



Parkes Radio Telescope - ImageCredit: Steffen Kluge

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## From the Editor

*Welcome to the August edition of Prime Focus.*

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 seeking articles about your experiences as an amateur astronomer or any astronomy related topic about which you hold a particular interest. Please submit any articles to the Editor at [editor@macastro.org.au](mailto:editor@macastro.org.au) at any time.

The larger "print" version of this August edition is now available at the "Members/Prime Focus/2011" menu on our website at:

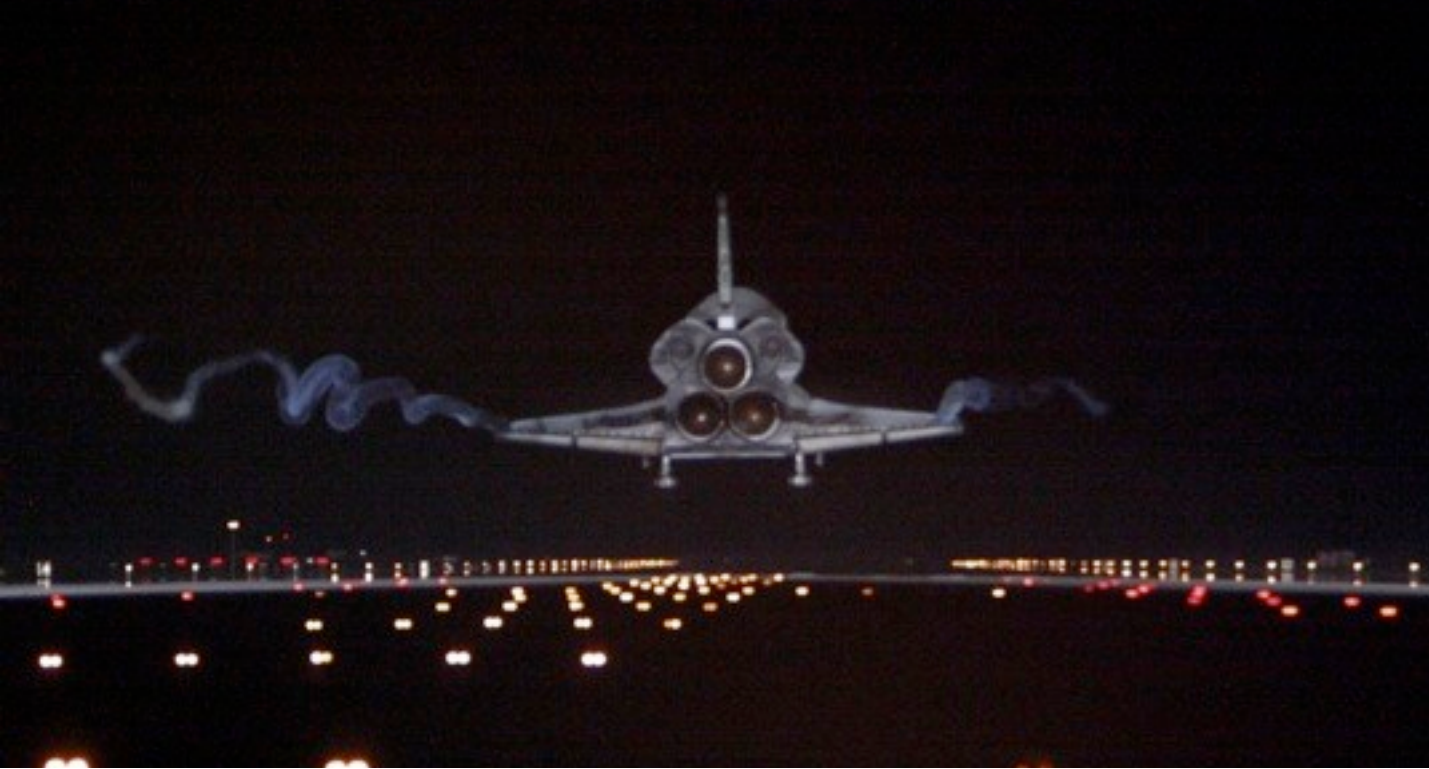
<http://www.macastro.org.au> for members to download.

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](mailto:secretary@macastro.org.au).

If amateur astronomy-related vendors would like to advertise in Prime Focus from next month, 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 August edition - our third in the new-look Prime Focus series.

*Clear Skies! Chris Malikoff*



# President's Report

*Trevor Rhodes*

## Welcome to Prime Focus

August is now upon us and it will be a slightly busier time for our society over the next few weeks. On the 20<sup>th</sup> of this month we have our annual International House Night at The Forest when a coach-load of Uni students arrive all eager to see what our southern hemisphere skies have to offer them. Following on from there we have our next Public Night on the 10th September at The Oaks. Along with our own Forest nights on 26th/27<sup>th</sup> August and Stargard on 3<sup>rd</sup> September, there will be plenty of opportunity for everyone to 'get out there'.

Last month's talk by Dr. Mike Ireland (Sydney University), certainly gave us a new perspective on exoplanets, and the new ways in which they are being found. As all the bigger and better telescopes come online around the world we can expect the number of known exoplanets to grow wildly. Are we somebody else's exoplanet?

Our September Macarthur Astronomy Forum will be a little different for a couple of reasons. The first is that it will be a workshop. The second and probably more important if you wish to be there, is that it will not be at UWS. Please keep an eye on the website for directions/map to Blair Athol Community Centre.

During my daily foray on the MAS forum, I have found it interesting to look at all the links our members have been putting up lately. Reading about 3D printers, a 28" F2.7 Dobsonian and NASA's Dawn Spacecraft entering orbit around Asteroid Vesta. While thinking about what we had 50 years ago and seeing what we have today, I have to admit to a little jealousy of those who will get to see what is going on 50 years from now. There was also a tinge of sadness seeing the Space Shuttle landing for the very last time, along with frustration at not knowing whether the James Webb

Telescope will ever get off the ground. These are definitely interesting times we live in for the scientifically inclined, and knowing that boffins around the world are hard at work dreaming up something new each and every day means that we get to sit back, safe in the knowledge that there will be a continuing stream of gizmos and gadgets with which to play! I wonder what the next decade will bring?

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

*Trevor Rhodes*

## Macarthur Astronomy Forum

### Next Meeting:

Monday 15<sup>th</sup> August 2011 at 7.30 pm

Lecture Room 5, Building 22,  
University of Western Sydney,  
Campbelltown Campus

Guest Speaker: **Dr Geraint Lewis**  
(Sydney University)

### Topic:

**"Just what do we know about the  
Universe?"**





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### *Member profile - Nicole Ireland*

As a child, my family took regular camping trips in the bush, and it was during one of these adventures, that my interest in astronomy was sparked.

On a three month camping trip around Australia, we camped 'under the stars' in Cape Crawford NT (mainly because we got lost and couldn't find the camp ground!). I was eight years old.

It didn't take me long that night to be in awe of the night sky and the wondrous patterns the stars made above me. A familiar question on that trip became 'can we camp under the stars again?!' When we returned, I bugged my parents for a pair of binoculars for Christmas, which I gratefully received, and started my journey on observing the universe.

My childhood dream (not uncommonly) was to become an astronaut, so after reading all I could about astronomy, I applied for and was accepted to the Australian International Space School in 1992. I spent five days with other Australian and international students, learning all about space science which included a visit by Aussie astronaut Andy Thomas.

Unfortunately during high school, I learnt that physics and mathematics were not my strongest subjects, so 'astronaut' fell down the list of future occupations! But astronomy did not lose its attractiveness for me.

Every chance I got for a school speech or presentation, I would enlighten my fellow students about the wonders of space and the SETI program. I remember showing a picture of some material found on some space junk that fell to Earth... the cell structure hadn't ever been seen on Earth before. I first heard about Mac Astro Society around this time.

Fast forward quite a few years, and after a six month trip to South America teaching English, including various overnight hikes in the Andes, the vastness and beauty of the Milky Way again amazed me. So when I returned I joined Mac Astro and haven't looked back! I have been amazed by Dr Lisa Harvey-Smith's SKA project, Dr Ireland's exo planets, and at the top of my list of amazing nights is my first observing night at The Forest on 29th July. I was lucky enough to have two knowledgeable guides in Tony and Jack (thank you!) who showed me the Lagoon Nebula, Swan Nebula, the Jewel Box and Saturn (with three of its moons!) among other wonders.

I have found the society to be extremely welcoming and friendly, and I look forward to learning a lot more!

*Nicole Ireland*

# Secretary's Column

*Roger Powell*  
*Committee Matters...*

Most members are probably aware of the great support this Society receives from the local newspapers, especially 'The Chronicle'. I send out a formal media monthly media statement concerning our upcoming events and I have always been pleasantly surprised to see them turned into great articles by their journalists.

