MACARTHUR ASTRONOMICAL SOCIETY Inc.

Journal

PRIME FOCUS

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PRESIDENT'S REPORT

Welcome to all our new and renewed members. Last month's meeting combined with the AGM was one of our best. Thankyou to Peter for being the Returning Officer, Daniel for taking the minutes, and the committee for their reports. Also thankyou to Noel for accepting the role of VP and his tireless work as Treasurer throughout 1998, Bob for his outstanding work on Prime Focus, Daniel for his liaising between the university staff and us, and all the committee and members who helped out throughout the year.
Special thanks to Carol Oliver for her entertaining talk on SETI.

This year we will be having star nights at least once and possibly twice a month at our Cobbitty site, and viewing most nights after our regular meetings at the university. Guests this year include, Leon Darcy, Peter Williams, Don Whiteman, Steve Williams, and more guests throughout the year, some yet to be confirmed.

Also I would like to welcome Peter Elston as Treasurer, Bobbie as a committee member, and Daniel as Secretary, I look forward to working with them and making 1999 our best year so far.

Phil Ainsworth
President ■

LIBRARY

I will be bringing some of the library and allowing members to borrow. It will be stationed in the boot of my car and accessible during our viewing time after the meeting. The library works on an honesty system, by just writing your name in a book to say which book or magazine you have borrowed. Items are for loan for one month with an extension via phone or just letting me know on the night, just in case someone else wants to borrow the item.

Phil Ainsworth
Librarian ■

LATEST NEWS

VOYAGER MISSION STATUS

Both spacecraft are still operating smoothly and are continuing to explore the outer regions of our solar system. While some of the equipment has been switched off, 5 instruments continue to send back important data. The spacecraft is currently (March 3rd) 8.6 billion kms from Earth, it is travelling at approximately 16 km/sec. The round trip light time for sending and receiving information is 16 hours. The spacecraft is expected to last into the early 21st century. Voyager 1 is now at 73 AU from Earth, it is shortly going to reach heliopause (the dividing line between our solar system and interstellar space) by 2001. With its instruments it should be able to detect a change.

ULYSSES MISSION STATUS

This remarkable spacecraft is now in its second orbit around our Sun and operating at full capacity. Currently it is 22° south of the Sun's equator and travelling at about 33,000 km/hr. The spacecraft's next mission is to study the Sun's south polar region under high solar activity in Sept 2000-Jan 2001 and in Dec 2001 over the northern polar region. The Prime mission is to study the Sun and its corona and the polar regions. So far large coronal holes have been found over the polar caps. Scientists expect to encounter streamers (distinctive jets or corridors of high density coronal material radiating outward from the Sun's surface.)

MARS POLAR LANDER MISSION STATUS (March 15th)

The Mars Polar Lander has made its second successful course correction and is due to rendezvous with Mars on December 3rd 1999. The spacecraft is currently 16 ½ million km from Earth and travelling at 1,680 metres/sec. More updates as they come to hand.

NASA TESTS TO EXTRACT O_2 FROM MARS.

NASA engineers have successfully tested a device which can extract oxygen from the Martian atmosphere. The experiment tested showed that oxygen can be created from other resources on Mars. This can be beneficial for eventual manned missions that will be able to use the oxygen for breathing and fuel. Briefly how this system works is a ceramic disk of Zirconia is wedged between two platinum plates and is heated to 750° C. Carbon Dioxide is fed into the system from the simulated Martian atmosphere is broken down or cracked by the Zirconia into carbon monoxide and oxygen. The zirconia acts as a filter allowing oxygen to pass through but not carbon monoxide or dioxide molecules. (ingenious hey) NASA is planning on flying this experiment on the Mars Surveyor 2001 Lander and do a live test on Mars. (can't wait for that one then NASA will have little excuse for not sending a manned mission to Mars.)

The main concept of using Martian resources is to reduce the amount of fuel and material that needs to accompany spacecraft and thus reduce weight and fuel needed to take with them.

LIVE OFF THE LAND

NASA has finally accepted some of Robert Zubrin's ideas and done some of their own experiments on a concept of "Living of the land"(Using Mars's resources to get petrol, air and other natural materials instead of transporting them on the spacecraft. In other words produce everything on Mars for the return journey and to manufacture air for colonists/explorers to breathe. It has now been proved on Earth through simulated experiments that it will work. Now on Surveyor in 2001 it will be proven once and for all it can be done on Mars.
To read more on Living of the land concept, I have the book, and am willing to lend it to anyone interested in this fascinating topic.

