SCORPIO

Journal of the Astronomical Society of Frankston Inc

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FUTURE EVENT

GENERAL MEETING

17th November 1993

Guest Speaker:-

Mr. Bill Magnusson

Satellite Communications

8th December 1993

* Note this is one week early *

Discussions & a Special Video

VIEWING NIGHTS

To be advised at meetings

COMMITTEE MEETING

The committee will be held at the Brown's residence on:-

25th November 1993

27th January 1994

The Astronomical Society of Frankston was founded in 1969 with the aim of fostering the study of astronomy by amateurs and promoting the hobby of amateur astronomy to the general public. The society holds a General Meeting each month for the exchange of ideas and information. Regular observing nights, both private and public are arranged to observe currently available celestial objects. In addition the Society provides the services of its members for educational presentations or observing nights for schools and local community groups.

COMING EVENTS

A number of special event are planned in the next few months and as you can see we have a full calender.

1) Transit of Mercury 6th Nov.

An observing day will be held at Ballam Park to watch the Transit of Mercury. We will be having BBQ lunch from 12 noon before observing the transit. {BYO everything.} If the weather is good enough we might extend this to an observing night.

2)The Society Dinner. 8th Nov at Bunurong Restrautant.

Unfortunately booking are now close.

3) A partial solar eclipse occurs on the morning of 14th Nov.

4) Annual General Meeting 17th Nov.

5) Cranbourne Public Meeting 18th Nov. {See committee notes & below}

6) The Christmas Breakup 4th Dec. at Mt. Martha Park. Melways Map 150, H7 Start 7pm {BBQ bring everything}

7) The December general meeting will be held one week early on the 8th Dec.

8) Members only observing night on 15th Dec. at The Royal Botanic Gardens, Cranbourne. {still subject to confirmation}

25th ANNIVERSARY IDEAS

1994 is the 25th anniversary of the Societys' foundation in 1969. Next year is thus very special and I would like to think we can make it LOTS OF FUN. To help the committee plan for next year we need some IDEAS. How would you like to celebrate. Please write, phone or see me at the meetings - - - Peter. Lowe.

NOTICE OF PUBLIC MEETING.

Cranbourne astronomy meeting will be held Thursday. 18th Nov. at The Cranbourne Community Centre, Melways Map 133,G4. Starts 8pm.

Meeting Venue:

The Peninsula School

Wooralla Drive, Mt Eliza

(Melways Map 105, F5)

Room F6 at 8.00pm on the third Wednesday of each Month

Visitors are always welcome

Annual Membership Fees

Full Members	$20
Concession Members	$15
Family Members	$30
Family Pensioners	$25

Membership Fees due 1st January each year

President

Peter Lowe (03)775 9347

Vice President

Peter Skilton (03) 776 5898

Treasurer

Peter Brown (03)789 5679

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Don't forget if you have any comments or contributions - please contact the Editor

SOCIETY NEWS

There are a lot of things happening from the Committee. The main items are:

-The Brairs Observatory

-The 1994 event program

-The Royal Botanic Gardens Observatory

-Cranbourne Membership

-Fund Raising

The Briars management has submitted a proposal to the Mornington Council. This will be considered at the Dec 8th Council Meeting. The proposal recommends an initial 12 month lease to operate from the Briars with an option for 5+ years thereafter. This would grant us permission to build a small observatory. In addition to a yearly peppercorn rental, the Society agrees to involvement in the Briars activities. This proposal is eminently acceptable to us and if council agrees we can move quickly to siting a telescope there. The Royal Botanic Gardens, Cranbourne management has agreed to allow viewing from the gardens. They have indicated a site where we can build a lightweight observatory within their security workarea. The initial discussions suggest a similar arrangement to the Brairs could be forthcoming. To assist this we have arranged a public meeting at Cranbourne to test the general interest in amateur astronomy. At this stage we do not know what form the interest will take: new members, Cranbourne Branch of the ASF or even a new club (Time will tell) Being our 25th anniversary next year, we would like to plan the major events early. We have some ideas but could do with some from the members. Think about it!!!