I would like to acknowledge the tremendous impact that the free promotion 'The Chronicle' and 'The Advertiser' provides to community organisations such as ours. They provide a great free service and it is up to us to make that work to our advantage. I would like to think that these monthly appearances in 'The Chronicle' in particular - along with the disciplined organisation and professional outlook in all our activities and the Website - have contributed to our local recognition and membership growth of recent years, helping to make MAS a very well respected community organisation.

There was an amusing blip last month when 'The Chronicle' article printed that if our guest speaker remains stuck in Chile, I would personally be giving his presentation about Exo-planets! This must have surprised some members when they read it, and I don't know where it came from - but I will take greater care next time when a journalist rings me for a quotation (or refer them to Trevor)!

As I have reported previously, the next few months could be a turning point for the Society. The committee is acutely aware that 2012 will see us paying more to International House for our monthly use of The Forest cabin; and we are also anticipating new costs for meeting room hire fees, something that UWS is likely to impose on us for the first time. We are still seeking to sell advertising space and attract sponsorships to cover these costs and the committee will keep you informed if anything eventuates.

With regard to the meeting room, the committee is taking two parallel paths. I have been trying (without success) to communicate with UWS and have also submitted an early room application for 2012, requesting a room without stair access. At the same time, Treasurer Tony Law has been looking for an alternate venue, in the event that we are unable to reach a suitable agreement with UWS. I can report that a possible venue has been located and Trevor will be letting you in on the details next Monday at The Macarthur Astronomy Forum at UWS.

With regard to The Forest cabin fees, we are still trying to negotiate a discount, as a long-term user. However, this site is our premium dark sky observing site and we do not wish to lose it, so there is no doubt that

we will be paying a higher cost. Currently we only charge members \$8.00 per night - which provides you with an evening's observing; a secure location; dark skies free of light pollution; food preparation facilities; indoor seating; toilet facilities; shelter in the event of inclement weather; pleasant company; a good opportunity to socialise; and the opportunity of an overnight bunk bed if you wish to stay overnight. That is an absolute bargain and it is only one hour's drive down the freeway from Campbelltown. Have you been there lately?

At least one of our potential fund raising opportunities looks as though it may come to fruition in a few months. We have registered with Bunnings to host one of their famous Saturday Barbecues and the committee is hoping for a positive response from Bunnings very soon. This idea was originally suggested by Bob Bee a few months back as a means of boosting our funds and the committee has agreed to trial it, if Bunnings will have us.

At the last committee meeting we resolved to ask for members with first aid qualifications to register with us. Whether you come to observing nights or not, we would like to keep a list of members with first aid experience. Please contact Trevor or myself with details. Safety in the field is very important and we feel we ought to be equipped with this knowledge in the event of a mishap.

The committee has also held a review of cancellation procedures for Stargard, in the event of dubious weather. It was decided that in future, Stargard would not normally be cancelled - except possibly in exceptionally bad circumstances and if all six key-holders decide not to go. The key-holders are listed on the committee page of the website. In all other situations, Stargard will proceed, even if cloudy, allowing individual members to attend in the hope that the clouds will clear during the evening. This relieves the President of the responsibility of making what is sometimes a very difficult and potentially controversial decision. As always, when arriving at the gate, you will know someone is there if the main gate is not padlocked.

## *Society Schedule*

**August 2011**

15/08/2011 **Macarthur Astro Forum**  
20/08/2011 **Int. House - The Forest**  
26-27/08/2011 **The Forest**

**September 2011**

3/09/2011 **Stargard**  
10/09/2011 **Public Outreach - The Oaks**

# Parkes Trip

## *MAS Field Trip*

Tony Law

**Depart 7th October, Return 9th October.**

Deposits and final bookings required by 15th August. Final payments by 19th September.

Only five places remaining. If you wish to attend, please contact Treasurer Tony Law immediately to confirm your booking - [tony.law@iinet.au](mailto:tony.law@iinet.au) or see him at the Macarthur Astronomy Forum.

Cost is \$290 per person.

### *Confirmed Itinerary:*

#### **7th October:**

8.00 am Pick up Narellan by Gang Gang Tours – Kevin is the driver (Queen Street)

10.00am Morning Tea provided by Gang Gang

12.00noon Break for Lunch in Mudgee (not included in cost)

3.00pm Arrive Golden West Motor Inn - <http://www.goldenwestmotorinn.com.au/>

5.45pm Dinner at Golden West (included in cost)

7.15pm -11pm Dubbo Observatory - <http://www.dubboobservatory.com.au/>  
(included in cost)

#### **8th October:**

7.30am Breakfast at Motel (included in cost)

8.15am Depart for Peak Hill

9.15am Arrive Peak Hill Open Cut Goldmine - <http://www.parkes.nsw.gov.au/about/1011/5922.html>

11.30am Depart for The Dish

12.15pm Arrive Parkes – lunch at The Dish (not included in cost)

Guided Tour of The Dish, movies and info – this event occurs every two years – see:

[http://www.parkes.atnf.csiro.au/news\\_events/opendays/2011/](http://www.parkes.atnf.csiro.au/news_events/opendays/2011/)

4.00pm Depart to Moonraker Motor Inn – <http://moonraker.bestwestern.com.au/>

6.30pm Dinner – at Moonraker (included in cost)



ImageCredit: Steffen Kluge

#### **9th October:**

8.00am Breakfast at Moonraker – (included in cost)

9.00am Depart for Narellan

11.30am Break for Lunch in Bathurst (not included in cost)

3.00pm ETA Narellan

Total Cost is \$290.00 per person based on 24 people twin share

Contact Tony Law to confirm your booking immediately – a \$100.00 deposit is required by August 15th 2011, the balance by September 19th.

Call Tony on 0419 215199 if you have any questions.



# “Debatable...”

Davy Jones

The Great Debate, aka the Shapley-Curtis Debate, took place on the 26<sup>th</sup> of April, 1920. It is described by some as ‘much more than a debate – rather the story of humanity’s discovery of the immensity of the universe, whose resolution amazed the world.’ Hosted by the National Academy of Sciences, Washington; the principal arguments centered on the nature of spiral nebulae and the size of the universe. The rudimentary questions being debated were: are distant nebulae comparatively small, and do they lay within our galaxy - or are they huge, autonomous galaxies in their own right?

Whilst the matters under debate took place in 1920 – scientific opinions relating to the topics had been around for many years – and would continue to cause dissension for many years hence.

Historically, the nature and background to the debate serves to demonstrate how far our knowledge in this field has progressed in a period of less than a hundred years. Likewise, retrospectively, we begin to appreciate the incredible advances in technology that have occurred. The protagonists, now long dead, were both well-respected astronomers in their own right, exemplifying the standard of those involved in the debate. Typically, the disputants represented not only the views of their respective scientific factions – but also the divisions between established views and those who disputed the accepted entrenched interpretations.

As a young man, Harlow Shapley had ambitions to be a journalist, but the journalism course was cancelled. A disappointed Shapley went back to the course list – at the top of the list was “a-r-c-h-a-e-o-l-o-g-y”, a word which Harlow claimed he could not pronounce. Over the page was “a-s-t-r-o-n-o-m-y”, which he could pronounce – and so began a distinguished career. At the time of the debate, Shapley was about 34 years old; and certainly the less confident of the two men, holding Curtis in some awe. At about 48 years old Heber Doust Curtis was the older of the two, and a long-established, well-respected astronomer. He is described as having an aura of superiority, and was well-known for speaking

with authority and confidence in matters of astronomy. It is recorded that both Shapley and Curtis actually shared a carriage on the 4,000 kilometer train journey from California to the debate venue in Washington. The atmosphere between the two men remained extremely strained throughout their enforced time together. By no stretch of the imagination could they have been considered ‘friends’.

On the night of the debate, each man was given forty minutes to outline his case; a very short time for such a complex subject. Shapley was the first to speak. He kept his presentation broad, hoping to appeal to a scientific audience which lacked representation from astronomical fields. It is worth noting here, at this time, Vesto Slipher (1875-1969), using spectroscopy, had already established the concept of red shift; and that the galaxies were moving rapidly away from each other. Despite this, Shapley insisted the Milky Way was the whole universe. Shapley estimated the size of our galaxy to be ten-times larger than a previous estimate, made at the turn of the century by Jacobus Kapteyn (1851-1922).

Shapley predicted the diameter of the Milky Way to be some 300,000 light years, or 100 kilo-parsecs. He also positioned the centre of our Galaxy approximately 20 kilo-parsecs from the Sun. All of these estimates were reportedly made with the aid of Cepheid variables. Having presented his ‘metagalaxy’ concept, Shapley suggested his model obviously precluded spiral galaxies being bodies in their own right. A second element to Shapley’s argument concerned the 1885 nova in the Andromeda Nebula – however, this proved to be a major fault in his argument. What Shapley failed to understand was the result of interstellar absorption on the apparent brightness of distant stars. (Terrestrial example: street lights on a foggy night).