MARS GLOBAL SURVEYOR

The spacecraft successfully deployed its high-gain antenna and is also orbiting only about 300 kms from the surface of Mars. Data is stored 24 hours a day on tape then relayed back to NASA for

analysis. It will continue to send data for the next two years.

MOON AROUND ASTEROID

In Nov. 98 a moon was discovered around asteroid 45 Eugene. It was tracked over 5 nights. The orbit of the asteroid's moon is 4-7 days and is at a 45° angle to the line of sight. No estimation of the moon's size is yet attainable, but it is about 6 magnitudes dimmer than the asteroid. Eugenia is approx. 200 km is diameter, estimations make the moon s/1998(45) to be no more than 6 kms in size. The first moon found orbiting an asteroid was Dactyl which orbits Ida. Dactyl is 1.2 km in diameter and Ida is 90 km in size.

MARS EXPRESS

(ESA) European Space Agency announces they are go for Europe's first planetary space mission. The mission is going to put a spacecraft in orbit around the Mars and its prime goal is to search for water. The Lander is named Beagle 2. Launch date possible 2003-2005.

LIFE ON MARS ???

Scientists who first suggested life was evident in the famous meteorite are now convinced more than ever that they have found similar evidence in other Mars rocks. The fossil-like creatures have been found in the 1911 Egyptian rock and they are far younger than ALH 84001. The fossils formed in the 1911 rock are much larger. Scientists say that if the rock hadn't been from Mars the first and most plausible conclusion would have been bacteria and fossilised life.

STARDUST MISSION

NASA's comet intercept mission and return a sample mission is so far well on track to succeed in its prime goals. On Feb. 7th it sent back information that all its equipment is functioning perfectly. Stardust encounters the comet in 2004.

Phil Ainsworth ■

PARTIAL SOLAR ECLIPSE

The photo below 'Solar Eclipse in the Trees' was taken by one of our members, **Stephen Hutchinson**, at approx. 7.15pm on 16th February, 1999 at Kentlyn. He used an Olympus OM2 SLR camera with a 400mm lens and a 2x converter at F22, 1/1000th second exposure on Kodak 200M film.

VICE PRESIDENT'S REPORT

Well another month greets us and I might say it's great to get daylight saving behind us. Not only is it good for observing a much longer night sky, but my son is now going to bed at 7pm instead of 8pm. Also the cooler weather makes a pleasant change to all the heat. Now if we could only get rid of the rain.

For this report, I'll summarise the following:

Tonight we present a 'pot pourri' of speakers who will entertain us in 10 to 15 minute blocks. Hopefully we'll have 4 speakers, then weather permitting we'll have some car park observing.

Membership fees were due last month. We will grant one extension to the end of this month (April). If still unpaid, you will cease to be a member and will need to pay a joining fee plus membership fee if seeking to belong to the Society.

Macquarie University: I must thank Bob, Ian, Attila and John on what was great night. I'm sure for John and Attila it was a 'baptism of fire'. No sooner than setting up they were besieged by hoards of eager stargazers. Well done guys!

Field Nights: Don't forget about our monthly observing at Cobbitty. Remember, always Saturday closest to a

New Moon. This month it was last Saturday, however, we are holding a second night this Saturday 24th April. Refer to your maps for location and conditions. I'll keep the gate open for a while after sunset for latecomers, but if you could arrive just before sunset it would be appreciated, or meet at Narellan Burger King at 4.30pm.

At this point I must request – **please do not** drive straight cross the field. Rather take the left outside edge as there is a cricket pitch that could be damaged. If in doubt just drive past the gate and with your parkers on give us a little toot on your horn and I'll come over.
If you need help with the dates, you'll find a separate listing in this Journal.

In Conclusion: Good luck with your observing and let us know in writing of your results, so we can put it in the Journal. We need new writers so don't be afraid to contribute. It will be very welcome.

Noel Sharpe
Vice President ■

OFFICIAL DATES FOR COBBITTY FIELD NIGHTS

24/4/99	15/5/99
12/6/99	10/7/99
14/8/99	11/9/99
9/10/99	6/11/99
11/12/99	

We are considering in addition to the above dates to hold observing nights the Saturday after the New Moon as this will give an opportunity for Lunar observing. The Moon will set on average around 10 to 10.30 which will also allow some deep space work. It will also allow for anyone missing the previous week.