ODDSPOT

Earlier this year an asteroid was named after the businessman Lan. Hancock. This seems to have set a precedent. The WA Observatory is planning to name one of it's newly discovered asteroids Holmes

Presidents Report 1993

This year has been a busy year all round. Last year the committee decided it was important for the society to enhance some of our activities. The Society still has a long term aim of establishing a permanent observatory despite several setbacks in recent years. To achieve this we needed to change the Society activities in several areas.

- The membership needed to be increased

- Enhance the social activities within the Society

- Broaden the level and diversity of members' activities.

- General meeting formats needed to become more entertaining as well as informative.

- Improve our fundraising abilities and make direct connections to the schools.

- Develop local viewing sites for possible future observatory locations.

We decided to have two events per month; the general meeting and a social event. The first social event was a BBQ lunch at The Cranbourne Botanic Gardens. It was a great success and has set the pattern for a number of BBQ viewing activities throughout the year. {Remember the Big Bang BBQ} The Winter Solstice Party was a great success and is now a fixed winter event. The recent "Jurassic Park" film and supper day was also very popular. A Society Dinner is planned in November as well as the usual Christmas get together. I would like to thank the ladies of the Society who have worked hard to make these events possible. Our association with The Briars Homestead has been steadily improving. We started the year with a series of public viewing nights as part of the Briars summer tourist program. These viewing nights established our credentials as well as confirming the excellent quality of the observing site. We anticipate the council will give permission to build there next year. It is planned in 1994 to establish a second observing site at the Royal Botanic Gardens, Cranbourne. The garden's management has already given us permission to observe there and agreed to the building of a small observatory. 1994 is shaping up to be a busy year. During last summer we had a full program of public and school viewing nights. This activity is a major part of our fund raising and we are planning to continue this summer. Tony Hales has taken on the task of organising and co-ordinating the viewing nights and despite his heavy B.Sc. study workload, has done an outstanding job. We have experimented with a variety of general meeting formats, some good - some not so good. It appears the most popular is a multi-session evening combining simultaneous activities. {observing, technical sessions and general interest topics} We plan to continue this format as much as possible. I would like to thank everyone for their support during the year. Every Society event has been well supported by members and from a committee viewpoint this is very gratifying as it shows we must be doing something right. Let's hope 1994 establishes 1993 as the start of many good years.

On a sad note we lost Arthur Higginson this year, a long standing and valued member. The generous donation of his telescope by Helen Higginson is a valuable addition to our telescope collection and it is planned to mount the instrument in an observatory at The Briars.

I would like to thank the committee for their efforts and hope we can continue the smooth running of the team into 1994.

P.J.Lowe

WHAT'S NEWS IN ASTRONOMY

BIG BANG NEXT YEAR

Sixty five million years ago a small asteroid or comet struck the Earth. The consequence for the life-forms of the day was catastrophic and fatal. Next year the planet Jupiter will experience a similar event when a fragmented comet strikes the planet. Earlier this year the comet Showmaker-Levy 9 was discovered and found to consist of at least 17 comet components strung out in a line. It is thought the comet started as a single body that had strayed too close to Jupiter and been disrupted by it's enormous gravitational field. Calculations suggest the comet fragments will start to hit the planet Jupiter around July next year. The effects of a single fragment hitting the planet's atmosphere at 60 km/sec is unknown but the speculation is rife.

- The impact explosion might leave a scar in the atmosphere such as a second Red Spot

- If all the fragments don't hit the planet some may go into orbit as new moons of Jupiter

- The existing moons might be bombarded with comet fragments producing new craters

- Some of the fragments might breakup further and form a new ring similar to Saturn

It seems certain that the explosion will be seen from Earth if a fragment hit the side facing us. While some of the speculations seem a bit far fetched the energies involved in the collision seem to guarantee something worth watching.