Curtis elected to ignore the audience mix, and delivered an astronomically technical presentation. As indicated, he spoke with great authority and self-confidence. Heber Curtis firmly believed the Milky Way to be only a small part of a much larger universe. Unlike Shapley, Curtis estimated the diameter of our galaxy to be 30,000 light years or 10 kilo-parsecs. He also estimated the Sun to be very near the centre of the Milky Way. In describing our galaxy, he suggested it might be shaped like a flat lens – like two dinner plates laid face to face. In regard to spiral nebulae, he claimed them to be ‘island universes’ positioned outside our galaxy. This idea had also

*First, get the facts, then you can  
distort them at your leisure –  
Mark Twain 1835-1910*



been postulated by Immanuel Kant in the mid-18th century. The key reason Curtis gave for disputing Shapley's metagalaxy model was that Cepheid variables were not good distance indicators.

Anyone with a basic knowledge of astronomy today would quickly realise the debate was not settled decisively by either man. If anything, the 'debate' merely emphasized the lack of substantial evidence for either man's argument. Whilst the dispute focussed attention on a question that, at that time, was far from resolved, it also accentuated the dangers of professional arrogance. Both men had publicly presented rival theories concerning matters at the limits of science, each prepared only with the weakest of evidence.

Oddly, each man was accurate on at least one major point, and both were incorrect on a key point. Shapley was correct, when he stated the Sun was well away from the centre of our Galaxy. Shapley had also been correct in suggesting the Galaxy was much larger than previous estimates. As we are now aware, Harlow Shapley was also right about the usefulness of Cepheid variables as distance indicators.

Heber Curtis was of course right about spiral nebulae being outer galaxies, he had also been correct when discussing the inaccuracies of van Maanen's measurements of these galaxies. However – both men were wrong about some things they actually agreed upon – the most obvious being the importance of interstellar absorption of light. Both men had stated this phenomenon was not important in determining the size of the universe. Today, we understand this to be an extremely important issue.

Those who attended the May, MAS Forum, may remember the subject: "Slipher, and the discovery of galaxies and the expanding universe". Prof. John Peacock (Edinburgh Uni), explained in great detail how it is difficult, with the naked eye, to see anything that is not in our Milky Way. Proverbially, one cannot see the wood for trees – or in this instance, cosmic dust etc. This element was one aspect that caused confusion in the Shapley-Curtis Debate; and to some extent was still not fully resolved or understood in 1920.

Discussing the resolution of the Great Debate, Robert Nemiroff et al, specifies how in 1924, Edwin Hubble found Cepheid variables in the nearest major spiral nebula, M31. This had followed a period where stars in this nebula were being determined. When challenged with this evidence Shapley immediately acknowledged he was wrong on the spiral nebulae question. Furthermore, during the 1920s and 1930s, evidence grew that interstellar (light) absorption was a significant issue. During this period the importance of Cepheid variables for distance authentication was also verified.

Whilst the Great Debate was neither 'Great' nor really 'a debate' – it was, nevertheless, an important intellectual event in the development of human understanding of the universe. No individual person has all the answers. Disagreement is as important as consensus, and mistakes are a vital part of our learning processes. Both Shapley and Curtis lived to serve mankind as leaders in the fields of science – astronomy – physics and cosmology.

Harlow Shapley's 'other love' was Myrmecology – the study of ants – which was his lifetime hobby. He passed away two weeks before his 87<sup>th</sup> birthday, in 1972.

After a long, illustrious career, Heber Doust Curtis, astronomer extraordinaire, died in 1942 aged 69. Their story is yet another chapter in humanity's on-going unravelling of the wonders of the universe.

### *Addendum:*

- In 1920 America's national debt was \$24.3 million – (now \$14.5 trillion), and the world's population was two billion.
- \*Metagalaxy: the total system of galaxies and intergalactic space making up the universe
- \*Nebulae - German – nebelflecken
- 'Some piously record "In the beginning God", but I say "In the beginning hydrogen". – Harlow Shapley

### *Refs:*

Gibbs, K. (2010). The Curtis-Shapley Debate - two different views of our universe. Retrieved June 25, 2011, from schoolphysics: [http://www.schoolphysics.co.uk/age14-16/Astronomy/text/Curtis\\_shapley/index.html](http://www.schoolphysics.co.uk/age14-16/Astronomy/text/Curtis_shapley/index.html)

Robert J Nemiroff et al. (n.d.). The Shapley - Curtis Debate in 1920 - The Scale of the Universe. Retrieved June 25, 2011, from [http://apod.nasa.gov/diamond\\_jubilee/debate20.html](http://apod.nasa.gov/diamond_jubilee/debate20.html)

Singh, S. (2005). Big Bang. London: Harper Perennial.

Wikipedia. (2011, April 28). The Great Debate. Retrieved June 24, 2011, from [http://en.wikipedia.org/wiki/The\\_Great\\_Debate](http://en.wikipedia.org/wiki/The_Great_Debate)





*Humayun Qureshi - "Capillary Conjunction"*  
*David Malin Awards - 2011: Honourable Mention: Solar System - Wide Field*



# 2011 CWAS Malin Awards

*One of our own excels...four awards on first attempt!*

**OVERALL WINNER:** Geoffrey Wyatt - "Curves" (Themed Section).

## Winners by category:

### Animated Sequences:

No Winner awarded this year:

HM: Alex Cherney - "Outback reflections"

HM: Phil Hart - "Spinning Tree"

HM: Phil Hart - "Lake Eppalock Timelapse"

### Junior:

Lara O'Brien - "Lunar Eclipse 16/6/11"

### Wide-Field:

WINNER: Gary Hill - "The Southern Milky Way"

HM: Phil Hart - "The Hockey Stick"

HM: Alex Cherney - "The Parkes Telescope and the Milky Way"

HM: Greg Bradley - "Inside Barnard's Loop"

HM: Greg Bradley - "The Small Magellanic Cloud"

### Solar System- Wide-Field:

WINNER: Christopher Thomas - "Time is of the Essence"

**HM: Humayun Qureshi - "Capillary Conjunction"**

HM: Geoff Sims - "Partial Eclipse Moonrise"

HM: Phil Hart - "Twilight Earthshine at Lake Eppalock"

HM: Robert Kaufman - "Total Solar Eclipse, 11 July 2010"

### Solar System - Hires:

WINNER: Peter Ward - "May Seventh Sun"

HM: Peter Ward - "ISS Transit"

HM: Eddie Trimarchi - "Colourful Moon"

HM: Paul Haese - "The return of Jupiter's Southern Equatorial Belt"

HM: Paul Haese - "Dragon Storm"

### Deep Sky:

WINNER: Phil Hart - "The Horse Head and Flame Nebula"

**HM: Humayun Qureshi - "The Eta Carinae Nebula"**

**HM: Humayun Qureshi - "The Snake Nebula in Ophiuchus"**

HM: Steve Crouch - "The

Circinus Galaxy ESO 97-G13"

HM: Marcus Davies - "Shield of the Centaur"

HM: Max Kilmister - "Abstract Art? IC 4603/4604"

HM: Paul Haese - "M42"

### Theme - "Australia Beneath the Stars":

WINNER: Geoffrey Wyatt - "Curves"

HM: Wayne England - "Moonlit Red Gums at Poocher Swamp"

**HM: Humayun Qureshi - "Scorpion Beach"**

HM: Peter Ward - "Dreamtime eclipse"

HM: Alex Cherney - "Galactic Dish"

HM: Peter Ward - "Moonlit Uluru under the stars"

### The Highly Commended entries (no prizes) were:

#### Wide-Field:

Wayne England - "Moonrise Reflections"

Tony Surma-Hawes - "Technology Reflecting Nature"

Bratislav Curcic - "Corona Australis Nebula"

Rolando De Michiel - "Full Moon among the gums"

Alex Cherney - "The Milky Way Above Loch Ard Gorge"

#### Solar System - Wide-Field:

Michael Grimshaw - "Lunar Eclipse, 21 December 2010"

Denis Crute - "Moon Glow"

Mike Salway - "Conjunction Water Rush"

Grahame Kelaher - "Starry Eclipsed Moon"

Phil Hart - "Venus and the Zodiacal Light"

### Solar System - Hires:

Mike Salway - "Saturated Colour Full Moon"

Paul Haese - "Dragon storm on Saturn"

Troy Tranter - "Saturn Seeliger Effect"

Troy Tranter - "Faded Feature: Jupiter and Europa"

### Deep Sky:

Eddie Trimarchi - "The Lagoon Nebula"

Eddie Trimarchi - "NGC 6357"

Phil Hart - "NGC 6188"

Steve Crouch - "The NGC 6872 galaxy group in Pavo"

Marcus Davies - "Tower of Treasures"

Michael Sidonio - "Fighting Dragons of Ara"

Stefan Buda - "Webcam Homunculus"

### Theme - "Australia Beneath the Stars":

Mike Salway - "Planets over the Opera House"

Tony Surma-Hawes - "Moon Spinner"

Phil Hart - "Moonlit Milky Way"

Rolando De Michiel - "Conjunction over an Icon"

Alex Cherney - "Meteor Above Country Road"

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\*HM = "Honourable Mention"



*Congratulations Humayun! :)*

# A Cretaceous Conundrum

*A short story by Robert Bee*

Dr Craig Nesmuth slammed his palaeontology tome shut with a thunderous thud. Offering an apologetic shrug to his stupefied colleagues, he expressed his scientific puzzlement in typically precise terms. "Bugged if I know what they're up to."