If the membership could let me know their reaction please, as at this stage it is just an idea and not confirmed. Jus grab me and say "Hey, what a great idea!".

Noel Sharpe ■

BOOK REVIEW

'Star Ware' by Philip Harrington (2nd Ed 1998)

Billed as "The Amateur Astronomer's ultimate guide to choosing, buying and using telescopes & accessories", this book fulfils its promise very well.

Beginning with a good overview of the more usual telescope types, how they work and the limitations that apply, Harrington goes on to cover how to choose the right type of scope for you and how to buy it.

Further chapters cover the important subjects of: eyepiece choice, matching finder scope to telescope, filters and various accessories.

A chapter on easily made additions to your astronomical arsenal is followed by care and feeding of your pride and joy and a fairly basic guide to observing and astro-photography.

Comprehensive appendices cover (U.S.) availability and price range of binoculars, telescopes and eyepieces. Manufacturers' and suppliers' addresses are listed along with a full Messier catalogue and other useful information.

Altogether, this could be $34 well spent. My copy came from Angus & Robertson in Liverpool.

(Note: One glaring mistake appears on page 7. In Table 1.2, the resolving power of telescopes is listed but at twice the correct figure.)

Dick Everett ■

ASTRO-QUIZ

Here are some Q & As to broaden your knowledge:

Q1. What does the term 'New Astronomy' mean?

A1. The 'new Astronomy' is a phenomenon of the late 20th century, and it has completely revolutionised our concept of the Universe.

While traditional astronomy was concerned with studying the light (optical radiation) from objects in space, the New Astronomy encompasses

all the radiations emitted by celestial objects: gamma rays, X-rays, ultraviolet, optical, infrared and radio waves.

The range of light is limited. It includes only radiation with wavelengths from 30% shorter to 30% longer than the wavelengths to which our eyes are most sensitive. The New Astronomy covers radiation from extremes which have wavelengths less than 1/1000th millionth as long, in the case of the shortest gamma rays, to over 100 million times longer for the longest radio waves.

To make an analogy with sound, traditional astronomy was an effort to understand the symphony of the universe with ears which could only hear middle C and two notes immediately adjacent.

Q2. The Arecibo Telescope is the world's largest radio dish, 305m across. Fitted in a natural hollow in the lime stone hills of Puerto Rico, the curved bowl reflects radio waves to an antenna suspended on cables a dizzying 130m above.

Although the dish cannot tilt, astronomers can allow the telescope to pick up radiation from different parts of the sky. How can they do that?

A2. There are two ways:

a) using the continuously changing effects of the Earth's spin and its orbital sweep around the Sun;
b) moving the antenna to allow the telescope to pick up radiation from different parts of the sky.

Q3. SETI proceeds on the basis of two crucial scientific assumptions. What are these assumptions?

A3. The first assumption is Biological Determinism – that life will emerge from non-life more or less automatically, given suitable conditions and a number of million years for the chemical process to work.

The second assumption made by SETI researchers is that if life did get going elsewhere, it would tend to evolve toward greater complexity and – ultimately – intelligence and technology.

Intelligence is very likely to arise whenever it has the chance. In other words, there is a cognitive niche in every biosphere waiting to be filled and there are many evolutionary paths leading to it.

John Muszynski ■

Seminar on Astronomy Education and Astronomy Night:

Saturday 1st May at UWS Macarthur, 10.00am – 5.00pm and 6.30pm – 11.00pm

Registration $20, includes Lunch and Morning/Arvo Tea

WHY MAKE YOUR OWN TELESCOPE?

The past 20 years have seen a revolution in amateur astronomy. The advent of cheap, mass produced, large aperture telescopes has caused an explosion in the number of people joining the ranks of avid stargazers and the hobby has benefited greatly from the influx.

One down side to all this has been noted, however. It is now less common for the enthusiasts to make their own telescopes, and in so doing get so much more out of the hobby.

Now telescope building is not all that difficult. Anyone who can use ordinary hand tools can make a Dobsonian reflector at home, even grind the mirror given patience and a methodical work plan.