NEW CRATER ON THE MOON

Recently, the Japanese space agency commanded their satellite called HITIN (The goddess of music) to plough headlong into oblivion by crashing into our Moon. The impact site lay on the day/night terminator at the time. The craft, weighing as much as 2 people, silently thudded into the Moon's surface at a speed of over 9000 kilometres an hour. (There is no atmosphere on the Moon to transmit sound and so the event would have been totally silent to watch).

The craft disintegrated in a bright flash, throwing up plenty of dust and successfully digging up a new crater. Planetary scientists hope to use this crater as a benchmark for crater formation as they definitely know the mass, size, speed and trajectory of the impacting object, information which is not known for any other craters formed outside the lab.

And who witnessed the event? All available observatories around the world were either clouded out or undergoing repairs at the time, except for the Anglo-Australian Observatory in NSW which successfully monitored the impact which was said to have "lit up the lunar night". I wonder if it was within reach of amateur telescopes?

Judging from the intensity of the burst, and amount of dust kicked up, astronomers feel that the satellite plummeted into almost solid rock, converting nearly all its energy into heat and light. Nevertheless, there is now one more small crater on the lunar surface that was not there last year.

PHONE HOME.

As you may have heard, NASA has had all funding taken away from its SETI project (Search for Extraterrestrial Intelligence) by the US Congress. The project is now cancelled. However, the privately funded Planetary Society is continuing with their search, albeit on a much smaller scale.

A recent seminar in Melbourne indicated that to date the project had detected 74 definite extraterrestrial signals.

Earth type interference was eliminated by feeding the incoming signals through special electronics that compensate for the motion of the Earth about its own axis, about its orbit around the Sun, and of the Sun around the galaxy. Signals originating from our planet are therefore caused to be spread out in frequency. Extraterrestrial signals appear as sharp spike-like frequencies.

Of these 74 signals, 37 were discounted as they had been inserted by the error detection auditing computer, whose sole job is to add false signals to ensure the detection computer picks them up successfully and does not miss any. The remaining 37 sources cannot be explained. Unfortunately, when the telescope later went back to have a second look, the signals were gone. It is sobering to think that to detect these handful of positive signals, the receivers scanned a hundred thousand billion possibilities.

The same seminar outlined a clever new method for us transmitting to another civilisation so as to maximise our chance of being detected.

Whenever a supernova explodes within our galaxy (about every century), we turn a radiotelescope in the exact opposite direction and start transmitting our own signals. This could occur even decades after the supernova is first discovered. The idea is that any other radioastronomers on distant worlds will be turning most of their instruments around to study the new supernova and would then automatically pick up our piggy-backed signals as well, because their instruments will be pointing in the right direction at the right time.

In 1987, a supernova occurred in the Large Magellanic Cloud, and was easily visible to the unaided eye. All available instruments quickly pointed that way to study the event. Indeed, even over the next few decades, sensitive instruments will be observing the remnant of this supernova for the emergence of any neutron star which could give off a telltale extremely regular radio pulsed signal (a so-called pulsar).

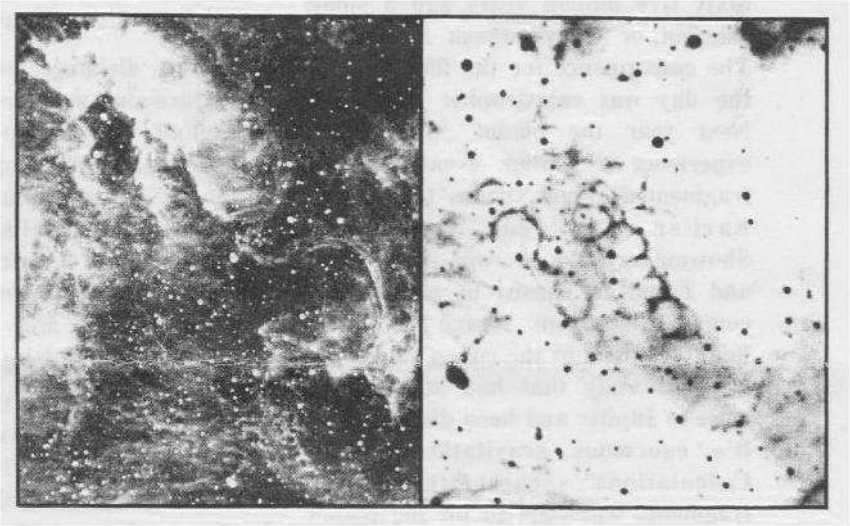
The opportunity then exists for us to begin beaming a false signal in the opposite direction in the sky. It might contain pulses spaced according to prime numbers, or the digits of the