'They' were the bizarre creatures displayed in the Medusa-like Planck-Schrodinger Temporal Displacement Monitor that dominated the furiously cluttered laboratory. Heated debate had punctuated the frenzied but directed chaos of the past days as to whether it was fair to apply the condescending term 'creatures' to the crew of a spaceship - if that's what it was - larger than a hundred football stadiums and which hovered, perfectly motionless, above the Cretaceous landscape with no visible propulsive system to defy gravity.

Synonyms had flown like missiles across the laboratory seeking the word with the right nuance while the speakers' hands worked desperately at their instruments to maintain focus, recording continuity and, most of all, temporal stability.

'Creatures'. Surely no other term would describe them. They were six, seven or eight limbed, apparently dependant on a combination of their colour and relative size, though no exact correlation had been agreed. What were finally concluded to be respiratory and optical orifices - no-one had yet detected waste or reproductive orifices - were located at the grotesquely bulbous hub of the limbs.

"Look at that spaceship." Physicist Joseph Knaape mentally estimated mass-energy ratios and was awed by his conclusion.

"We don't know it's a spaceship, Joe. It..."

"...didn't come from a Holden factory. Of course it's a bloody spaceship." Knaape threw a contemptuous scowl at his colleague. "And how can we call its occupants 'creatures' as if they came from a zoo. They're not exactly grazing out there. They have a purpose...no Craig, I don't have a clue what it is either. But believe me, they have a purpose." He checked the temporal alignment. "I vote for 'beings'." The bewildered silence seconded and carried his motion. 'Beings' they were.

Their biology, physical mannerisms and communication mode remained a frustrating mystery, despite exhaustive study over the five days since lock-on. The university's

Cray IV super-computer was slavishly crunching numbers through a 'body language' neural algorithm suite, so far with no breakthrough.

"Are we certain this is Earth?" a jittery technician asked.

The scientists crowded into the trans-temporal prehistory laboratory ignored the question. They were confident they were staring at the spot where their laboratory now stood - 68 million years ago. The TDM was fully proven and calibrated. They knew exactly where and when they were looking. What they were seeing, however, challenged their senses. They had gone dinosaur hunting, but all they had in their sights was an insane nightmare.

"What they are doing, Nesmuth, is obvious." Professor Hugo Hungerford stood stiffly in the doorway and stretched his lanky frame. Exhausted from over forty hours of constant observation, he'd reluctantly grabbed six hours sleep, but still was ready to drop in his tracks. "They're busy dumping all those bones. It's like a bloody production line out there. How many now?"

"It's past the two million mark, Hugo." Dr Lillith Portney indicated the palaeo-counter beside a rapidly expanding catalogue spreadsheet. She was as exhausted as Hungerford and equally unwilling to admit it. This was hers...and Hugo's...baby and she was determined to see it delivered. "And that's only since we tuned in."

"Still Jurassic?" Hungerford stumbled to the coffee dispenser, poured a luke warm cup and slumped into a chair next to Lillith. He stared bleary eyed at the TDM.

"No, they stopped burying them four hours ago. They're well into the Cretaceous now. See...there." Lillith pointed at a maroon seven limbed 'being' cart wheeling across the bone strewn landscape while juggling a huge load. "Tyrannosaurus Rex jaw bone for sure."

They watched as the giant razor toothed bone was dropped unceremoniously on top of a triceratops skeleton, its horns pointing lamely towards the spaceship burdened sky. Then the alien rolled like a rimless wagon wheel back to the vessel's ramp, avoiding other bone laden aliens with the uncanny precision of ants in a picnic line.

"Why?" A stunned scientist vocalised the single thought screaming in all their minds. Why indeed? The energy expenditure to drive a ship of that size, across God only knows what distance beggared the imagination. And to systematically deposit what looked



like dinosaur bones in Jurassic, then Cretaceous layers. Why? But no answer was offered.

A stifled sob broke the electronics-filled silence. Nesmuth spoke in a strangled voice. "How long have they been doing this?" Incredulity hung over the group like a hail-filled cloud. All their vaunted project objectives of the trans-temporal survey of Cretaceous wildlife, developed over years of planning and university budget back stabbing were demolished before their eyes, scattered amongst the bones strewn across the verdant landscape.

"Has it occurred to anyone," Hungerford growled, "that this is the greatest scientific discovery since..."

The sharp jangle of the phone struck like a lightning bolt.

"Portney." Lillith listened, then gestured to Hungerford, her grey-blue eyes instantly animated. "The Cray's got a line on the body language. Ninety-eight percent confidence." She pointed at the TDM. "They want a reality test. Craig, select that eight-legger at the ramp top. They think he may be in command."

Suppressing a shiver of revulsion, Nesmuth moved the monitor's cursor to the red scaled alien, then clicked and

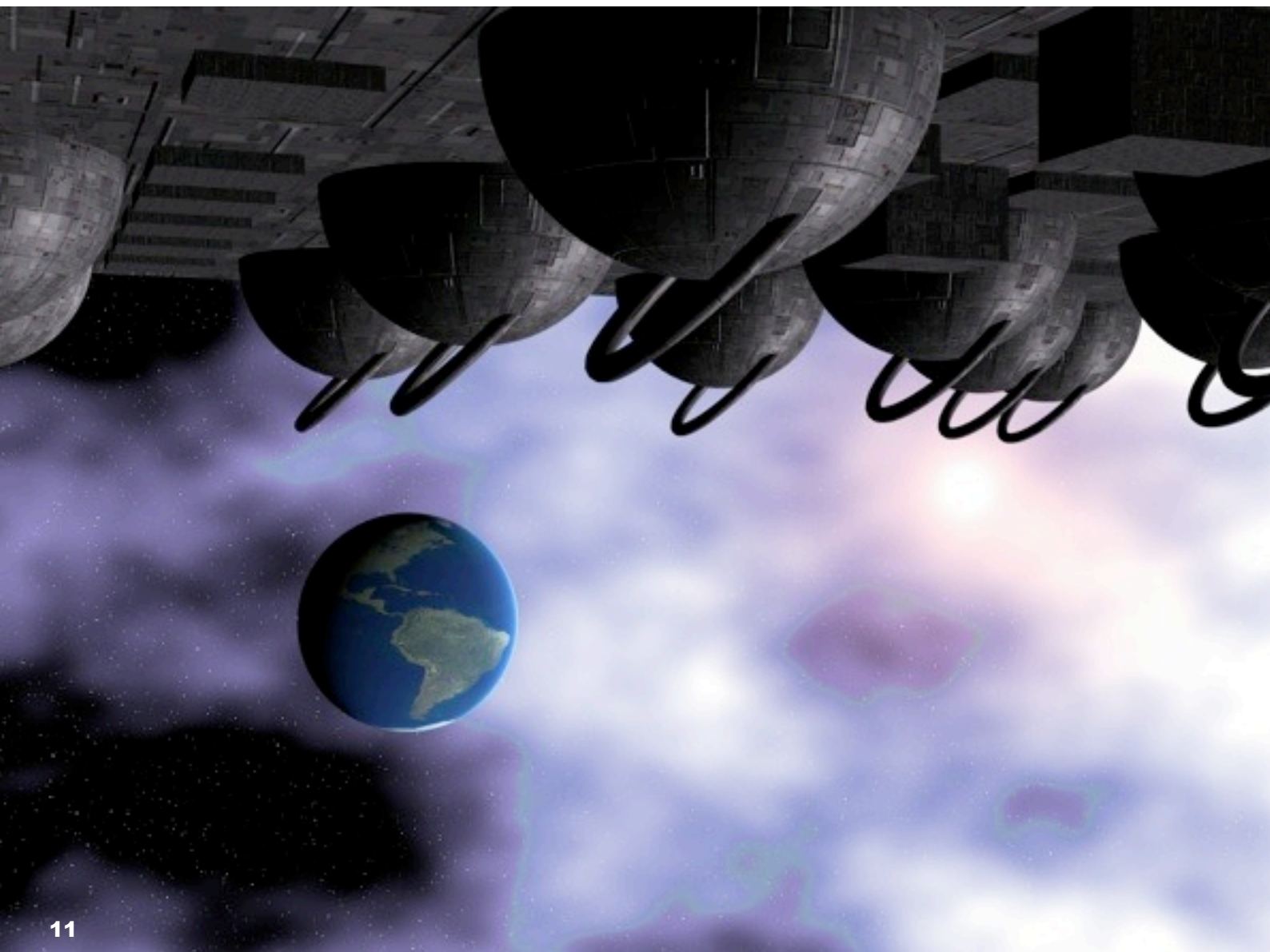
dragged a square around it. The being's limbs seemed to tremble to some epileptic beat and the scales about its orifices pulsed convulsively like anemones. For all they knew, it could be exhorting the others to work faster, or calling them in for dinner.