Many approaches may be adopted. Some may want to make as much of the instrument as possible, others will purchase commercial parts and assemble the tube and base to their particular requirements.

There are many benefits to your own telescope. Whilst it is not highly likely that you will save a great deal of money vis-à-vis buying a commercially available scope, you have a lot more freedom as to size, focal length etc., allowing your telescope to be optimised for your own particular interests, be they

planetary, deep sky or whatever.

WHY WOULD YOU DO IT THEN?

First of all by designing and building your own personal scope you will learn more about telescopes – how they work and how to get the best out of them by any other means I can think of.

You can expect to own a telescope that will outperform similar sized commercial ones and which is optimised to your own requirements without spending the National Debt.

But best of all, imagine the questions. "Where did you get your telescope?" Picture yourself saying (rather offhandedly) "I made it myself."

If you are interested but feel perhaps a bit overawed by the prospect or need a bit of help to get started, please contact me at a meeting. If enough people are interested we can look at forming a group within the Society to share knowledge and help ane another along.

Highly Recommended:
Richard Berry's book "Building Your Own Telescope." It's the Bible... available from the usual outlets.

Dick Everett ■

BOOK REVIEW

Hi Guys, Linda here. I'm new to writing so please bear with me. I feel I need to respond to the article "Ancient Mysteries" by Attila Kaldy, in the March issue of Prime Focus. I do not wish to dismiss the theories that have been suggested, rather I would like to add a new theory, not only to the Pyramids of Giza, but to the origins of mankind also.

First time Author, Alan F. Alford, has presented not only his theories but a whole new chronology to support them in his book titled "GODS OF THE NEW MILLENNIUM, The shattering truth of human origins." published by Hodder and Staughton.

This book is the product of a ten year " personal quest" by the author who has personally visited the many anomalous places described in the book and has carried out a thorough review of all existing literature.

This compelling account of mans history will raise the eyebrows of even the most sceptical readers touching on events and topics as diverse as: Darwinism, The missing link, The Pyramids of Giza, Astronomy, Stonehenge, The search for planet X, A new chronology, The epic of creation, The great flood, Flesh and blood gods, Genetic engineering, Adam and Eve's creation (rib or D.N.A?), Longevity, Origins of racial diversity, Heaven and Hell and Judgement Day.

These are just a few of the subjects that Alan Alford discusses in his book paralleling them with the Bible, Ancient Sumerian and Mesopotamian texts.
He provides explanations of the Nazca lines, Easter Island and the lost city of Petra, and the Great Pyramid.

His new chronology matches scientific estimates of the creation of mankind and reconciles the arrival of the gods and the creation of mankind with the independently verifiable date of the flood, the dates of the biblical patriarchs from Adam to Noah and later from Noah to Abraham and also reconciles with the infamous Sumerian Kings List of pre-flood rulers.

The evidence contained in the book is based on scientifically verifiable facts and the scope of this evidence is world wide and solar system wide. The author has linked together all the mysterious places of the world leaving no loose ends and no contradictory facts. If you approach this book with an open mind you will see that Alan Alford's chronology offers an interestingly alternative paradigm than those already known.

I urge you to get your hands on a copy of "Gods of the new Millennium." as soon as you can and draw your own

conclusion from his wealth of information.

Linda Middlemas ■

I haven't read this book, but from Linda' review, it smacks of Emmanual Velikovsky's "Worlds In Collision" to me.
If anyone would like to add their views to Linda's book review or even Attila's articles on ancient civilisations, please write and do so. Remember though, this is an Astronomy Society, so let's keep to ideas on matters astronomical and away from the 'pseudo-scientific' clap-trap that populates many a Californian based book.

There's nothing like a good debate, but let's try and keep our feet on the ground while we explore the skies.

Editor

FROM URSULA BRAATZ

Ursula has contributed two articles of totally different character and content:

My Telescope:
I have a Tasco telescope (63mm) which is small, light and easy to carry in a bag. I have three eyepieces with it and a 3x Barlow lens.

I have to do drawings of my sightings as there is no camera with this telescope. On 25th December 1998, I watched the near occultation of Jupiter with the Moon. The sketch below is how I saw Jupiter and its moons with our Moon through the eyepiece.

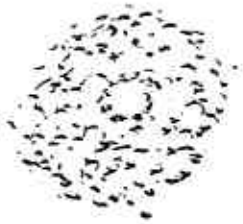
My Fantasy of the Universe

Now the scientists have discovered that the galaxies are speeding up the more they are apart. The Universe should slow down after the Big Bang.