number pi, or something similar that cannot occur naturally. This would provide unshakeable evidence for another civilisation that they were not alone.

Who knows, in the next few decades we may even receive such a signal from the direction of the Large Magellanic Cloud by suitably advanced civilisations between the supernova and us.

Of course, the Large Magellanic Cloud is 169,000 light years away, and so any such signal could in the worst case have been travelling for up to 169,000 years. There is no guarantee that any detected civilisation would still exist after this time. Will we? Conversely, a nearby star system may transmit to us, and so may only be a few tens of light years away. Time will tell if we decide to intentionally transmit the knowledge of our existence in this ingenious way. Certainly we have already been sending television signals (such as "I Love Lucy") for the last half century. I wonder if any other civilisation would think they had detected intelligence if they received these?

STAR BUBBLES



While studying the material surrounding the Supernova 1987A, astronomers have found what appears to be a series of bubbles in space. The bubbles shown in the photograph above appear as a series of round structures. Designated "The Honeycomb", the structure consists of at least ten spherical bubbles of gas, each about ten years across. While the exact cause of The Honeycomb is not known, it seems likely that each bubble is created by the strong stellar wind from massive stars. The uniform size and distribution of each bubble suggest the embedded stars must have formed at the same time with about the same initial mass and general evolution. Simultaneous formation of stars is of course well known in star clusters but in this case the formation must have been triggered by a single event such as an ancient supernova shock wave passing through the gas cloud.

VOYAGERS KEEP DELIVERING.

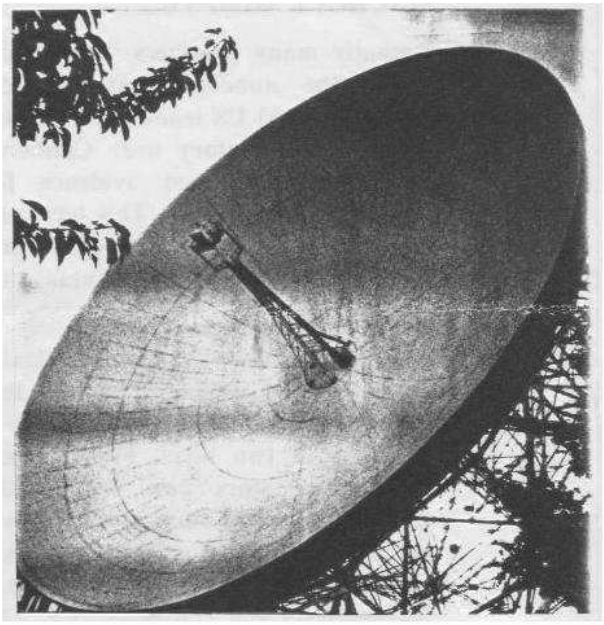
Amongst the great astronomical observatories established this century, the two Voyager spacecraft's are undoubtedly leading explorers. After epic voyages of discovery through the Solar System, these two space observatories are still exploring the regions outside the Solar System on a journey around our galaxy. Recent observations suggest they are approaching true interstellar space. As the Sun's solar wind spreads out, it eventually interacts with the gases between the stars. The boundary between the solar wind and this interstellar gas is called the heliopause. Both spacecraft's have started to detect low frequency radiation that appears to originate from the heliopause. When the craft passes through this barrier they will become our first true interstellar probes.