The roomful of scientists - temporal physicists, xenologists, palaeontologists - watched Lillith intently as she listened on the phone. Those who were not beyond noticing saw the colour slowly drain from her face.

"What is it?" Hungerford asked, though he feared he already knew.

"The Cray says the alien's splitting its sides..." Lillith's stricken eyes stared at the monitor "... laughing."

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# magnitude

macarthur astronomical society public events

**Saturday 20th August:** Our next *m a g n i t u d e* public outreach event will be at The Forest for International House students and MAS members only. Details to follow. Please note this date in your diary. We need as many telescopes on the ground as we possibly can get. There will be a free barbecue for MAS members and the normal Forest charge will be waived. After the students leave, members may remain for their own observing.

Then....

**Saturday 10th September:** We will hold another of our very popular *m a g n i t u d e* 'Open Nights' at the Dudley Chesham Sportsground, The Oaks. Members are asked to arrive early to set up their telescopes. Members of the public are invited to arrive after sunset (about 5.45 pm) and are advised that the event will conclude at approximately 9.00 pm.

*The Dudley Chesham Sportsground* is located at The Oaks, about 15 minutes SW of Camden. A location map is posted on this website: go to the "About" menu (above, left) and select "Maps - Where To Find Us" then select "Dudley Chesham Sportsground."

This **m a g n i t u d e** event is suitable for all ages. Families with children are very welcome to attend. Persons with physical disabilities might like to call us for information.

Astronomical viewing takes place in darkness and visitors are requested to take appropriate care while on the sports ground. The Society cannot accept responsibility for any accidents. Red lights are permitted. If you bring a normal white torch, please ensure that the bulb is covered in **at least three layers of red cellophane** (held on with a solid rubber band) to avoid the effects of light dazzle on the eyes of all participants.



# A Plethora of Double Star Catalogues

Bob Bee

## *Part 1: From Struve to Aitken*

As we plough the fields of the heavens above us, referring to star maps for a guide to the myriad of stars, you will often come to star numbers not following the familiar Greek letter Beyer system (e.g.  $\alpha$  Centauri) or Roman letters (after the Greek alphabet ran out – eg z Carinae, or S Mon, a variable with a capital Roman letter) or even the Flamsteed numbers (61 Cygni, for example).

These ‘unusual’ designations will most likely be from some Double Star catalogue. The most commonly encountered would be prefixed with ‘ $\Sigma$ ’ for Struve, or maybe a ‘h’ for Herschel, or even ‘ $\Delta$ ’ for Dunlop. But there are many more Double Star catalogues out there, each with their own prefixes. Burnham identifies 21 in all. The astronomer’s name and the prefix to his double stars are shown in the list below.

F.G.W.Struve	= $\Sigma$	T.E.Espin	= Es
O. Struve	= 0 $\Sigma$	W.J.Hussey	= Hu
J.Herschel	= h	R.T.Innes	= I
J.Dunlop	= $\Delta$	T.J.J.See	= $\lambda$
S.W.Burnham	= $\beta$	C.Rumker	= Rmk
R.G.Aitken	= A	G.W.Hough	= Ho
Alvan Clark	= AC	W.H.van den Bos	= B
R.A.Rossiter	= Rst	E.S.Holden	= Hn, Hld
F.Argelander	= Arg	G.P.Kuiper	= Kui
H.A.Howe	= Hwe	J. South	= S
Cordoba Observt	= Cor		

Some of these names will be familiar to you, others certainly not. Remember that it is believed that of all the stars in our Milky Way (and presumably other galaxies), more than 70% are in a multiple star arrangement. So there are plenty of double stars up there to be catalogued.

So many, in fact, that Google search under ‘double star catalogues’ will reveal a list of hundreds of designations. The following website provides an alphabetical list of Double Star Catalogue designations.

<http://www.munisingwebsites.com/lookum/Downloads/DoublestarDes.pdf>

The 21 listed above just touch the surface but I suspect they include the more common catalogues. Feel free to prove me wrong.

In this article, I will attempt to give you some background to the astronomer who compiled each double star catalogue, giving you some context to appreciate the name of that obscure star you find in the star atlas or, hopefully, in your telescope’s eye piece.

Due to space available, each item will need to be unfortunately brief. I encourage you to do some extra research into the lives and history of these dedicated gentlemen. Again, due to space, this Part 1 will only cover the first six catalogues mentioned above. Watch this space for future instalments to complete the list. Each of the astronomers listed led fascinating lives, worth remembering as you patrol the sky for their doubles.



**FGW Struve**

### **Otto Struve = OΣ**

Otto Wilhelm von Struve (1819-1905) was a Russian astronomer of German Baltic origin, son of FGW Struve. (He was the third of eighteen children of FGW Struve and his wife Emily Wall.) Amongst his other many accomplishments, he was the head of the world renowned Pulkovo Observatory from 1862 to 1889, following in the path of his famous father.

Being his father's son, he followed his father's work in a number of directions, including the cataloguing of double stars. Together, using the Pulkova 15" refractor, they compiled the Pulkova catalogues of stellar coordinates which included several thousand double stars.

His other astronomical activities are too numerous to list, but include measurements to establish the exact shape of the Earth's sphere, ground-breaking work on solar flares and observations of Uranus's satellites Ariel and Umbriel in 1851 and later Neptune's satellites. In 1885, under his leadership, a 30" refracting telescope was installed at Pulkovo, at the time the largest in the world.



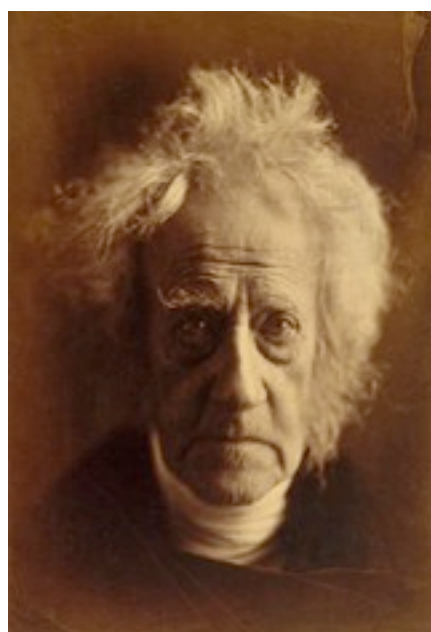
**Otto Struve**

### **F.G.W.Struve = Σ**

Friedrich Georg Wilhelm von Struve (1793–1864), born at Alton, Germany and was the second of an entire family of astronomers through five generations. We will hear of his son Otto Struve later. While great astronomers like William and John Herschel and lesser known Sir James South studied double stars, Struve arguably outdid their efforts, making his name through double star observation, particularly as the first to systematically survey the sky for such stars.

Having discovered a huge number of double stars, Struve published his catalogue *Catalogus novus stellarum duplicium* in 1827.

His *Stellarum duplicium et multiplicium mensurae micrometricae* presented the micrometric measurements of 2714 stars which he observed from 1824 to 1837, providing precise data about the changing orbits of these stars as they moved about their barycentres, a first for astronomy.



**John Herschel**

### **J.Herschel = h**

Sir John Frederick William Herschel (1792–1871) was the son of the famous William Herschel, discoverer of the planet Uranus amongst many other huge accomplishments. His was a big act to follow. John himself fathered twelve children.

His contribution to astronomy was huge, covering many fields within the discipline. To name but a few, the names of seven of Saturn's moons and four of Uranus were supplied by John Herschel.

He took up astronomy at the relatively late age of 24 in 1816. He did this by building a 460mm refractor with a 6 metre focal length. Then, from 1821 to 1823, he collaborated with James South to re-examine his father's double star catalogue, receiving a Gold Medal from the Royal Astronomical Society for his efforts.

In 1864, he expanded on his father's *Catalogue of Nebulae* by adding the results of his own work. This he published as the well known *New General Catalogue of Nebulae and Clusters*, from which the abbreviation NGC comes. After his death, another of his catalogues was published – the *General Catalogue of 10,300 Multiple and Double Stars*. A very prolific double star observer.