There must be something around the Universe (strong matter, dense cloud) which is pulling it apart.

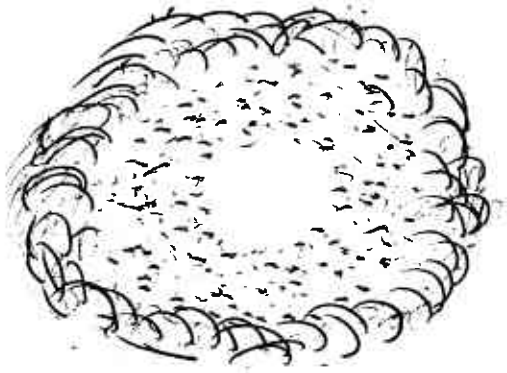
My idea is shown in the following sketches:

We see the 'baby universe' as it was 15 billion years ago.



It is only a hole there now.

Something is around our Universe, pulling the galaxies and making them go faster. The Universe may dissipate in 20 billion years or more in a big dense cloud or strong matter, and leave a large hole behind. This large cloud (a Sea of Eternity) can make other big bangs, but we cannot see that far.



In 20 billion years or more, the Universe bursts like a soap bubble.

Ursula Braatz ■

Ursula's 'fantasy' may not be so far off the mark with the latest data on the expanding universe pouring in. If anyone has some fresh data or insights into the expanding/ accelerating universe debate, please jot them down and pass them to me for publication. Remember, none of us are experts, we are just sharing ideas or information. So no judgements will be made. But it's a lot of fun thinking about the possibilities.

Editor

BITS & PIECES

1000th Pulsar: The 64 Metre radio Telescope at Parkes, using the new multibeam system which has revolutionised the speed with which the sky can be surveyed, has found the 1000th pulsar known to science. Actually they found it in November 1998, so the score is probably much higher now.

Extra-Solar Planets: And still they come. As of March 99, the number of detected planets around other stars has risen to 18. Three of these were added recently by the Marcy/Butler team, bringing their total to 12.

8 of the 16 planets orbiting Sun-type stars are 'hot Jupiters'. ie Big planets of Jupiter-plus size, with very close orbits (about 0.1 AU) about the star. Very hot!

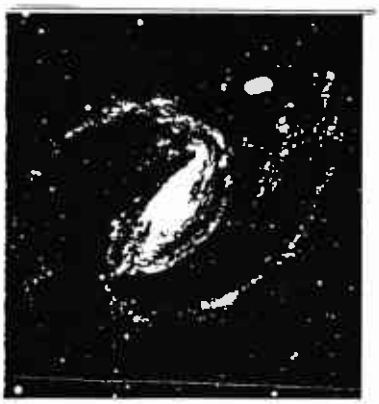
Now they know how to find them, they are just cranking them out.

The Local Group Grows: Astronomers have confirmed the existence of three additional dwarf galaxies (each with only a few million stars) about 2.5 million light years away, forming part of our Local Cluster. The latest total of galaxies in our cluster now stands at 35. Watch this space...

Milky Bar: It seems it's official... our own beloved Milky Way galaxy, always thought of as a classic spiral galaxy like our neighbour Andromeda, is in fact... a Barred Spiral Galaxy. It kinda smashes your faith in the obvious, doesn't it? Is nothing sacred?

It seems the possibility hasn't been ignored in the past. In fact, there have been a number of astronomers who proposed the idea since the '50s, but this has been on the basis of indirect evidence, such as the observed orbits of neutral hydrogen gas (HI) around the central core. But the debate still leaned towards a simple spiral.

However direct evidence from infrared emissions has finally been accepted by the astronomical community. The central core, it seems, is not spherical but elongated. Peanut shaped, actually, with a length approx 3 times its width. The bar is estimated to be 12,000 to 18,000 light years long, with the spiral arms coming off each end of the peanut... er, bar.



WHAT'S TO SEE THIS MONTH?
(19th April – 16th May)

Mercury: There are a couple of good conjunctions this month, but they are during morning twilight and you'll need binoculars to view them. (ie a bit hard to spot with naked eye.)