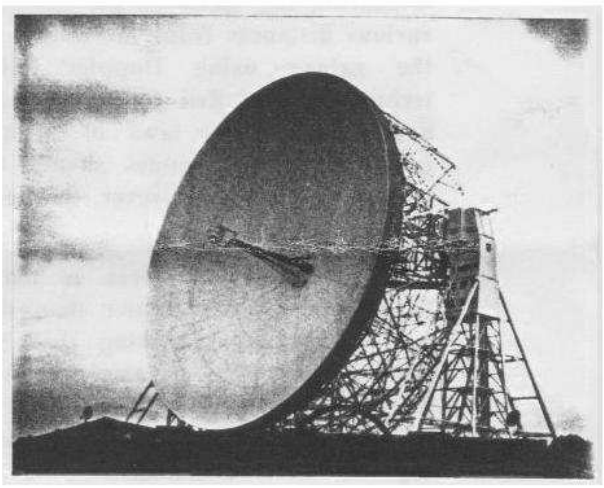
X-RAY BURSTER IDENTIFIED

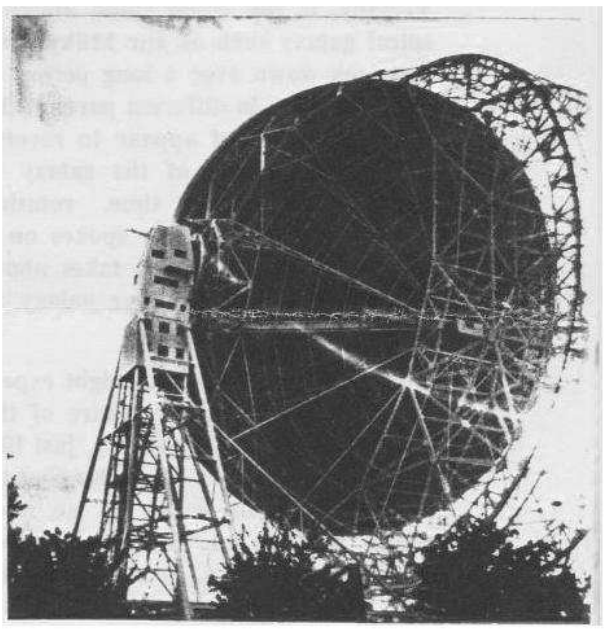
One of the recent surprises in the study of globular clusters has been the discovery of large numbers of pulsars. Pulsars are neutron stars beaming energy in our direction. This discovery suggests that a larger number of neutron stars are present but are either not pulsars or are not beaming our direction. Globular clusters are believed to be very old structures formed before the Milky Way galaxy itself formed and it is thus not too unexpected that neutron stars are being found. The Hubble Space Telescope has been used to study an unusual binary star in the globular NGC-6624. The binary consists of a white dwarf star and a neutron star orbiting each other every 11 minutes. Discovered in the 1970's the star is a known X-ray source and X-ray burster but its precise location was unknown. The precise position of this object was discovered when the types of stars present in the globular cluster were being studied. The old red giants are very bright visually but very faint in the ultraviolet whereas X-ray binaries are very bright in the ultraviolet. The Hubble telescope found the X-ray pulsar when taking UV photographs of the cluster. X-ray Bursters are believed to comprise a neutron star and a normal star exchanging gas's material. The normal star has material pulled from its surface into an accretion disc about the star. This disc acts as a source of matter falling onto the neutron star surface causing nuclear explosions. Astronomers now have the opportunity to observe the X-ray burster at a variety of wavelengths to reveal its dynamics and chemical composition.

JODRELL BANK RADIO OBSERVATORY.