### **J.Dunlop = $\Delta$**

James Dunlop (1793 – 1848) was hired by the then Governor of New South Wales Lord Thomas Brisbane (a passionate amateur astronomer) as an assistant at Brisbane's private observatory in Parramatta. He did mostly visual observing of stellar astrometry for Brisbane, but then went on independently to discover and catalogue numerous telescopic double stars and deep sky objects for the southern sky. During some of his time at Parramatta, he worked with Carl Rumker who was to become the first NSW Government Astronomer. Before that though, Dunlop held the post of Superintendent of Parramatta Observatory after Brisbane sold it to the NSW Government.

Amongst Dunlop's other works was the publication of a catalogue of 256 double stars below declination  $-30^\circ$  south. This had the grand title *Approximate Places of Double Stars in the Southern Hemisphere, observed at Paramatta (sic) in New South Wales*, published in 1829. Not all of these were new discoveries. However, he discovered some new doubles and re-observed previously discovered ones, all through his home-made 23cm speculum Newtonian reflector.

When John Herschel arrived in South Africa in 1834, he worked on re-observing Dunlop's catalogue of doubles, sometimes with critical outcomes (e.g. not really binary pairs but optical doubles). However, he was the first to designate the Dunlop doubles as numbered with the  $\Delta$  symbol. In modern times, this is now restricted to amateur circles, official designations taking the form of 'DUN'. e.g. Gamma Crucis is DUN 124.

### **S.W.Burnham = $\beta$**

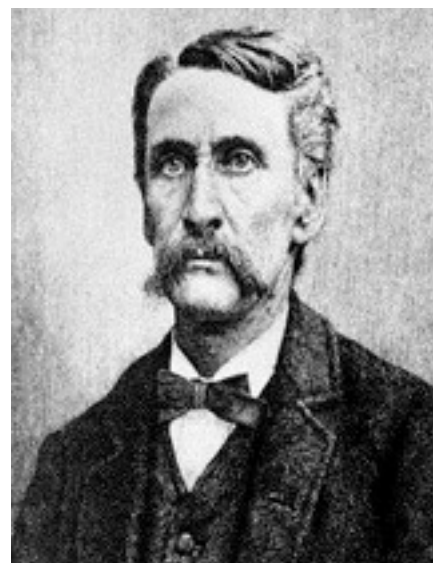
Shelburne Wesley Burnham (1838-1921) was an American astronomer, not to be confused with Robert Burnham Jr. (1931-1993) who wrote the classic *Burnham's Celestial Handbook*.

As a military stenographer to the Union Army occupying New Orleans, he by chance bought an astronomy book at an auction which so inspired him he bought a small 150mm telescope. With this scope he discovered 400 double stars. This brought him to the attention of astronomers as a good observer and he went on to work at Lick Observatory (1882 -92) and then Yerkes Observatory (1897-1914), adding greatly to his list of discoveries.

Becoming a fellow of the Royal Astronomical Society, he continued to identify double stars and later published the *General Catalogue of 1290 Double Stars*. In 1906, he published the *Burnham Double Star Catalogue*, containing 13,665 pairs of double stars.

He is credited with personally discovering 1340 binary stars.

### **Shelburne Wesley Burnham**



### **R.G.Aitken = A or ADS**

Robert Grant Aitken (1864-1951) was an American astronomer of great repute, doing most of his work at Lick Observatory. His major achievement was the publication in 1932 of a massive two volume *New General Catalogue of Double Stars within 120 Degrees of the North Pole*. This work is more commonly known as the *Aitken Double Star Catalogue* or ADS. Containing measurements of 17,180 double stars located north of the  $-30^\circ$  declination, it superseded the 1906 catalogue by Shelburne Burnham. His detailed observations of double star orbits allowed for the improvement in knowledge of stellar masses.

Highly respected, he was President of the Astronomical Society of the Pacific twice, elected in both 1898 and 1915.

### **Robert Grant Aitken**

(To be continued in September)

# 96 new star clusters found

## *VISTA finds 96 new clusters hidden behind interstellar dust*

Using data from the VISTA infrared survey telescope at ESO's Paranal Observatory, an international team of astronomers has discovered 96 new open star clusters hidden by the dust in the Milky Way. These tiny and faint objects were invisible to previous surveys, but they could not escape the sensitive infrared detectors of the world's largest survey telescope, which can peer through the dust. This is the first time so many faint and small clusters have been found at once.

This result comes just one year after the start of the VISTA Variables in the Via Lactea programme (VVV), one of the six public surveys on the new telescope. The results will appear in the journal *Astronomy & Astrophysics*.

"This discovery highlights the potential of VISTA and the VVV survey for finding star clusters, especially those hiding in dusty star-forming regions in the Milky Way's disc. VVV goes much deeper than other surveys," says Jura Borissova, lead author of the study.

The majority of stars with more than half of the mass of our Sun form in groups, called open clusters. These clusters are the building blocks of galaxies and vital for the formation and evolution of galaxies such as our own. However, stellar clusters form in very dusty regions that diffuse and absorb most of the visible light that the young stars emit, making them

invisible to most sky surveys, but not to the 4.1-m infrared VISTA telescope.

"In order to trace the youngest star cluster formation we concentrated our search towards known star-forming areas. In regions that looked empty in previous visible-light surveys, the sensitive VISTA infrared detectors uncovered many new objects," adds Dante Minniti, lead scientist of the VVV survey.

By using carefully tuned computer software, the team was able to remove the foreground stars appearing in front of each cluster in order to count the genuine cluster members. Afterwards, they made visual inspections of the images to measure the cluster sizes, and for the more populous clusters they made other measurements such as distance, age, and the amount of reddening of their starlight caused by interstellar dust between them and us.

"We found that most of the clusters are very small and only have about 10–20 stars. Compared to typical open clusters, these are very faint and compact objects — the dust in front of these clusters makes them appear 10 000 to 100 million times fainter in visible light. It's no wonder they were hidden," explains Radostin Kurtev, another member of the team.

Since antiquity only 2500 open clusters have been found in the Milky Way, but astronomers estimate there might be as many as 30 000 still hiding behind the dust and gas. While bright and large open clusters are easily spotted, this is the first time that so many faint and small clusters have been found at once.

Furthermore, these new 96 open clusters could be only the tip of the iceberg. "We've just started to use more sophisticated automatic software to search for less concentrated and older clusters. I am confident that many more are coming soon," adds Borissova.



Credit: ESO





Since 2010, the VISTA Variables in the Via Lactea programme (VVV) has been scanning the central parts of the Milky Way and the southern plane of the galactic disc in infrared light. This program was granted a total of 1929 hours of observing time over a five year period. Via Lactea is the Latin name for the Milky Way.

Credit: ESO



# Members Observing Nights

*Make sure you remember to bring your woolies...it's winter!*

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 \$8.00 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 \$12.00 per person 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 as are kitchen and washroom facilities.







A concept drawing showing space shuttle Atlantis as the centerpiece of a new exhibit showcasing the Space Shuttle Program. The display shows the orbiter in its on-orbit configuration, with the cargo bay doors open and robotic arm extended. Artist concept courtesy Kennedy Space Center Visitor Complex.

## Atlantis to park at KSC Florida

### *NASA to Enhance Shuttle Story at Kennedy with Atlantis*

**For decades, NASA has shared the excitement, emotions, dreams and remarkable feat of voyaging out beyond the reaches of Earth's gravity in the world's first reusable spacecraft. In retirement, space shuttle Atlantis will help the agency bring that story to life for generations to come from its launch site at Kennedy Space Center in Florida.**

"Not only will the workers who sent it into space so many times have a chance to still see it," NASA Administrator Charlie Bolden said to cheers and applause while standing in front of Atlantis outside Kennedy's Orbiter Processing Facility-1, "the millions of visitors who come here every year to learn more about space and to be a part of the excitement of exploration will be able to see what is still a great rarity -- an actual flown space vehicle."

After hearing the news, Kennedy's Center Director Bob Cabana said to Bolden, "Thank you so much for trusting us with the care of Atlantis. I promise you, we'll take good care of her."

On the day that NASA celebrated the 30th anniversary of the first space shuttle launch -- Columbia's STS-1 mission on April 12, 1981 -- the space agency and its design partners received the "go" they've been hoping for with the announcement that a shuttle will join rockets, capsules and artifacts from the Mercury, Gemini and

Apollo eras at the Kennedy Space Center Visitor Complex.

"This is a really, really big artifact that will really bring the legacy of what Kennedy has meant to people locally and around the world," said Bill Moore, chief operating officer of the visitor complex. "I think it ties in just absolutely perfectly to what the history of the visitor complex means."