On 30th April at about 4.30am in the East, Mercury (mag. –0.4) and Jupiter (mag. –2.1) are within 3.2°, and by 2nd May are only 1.6° apart.. Then, on 14th May at 5.30 am in the East, Mercury and Saturn (mag. 0.4) are only 0.7° apart.

Venus is setting about 7.30pm all this month. It's still pretty bright at mag. –4.2.

On 10th May, it passes within 1.5° from the open cluster M35 in Gemini, about 7° from the mid-point between the tips of Taurus's horns (β and ζ Taurus). This presents a nice sight for binoculars.

Mars is in Opposition on 25th April. It's not one of its better oppositions , being about 86 million km away, considering it will be 67 million km away in 2001 and its closest opposition at a mere 55 million km in 2003. But still, it's the closest this year, at mag. –1.7 and only 16" diameter.

It will still show up as a nice red disc under reasonable magnification. With good conditions and higher magnification, you may make

out the Polar Caps and some surface features. The best part is you can view Mars in the evening all this month and still get to bed at a reasonable time.

On 29th April at about 8pm, there will be a pretty arrangement with Mars, the Full Moon and Spica forming a neat triangle with approx. 7.5° sides.

Jupiter and **Saturn** return to the morning sky in May.

A Blue Moon?

A Blue Moon is when there is a second Full Moon in the same month. It seems May is another Blue Moon month, with Full Moons on 1st May and 30th May. So all those things you say happen 'once in a Blue Moon' might happen in May. (P.S. I read somewhere there is a minor debate as to whether both full moons actually fall in May. It has to do with the actual times the full moon occurs. Can any one shed some light on this?)

Constellations:

The False Cross (alright you pedants, it's not an official constellation, but it should be. ***Crux Imposterous***.) is regally high in the sky this month at about 8pm and later. It gives a great view of the cluster NGC2516 hanging below its bottom star. [Noel, I tried to cover you in glory in my Heavens Above! Column on 24th March. I related how NGC2516 got its name as the "Buggered If I Know" cluster but the Chronicle Editor (in her wisdom) took it out. Sorry, but I tried!]

Southern Cross. The real Cross (Crux) is also climbing higher, giving great views of its double stars and the deservedly popular Jewel Box.

Leo and its prime star regulus are due north this month. Can you spot Regulus's mag. 7.7 companion in binoculars or a small scope?

Leo has a good selection of spiral galaxies to view.

In good conditions, M65 and M66 (a pair of virtually adjacent 9th mag spirals) can be spotted in large binoculars and seen as nebulae with concentrated centres with 100mm+ scopes.

M65 & M66 (Photo by D Malin)

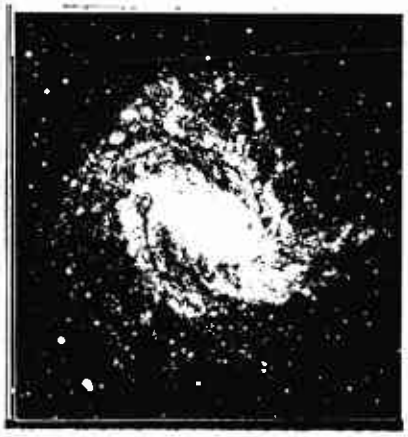
M95 and M96 are 10th and 9th mag spirals about 0.75° apart and can be seen as nebulosities in small scopes.

Another 1° away from them is M105, a 9th mag. elliptical galaxy.

Cancer is just west of Leo, and the easily spotted Beehive Cluster (M44) is there in its middle, with M67, a smaller denser cluster of about 200 stars next to α Cancri, at the Hydra end of Cancer's Y.

M44 is one of the closest open clusters, at only 520 l.y. and is very satisfying viewing in binoculars or a low powered scope. Burnham advises that Galileo was the first to view M44 through a telescope and recognise it as a cloud of stars.

Hydra is also spread across the northern sky, from east to north-west, directly above Leo and Cancer. It's worth a good look, especially for M48 (NGC2548, a large star cluster) which looks great in binoculars; M83 (NGC5236) an 'in your face' spiral galaxy of 8th mag, visible in small scopes;



M83 (Photo by D Malin)

And NGC3242, the so-called 'Ghost of Jupiter", a 9th mag. planetary nebula which appears as a Jupiter sized blue-green disc in small scopes

Good Seeing

Bob Bee ■

YES VIRGINIA THERE IS A LAMBDA

At our washed out Cobbity Star Night on 20th March, a few of us formed a circle of chairs to chew the astronomy fat. Peter Druery dropped a poser – had anyone heard about the 'discovery' that the expanding universe was in fact accelerating, and what did we think of it all? Nice one, Peter.