While in UK recently, I discovered the Jodrell Bank radio telescope was only 30 minutes drive from where I was staying. This was too close to resist and in no time I was off down the M6 motorway. The main telescope dish is visible from the motorway and looks like something out of "Quakermasters". The Jodrell Bank site was and still is part of the Manchester University botany department. When radio observing started there in 1945 the only equipment was ex-Army radar mounted in two trailers. Dr. Bernard Lovell {now Sir. B. Lovell} operated the equipment under the leadership of Professor Blackett. It was planned to use the radar to observe the ionization trails left in the Earth's atmosphere by cosmic rays. The equipment proved too insensitive for cosmic ray detection but was ideal for studying meteor trails. An early achievement from the Jodrell Bank site was the confirmation of the connection between meteors and comets. In the autumn of 1946, simultaneous visual and radar observations of the Giacobinid meteor shower proved the connection to comets beyond doubt. The radar receivers were also used for solar observations. It became obvious that a more sensitive detector was needed and this meant amongst other things a bigger antenna. A fixed transit radio telescope was constructed in 1947. The transit telescope was a 218-ft diameter wire frame bowl mounted horizontally on the ground. By moving the central detector mast about the telescope could roughly be pointed at different parts of the sky. While this instrument was severely limited in its pointing abilities, it was far better than the radar antenna that had been used to that time. This instrument proved the benefits of using a large antenna area and was the first telescope to detect radio from the Andromeda galaxy (M31). Observations being limited to a small strip of sky across the zenith was a major problem and it became obvious that a large fully steerable instrument was needed. The Mark 1 telescope was to be a 250-ft diameter dish antenna, fully steerable on an alt-azimuth mount. Funding for the instrument was a major nightmare particularly as the instrument had to be re-designed when it was discovered that hydrogen emitted a radio spectral line at 21cm wavelength. Eventually the telescope was constructed and came into service in 1957. The main instrument was upgraded in 1970 to improve the resolution and frequency range. The two upper photographs show the upgrades telescope known as The Mark 1A Telescope. The instrument is now a proven workhorse in satellite communication, radar investigation of the Moon and planets, the study of neutral hydrogen in our and other galaxies, pulsars and flare stars. Surrounding the main instrument now is a series of smaller yet no less powerful instruments. The Mark II and III are more modern designs and together with other local instruments form part of the MTRLI, Multi-Telescope Radio-Linked Interferometer. Similar to the Australia Radio Telescope, the MTRLI allows several telescopes to link and behaves as though one single large instrument. I must admit I found standing next to the original Jodrell Bank instrument a bit awesome. It is really an instrument that spans two ages; while the solid heavy engineering is from pre-war England with its heavy steel sections and millions of rivets, the instrument's nature is decidedly space age and still looking to the stars ..... Peter Lowe.







DISCUSSIONS - MISSING MATTER FOUND???

MACHOs 1, WIMPS 0

Recently many members would have heard the announcement that an Australian and US team at the Mount Stromlo Observatory near Canberra had discovered good evidence for MACHO dark matter. This has been confirmed by French observers, though with poorer quality data.

Dark matter was hypothesised in order to explain why stars in galaxies do not behave as might be expected. You can estimate how much mass is in a galaxy in two ways. Firstly count how many stars you see in the telescope, assume they are all about the mass of our Sun, and therefore estimate the mass of the galaxy. Alternatively you can work it out by measuring the speed of the stars at various distances from the centre of the galaxy using Doppler shift techniques (the Red Shift method), and use Kepler's laws of orbital motion. The two values should be roughly the same. However, they are not.

The first method gives a mass generally 10 times greater than the second method, indicating that 90 percent of the mass of galaxies cannot be seen by existing telescopes. Not a trivial amount, and certainly beyond experimental error limits.

Visually, if you could stand above a spiral galaxy such as our Milky Way and look down over a long period of time, the stars in different parts of the spiral arms would appear to revolve around the centre of the galaxy in roughly the same time, rotating somewhat like the rigid spokes on a bicycle wheel. In fact it takes about 220 million years for our galaxy to revolve once.