Inside a new 65,000-square-foot facility in the heart of the complex's Space Shuttle Plaza, the 100-ton shuttle is expected to look like it's soaring through space, with its landing gear raised and payload bay opened. Anchored at an angle, guests would get an up-close view of Atlantis' belly and the thousands of black



heat shield tiles that allowed the shuttle to travel more than 115 million miles and through Earth's harsh atmosphere. The shuttle's robot arm also could be deployed, as if reaching out to a satellite.

"We plan on adding to the Shuttle Launch Experience attraction and enhancing the storytelling with what will become a very, very large addition to this complex," said Luis Berrios, a NASA design specialist working with the visitor complex's development team.

Berrios and his teammates envision the facility as a super-charged, space shuttle-themed science center with interactive exhibits to engage, entertain and inspire even the world's most tech-savvy audience. And while these new exhibits will shimmer, Atlantis is expected to keep every bit of wear-and-tear it encountered on its 33 journeys into space.

The display could reveal the way shuttle crews performed science and research experiments in the weightlessness of space and how the shuttle was the go-to vehicle for transporting International Space Station laboratories, modules and solar panels to low Earth orbit.

During the announcement ceremony, the station's Expedition 27 crew thanked the NASA team for its hard work and dedication to the shuttle program.

"We will miss the capabilities and the beauty of the space shuttle. It has been a national icon for innovation and exploration for 30 years, but its legacy and yours lives on in the work that we do here on the ISS," said NASA astronaut Catherine Coleman. Designers also are looking to convey how the shuttle and its crew members deployed, retrieved and serviced satellites -- much like Atlantis did two years ago on the shuttle's final servicing mission to NASA's treasured Hubble Space Telescope.

Berrios described one of his favorite milestones in shuttle history -- Bruce McCandless flying untethered for the

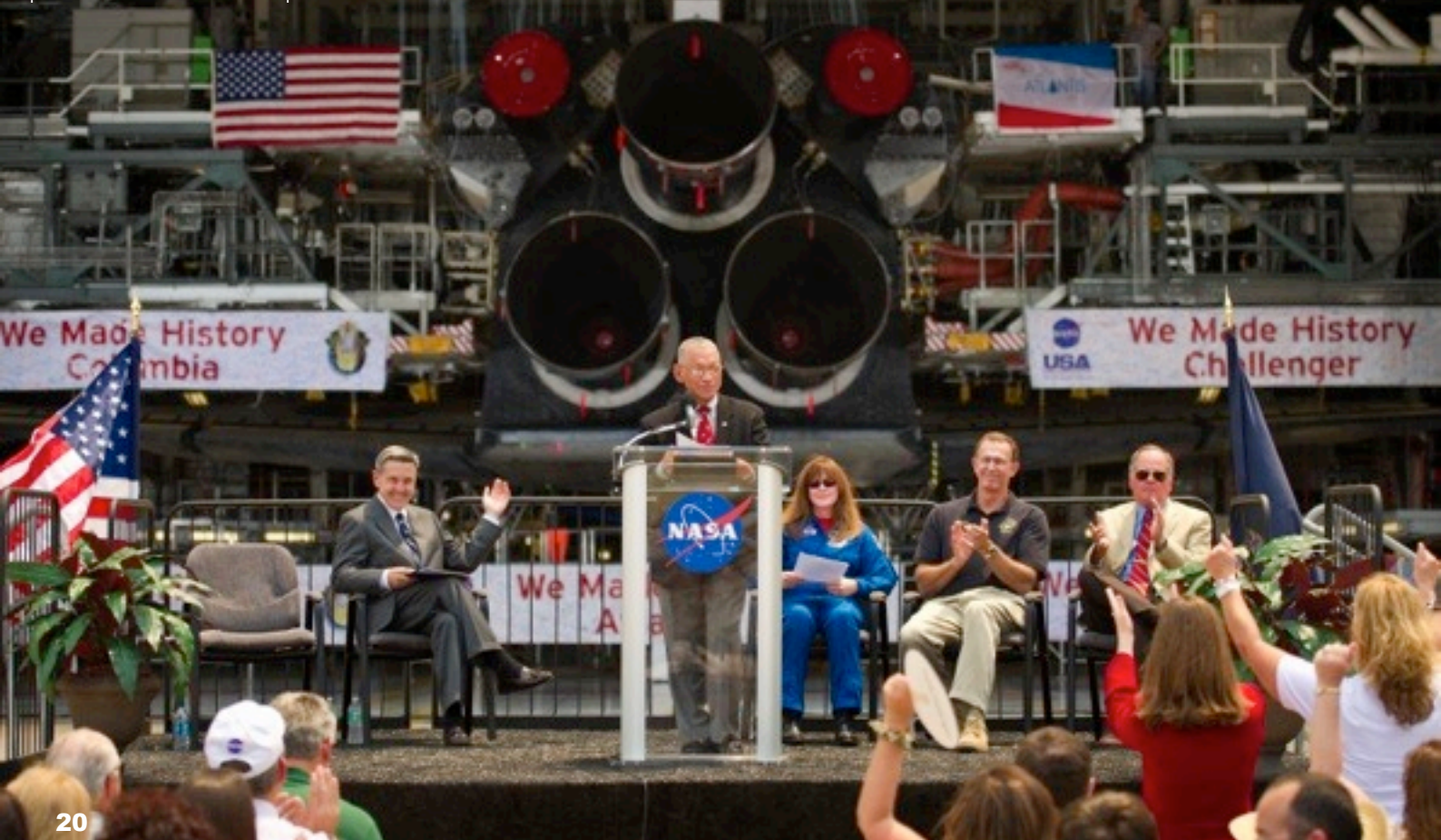
first time with the manned maneuvering unit (MMU) to retrieve a pair of communications satellites in 1984 -- and what it would feel like to share that experience with generations to come.

"What must that have felt like for him? It must have been amazing," Berrios said.

Designers also want to paint a picture of just how many working parts it took to launch NASA's space shuttle fleet. There are many features that could be worked into the display to help guests appreciate the shuttle system as a whole, including the solid rocket boosters and giant external fuel tank.

Even structures saved during the deconstruction of Kennedy's Launch Pad 39B could be incorporated, such as the gaseous oxygen vent arm, called the

NASA Administrator Charlie Bolden, standing, announces that Atlantis will remain at KSC on permanent exhibition at the Kennedy Space Center Visitor Complex.





"beanie cap," and the orbiter access arm, which is replete with the memories of astronauts walking through before waving farewell and boarding a shuttle for liftoff.

While the spacecraft and its myriad of components will be the main attraction, designers also dove deep into the human aspect of the program. "We treat our orbiters like our own family members and they're very close to our hearts," Berrios said. "That is probably the most important component of our storytelling -- to let the world know how passionate our Space Shuttle Program has been to our whole NASA family, all of its civil servants and contractors, and all the other sister centers that have played a huge role in making Kennedy Space Center the launch site to deliver the future for over 30 years."

Annually, the Kennedy Space Center Visitor Complex reaches more than 1.5 million guests and by adding a flown shuttle to the mix, it's expecting a major boost in attendance. It's not just about the number of people who will flock to see the space-flown shuttle, though, Moore said, it's about touching the lives of NASA's future engineers, scientists and explorers.

"I really like hearing about the rides on the way home when the kids say, 'Mom, did you know?'" Moore said. "Those conversations are priceless and we're setting the stage for these kids' future in a big way."

Atlantis rounded out the shuttle program last month with its last flight -- STS-135. After its return from space, technicians and engineers will now spend a few months prepping the vehicle for public display -- paving

the way for a grand opening as early as the summer (US time) of 2013.

"This is the home of human spaceflight, it's the home of the space shuttle," Cabana said. "To be able to share that excitement, that story with all our visitors to inspire the next generation of explorers . . . it's huge in being able to tell the story of human spaceflight and of NASA. I think it's outstanding that Atlantis gets to stay here with us and not leave after her last flight."

NASA's remaining shuttles will embark on longer journeys to reach their final destinations and Bolden congratulated the institutions that will have the unique opportunity to share a large piece of space history with the world by saying, "Take good care of our vehicles. They've served the nation well and we at NASA have a deep and abiding relationship and love affair with them that's hard to put into words."

Enterprise will be featured at New York City's Intrepid Sea, Air and Space Museum. Bolden said many of the applicant institutions will receive significant shuttle hardware and artifacts to share with visitors.

"Even though the space shuttles aren't going to fly anymore, they're still going to launch the dreams of future exploration," Berrios said. "Thousands of years from now, it'll be the same process -- smart, courageous people doing amazing things."



Shuttle Discovery will go to the Smithsonian's National Air and Space Museum Steven F. Udvar-Hazy Center in Chantilly, Va., for exhibition. Endeavour will go to the California Science Center in Los Angeles, and

*Credit: Rebecca Regan*

NASA's John F. Kennedy Space Center

# MAS Shop

*It's buyin' time!*

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 II:** 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 Aborigines: was \$15.00 - now reduced to only \$10.00.

