.

Stargard nights are free to members and invited guests. Please contact the President before inviting anyone. Beginners are encouraged to observe at Stargard before progressing to the Forest.

To cover our costs, the charge for The Forest is \$15.00 per member per evening, whether attending just for the evening or staying all night. Experienced amateur astronomers who are non-members may be invited to attend the Forest subject to prior clearance from the President and will be charged \$20.00 per visitor per evening. Please see Ned Pastor on your arrival to make your payment and please try to have the exact amount.

Limited sleeping accommodation is available but not guaranteed. 240vAC field power is available (bring your own waterproofed extension leads) as are kitchen and washroom facilities.



Toni and Borislav - ImageCredit: Chris Malikoff

M.A.S. HYSTERIA !!!



A GALAXY
WALKS IN TO
A SALOON...



SORRY, BUT
YOUR TYPE ARE
BARRED!