The rain eventually brought this philosophical and at times lively discussion to an inconclusive end. But I suspect Peter's question left a few brains ticking. What was this all about? What indeed!

As cosmology was a subject that has always fascinated me, I scoured the Internet looking for information of 'Universe +Accelerating' and was amazed by what I found, thankfully in a language that an amateur might understand.

Here, for what it is worth, is a brief digest of my current limited understanding. No doubt that could change quickly as new data comes to hand. If you'd like to discuss it further, I have the full articles available and would love to chat about it over a coffee at a meeting or a nice Port at a Star Night.

Cosmologists have been busy the last few decades honing their measurements of the Hubble Constant, the inventory of the amount of visible and Dark Matter and the corresponding mean densities of the universe, to try to determine which of three possibilities will be the ultimate fate of the universe.

a) Expanding but slowing
b) Slowing and stopping
c) Stopping and reversing

Behind all this, buried but never, it seems, forgotten was the fabled Λ (Lambda), the Cosmological Constant. Einstein's so called 'greatest blunder'. [In his General Relativity Theory in 1915, he had proposed an additional term with a constant Λ which had the effect of keeping the universe static. When Hubble proved the universe was expanding, Einstein, in 1933, stated that Lambda had been his greatest blunder and dropped it from his equations.]

Recent 1998 studies of Gamma Ray Bursts from sources at a huge range of distances, and other studies of a special class of supernovae in vastly remote galaxies have produced two independent sources of data that point in the same totally unexpected direction – an **accelerating universe.**

Here's how it goes –

From the Gamma Ray Bursts, the observed brightness of the radiation should decrease with the square of the distance while the volume of space we observe to the same distance increases with the cube of the distance.

Now if light (or gamma ray) sources are uniformly distributed through space, you'd expect to see more of them the further you looked, but they would be dimmer. So if you looked for gamma ray sources one quarter as bright as a certain nearby one, you'd expect to see eight times as many. But studies don't reveal this. In fact, they reveal that the further away they looked, the gamma ray sources started thinning out a lot faster than predicted by the current cosmological model.

Astronomers have no reason to believe that the range in size (and intensity) of gamma ray sources should be any different from that of stars which can vary in brightness by a factor of million to one. If gamma ray sources follow a similar pattern, they simply should NOT thin out as observed. So either:

a) Gamma ray sources do have an inconceivably low range of brightness from largest to smallest of six to one (and there is no other known example in astronomy of such a small range), or;
b) Gamma ray sources do have the normal (million to one) range of brightness but the expanding universe is accelerating. Such an accelerating model would explain the observed thinning out.

From the Special Supernovae: Studies by two independent teams (one led by Saul Perlmutter of the Lawrence

Berkeley Laboratory, the other by Brian Schmidt of the Mount Stromlo and Siding Springs Observatories) of the Type 1A type of supernovae in galaxies billions of light years away indicate that they appear to be 10 – 15% dimmer than expected for their distances. This means that they are further away than they would be if the universe's expansion had been steady over the past few billion years. This suggests the universe's expansion was actually accelerating during that time.

The rationale for the supernovae observations is as follows: Type 1A supernovae, coming from the same source (a white dwarf of 1.4 solar masses) can all expect to give the same peak maximum brightness after detonation. They are a very good standard candle to deduce distances.

Now remember, when they measure the Hubble Constant (ie the rate of expansion of the galaxies) they can measure it 'locally' (for closer galaxies, closer to our time in the universe's history) and also measure it 'remotely' (for far off galaxies, when the universe was a lot younger).

So when they compare the measured Hubble Constant for vastly distant galaxies to our current 'local' value, there are three possible outcomes:

a) The remote and local Constants are the **same.** This means the universe is expanding at the same rate billions of years ago as it is now.
b) The remote Constant is **larger** than the local. That means the universe was expanding faster billions of years ago than it is now. That means the universe's expansion is slowing as it gets older. (This is what we would expect with gravity pulling everything back.)
c) The remote Hubble Constant is **less than** the local. That implies that the local universe is expanding faster than it was billions of years ago. That is, the universe's expansion is **speeding up**!