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

[merchandise@macastro.org.au](mailto: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.







## Full-frame image of Vesta

NASA's Dawn spacecraft obtained this image of the giant asteroid Vesta with its framing camera on July 24, 2011. It was taken from a distance of about 3,200 miles (5,200 kilometers). Dawn entered orbit around Vesta on July 15, and will spend a year orbiting the body. After that, the next stop on its itinerary will be an encounter with the dwarf planet Ceres.

The Dawn mission to Vesta and Ceres is managed by NASA's Jet Propulsion Laboratory, Pasadena, Calif., for NASA's Science Mission Directorate, Washington, D.C. It is a

project of the Discovery Program, managed by NASA's Marshall Space Flight Center, Huntsville, Ala. UCLA is responsible for overall Dawn mission science. Orbital Sciences Corporation of Dulles, Va., designed and built the Dawn spacecraft.

The framing cameras have been developed and built under the leadership of the Max Planck Institute for Solar System Research, Katlenburg-Lindau, Germany, with significant contributions by the German Aerospace Center (DLR) Institute of Planetary Research, Berlin, and in coordination with the Institute of Computer and Communication Network Engineering, Braunschweig, Germany. The framing camera project is funded by NASA, the Max Planck Society and DLR. More information

about Dawn is online at <http://www.nasa.gov/dawn>.

Credit:  
NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



*Photos from the Forest  
by Murray Parkinson*



Corona Australis



NGC 7293 - Helix Nebula



IC 4628 - Prawn Nebula





## August's Speaker

*Prof. Geraint Lewis*

Our August guest speaker is the very popular Geraint Lewis, Professor of Astrophysics and ARC Future Fellow at the Sydney Institute for Astronomy at Sydney University. Geraint is a dynamic speaker and older members will be delighted to welcome him back to MAS. His talk, "Just what do we know about the Universe?", promises to have us all sitting on the edge of our seats again:

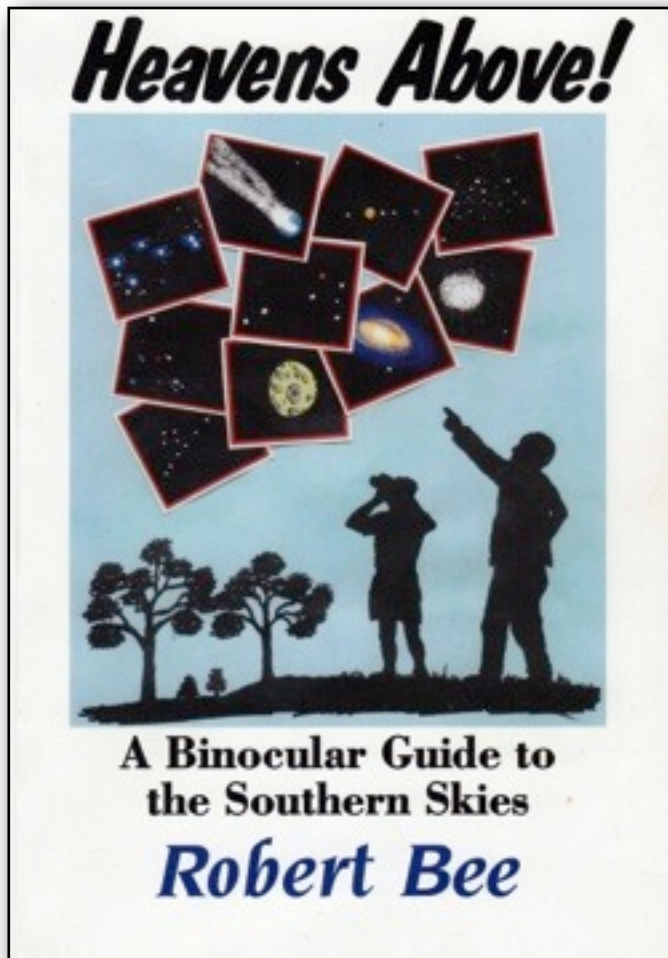
***"Cosmology has come on in leaps and bounds in the last decade, but just what do we know about the Universe? In this talk, I will review the key observations that brought us to this point, and talk about the ongoing and future experiments that will (hopefully) reveal the Universe's inner secrets."***

Professor Lewis undertakes a broad spectrum of research. On the largest scales, his program involves looking at the influence of dark energy and dark matter on the evolution and ultimate fate of the Universe. Another aspect of his research uses the phenomenon of gravitational lensing to probe the nature and distribution of the pervasive dark matter, and employing individual stars to magnify the hearts of quasars, the most luminous objects in the Universe.

Closer to home, Geraint's research focuses upon galactic cannibalism, where small dwarf galaxies are torn apart by the much more massive Milky Way and Andromeda Galaxy. Using telescopes from around the world, including the 10-m Keck telescope in Hawaii, he has mapped the tell-tale signs of tidal disruption and destruction, providing important clues to how large galaxies have grown over time.

# 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 [rmb99@hotmail.com](mailto:rmb99@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.



# Camden Science Café

*Community  
Announcement*

**September 8th 2011**

**6.30 (for 7.00pm) - 9.30pm**

COME ALONG AND LISTEN TO OUR GUEST SPEAKERS PROVIDE INSIGHT INTO CURRENT SCIENTIFIC RESEARCH.

**Where:** Camden Senior Citizens Centre 65 John Street CAMDEN

A light supper will be provided.

There will be a small admission fee to defray costs -

\$6.00 single / \$10 couple

**GUEST SPEAKER:**

**Robert Bee**

Astronomy columnist for the Macarthur Chronicle and Member of Macarthur Astronomical Society

**Subject of talk:**

Astronomy in Wonderland - From Curious to Curiouser

The Universe literally 'through the looking glass...'

How the past 100 years have turned our view of the Universe on its head.

Numbers will be limited -

Please RSVP 48 HOURS prior to Helen 0412 364 939

or email: [camdensciencecafe@gmail.com](mailto:camdensciencecafe@gmail.com)

# Spektr-R Launched

Spektr-R (or Radioastron) is a Russian orbital radio telescope, and currently the largest space telescope in orbit. It is funded by the Russian Astro Space Center, and was launched into Earth orbit on 18 July 2011, with a perigee of 10,000 kilometers (6,200 mi) and an apogee of 390,000 kilometers (240,000 mi), about 700 times of the orbital height of the Hubble Space Telescope. The main scientific goal of the mission is the study of astronomical objects with an angular resolution up to a few millionths of an arc-second. This is accomplished by using the satellite in conjunction with ground-based observatories and interferometry techniques.

Spektr R is one of the instruments in the RadioAstron program, an international network of observatories led by the Astro Space Center of the Lebedev Physical Institute.

The telescope is intended for radio-astrophysical observations of extragalactic objects with ultra-high resolution, as well as researching of characteristics of near-Earth and interplanetary plasma. The very high angular resolving power will be achieved when used in conjunction with a ground-based system of radio-telescopes and interferometrical methods, operating at wavelengths of 1.35–6.0, 18.0 and 92.0 cm. With its Earth-based companions, it will form a network able to

provide detailed images of the universe at 1,000 times the resolution attainable using the Hubble Space Telescope. Once in space, the flower-like main dish will open its 27 'petals' within 30 minutes.

At launch the mass of the spacecraft was about 5,000 kilograms (11,000 lb). It was launched from the Baikonur Cosmodrome on July 18, 2011 at 6.31 a.m. MSK by a Zenit-3M launcher with Fregat-SB upper stage.

## General information:

NSSDC ID	2011-037A
Organization	Russian Astro Space Center
Major contractors	NPO Lavochkin
Launch date	02:31 UTC July 18, 2011
Launched from	Baikonur Cosmodrome Pad 45/1
Launch vehicle	Zenit-2SB
Mission length	5 years
Mass	3,295 kg (7,260 lb)
Type of orbit	Highly elliptical, geocentric
Orbit period	8 days 7 hours
Wavelength	Radio
Diameter	10 m (33 ft)[1]
Focal length	4.3 m (14 ft)
Website	<a href="http://asc.rssi.ru/radioastron/index.html">asc.rssi.ru/radioastron/index.html</a>

Credit: Wikipedia







*Right time, right place.... NASA astronaut Jeff Williams took this picture of Cleveland Volcano in the Aleutian Islands from the International Space Station on May 23, 2006.*



# M.A.S. HYSTERIA!!!

TWO ATOMS BUMP  
INTO EACH OTHER,  
AND ONE SAYS...

"I THINK  
I'VE LOST AN  
ELECTRON!"



THE OTHER REPLIES...

"ARE YOU  
SURE"?



"YEP... I'M  
POSITIVE!"