It is this third scenario, that the universe's expansion is speeding up, that the new data appears to be supporting.

And that, Virginia, is where Lambda comes in. This observation is exactly what you would expect if your cosmology model had a non-zero value of Einstein's Cosmological Constant. **A repulsive force.**

HOWEVER, it is important to note that these are early days. Exciting days, yes, but still early. There are plenty of things to be checked out. A larger sample of Type 1A supernovae to be studied; a better understanding of Gamma Ray Burst objects; the need to check for intervening dust clouds affecting the observed brightness of the supernovae. Then, if consensus can be reached on the validity and consistency of the empirical data, a new age of Cosmology may dawn when a non-zero value of Lambda (Λ) may have to be included in future models of the expanding universe. Keep in mind, these observations in no way invalidate the Big Bang model of the universe. They just add another factor to the calculation of its mechanics and ultimate fate.

And what is causing this acceleration of the expanding universe (if such proves to be the case)? Well the word 'anti-gravity' is being bandied about quite openly.

But that's another BIG story.

Bob Bee ■

(References on Internet: http:
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3. **Is the Big Bang Expansion Really Accelerating?** //image.gsfc.nasa.gov/poetry/ask/a11752.html

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ANCIENT MYSTERIES

Having a birds eye view on the three great Pyramids of Giza, you would undoubtedly notice that the third and smallest Pyramid (supposedly built by the Pharaoh Menkaura, the son of Chefren around 2450 B.C is oddly out of alignment compared to its other two predecessors. If you would symmetrically measure the north-eastern corner of Khufu's Great Pyramid to the south-western corner of Chefren's Pyramid, you would have a dead straight line. So why this ridiculous lack of symmetry you might ask? The answer may lie in the sky above us. The famous writer Robert Bauval, who had ventured on many archeological expeditions in Egypt, had come up with the theory that three great Pyramids of Giza precisely resembled the three stars in Orion's Belt (Zeta, Epsilon, Delta). Surprisingly enough, after further studies, two other Pyramids had corresponded with the Orion stars - the Pyramids at Abu, Ruwash and at Zawyat al Aryan resemble the hunter's left foot and his right shoulder, while the Milky Way would resemble the river Nile. However, the other two Pyramids that would have concluded the full hour glasslike picture were either never built or may lie in rubble, somewhere under the sand. One possible reason for all this, may have been for ritual purposes. A theory is that the southern vent or shaft in the King's Chamber in the Great Pyramid, was apparently aligned with Orion's belt around 2550 B.C. at the time when the structure was theoretically completed. The dead Pharaoh would be placed in the chamber, and at the time of alignment the Pharaoh's soul would shoot up like a missile to Orion and become a god. But before all this, there would be a pre-ritual in the Queen's Chamber (situated slightly offset below the King's Chamber). It was believed that the son of the dead Pharaoh would force his father's mouth open with a tool called the sacred adze (made out of meteoric iron. It was believed that the bones of the gods were made up of iron since it came from the skies above). At a certain time during that night, the star Sirius, which was associated with the goddess Isis (the goddess of life), would shine through the shaft in the Queen's Chamber, and into the mouth of the dead Pharaoh. The ritual was called 'the opening of the mouth' which was carried out to restore life in the departed Pharaoh's body. But if the Pyramids were made to resemble Orion, were they ever geographically and astronomically aligned? If we take into account the precession of the equinoxes (equinox: when the Sun is closest to the equator. Solstice: When the Sun is at its furthest from the equator), the direct alignment would have taken place around 10,500. That date has no significance in our history books. The Pyramids of Giza were once encased in limestone and had spent most of the time buried under the Sahara's sand, void of any extreme weathering. These facings were believed to have contained important hieroglyphs and told stories and information about the Pyramids and their builders. Unfortunately, in 1222 A.D, a large earthquake leveled much of Cairo. Ironically, approximately 20 acres of limestone facing was removed to restore the ravaged city. Plato, a Greek philosopher told a story about a Greek statesman who visited Egypt 600 years before Christ. The statesman spoke about an Egyptian priest that he met and told him about the destruction of an island and its superior people 9000 years earlier. Did the survivors of this lost continent had something to do with the construction of these and many other magnificent structures around the world?

Next article: Who were the Dogons?

Attila Kaldy ■