However, intuitively you might expect those further from the centre of the galaxy to rotate more slowly, just like the outer planets in our Solar System take longer and longer to go once round the Sun the further they are away from the Sun. For example, the Earth takes 1 year to go once around the Sun, but Pluto takes 249 years. The effect might give the appearance of the spiral arms winding themselves up.

The fact that the observed situation is more like the first "spoke" explanation indicates that the visible stars must be embedded in a much larger sphere of invisible matter, and we can only see the motion near the centre of this ghostly sphere.

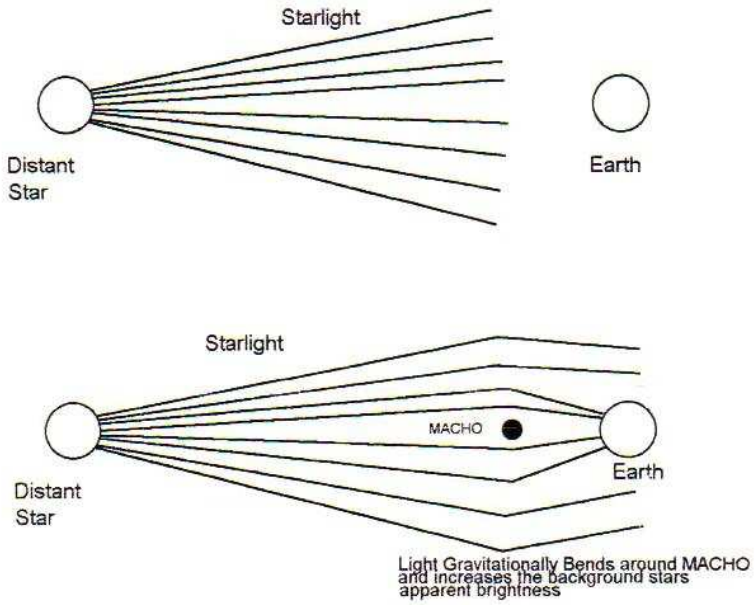
To explain this dark matter, two rival camps have emerged: the WIMPs and the MACHOs. Only an astronomer can come up with acronyms like that.

Weakly Interacting Massive Particles, or WIMPs, are subatomic particles suggested to be left over relics of the first few moments after the Big Bang, and might be exotic entities such as invisible neutrinos which have mass (and hence have a gravitational effect) but pass through matter readily and therefore will not easily interact with it, excite it, and cause it to glow. This idea then suggests that the visible stars in galaxies are embedded in an invisible soup of particles. The only way we could detect such particles is in a particle accelerator if such a particle happened to pass through it during an experiment and interacted (albeit weakly) with the experiment. None has been detected to date.

On the other hand, Massive Astrophysical Compact Halo Objects, or MACHOs are thought to be either failed brown dwarf stars (like our planet Jupiter) that had insufficient mass to begin nuclear fusion, or are stars near the end of their lifecycle, such as black holes and white dwarfs. In these cases, the objects give off little or no detectable light for astronomers to view in their telescopes.

The Mount Stromlo observatory astronomers detected a MACHO, but how did they do it if it is so dark?

In 1986, a clever technique was suggested that uses gravitational lensing. The Mount Stromlo team observed the Large Magellanic Cloud,



a small companion galaxy of our Milky Way, and easily visible to the unaided eye of Southern Hemisphere observers. They recorded 15 million stars in the night sky in this region each night over a period of 2 years. If a MACHO happened to pass between one of these stars and the Earth, the light from the star would be bent around the MACHO and concentrated to a focal point much like a magnifying glass bends Sunlight to a bright focus.

In fact the MACHO acts like the reverse of a magnifying glass, being more like the base of a wine glass, but has the same effect from our position on Earth. Light passing through a wine glass is bent more strongly near the central stem of the glass, simulating light being bent strongly near the MACHO due to its stronger gravity closeby. A magnifying glass bends light to a greater extent near the edges of the lens, and weakest near the middle.

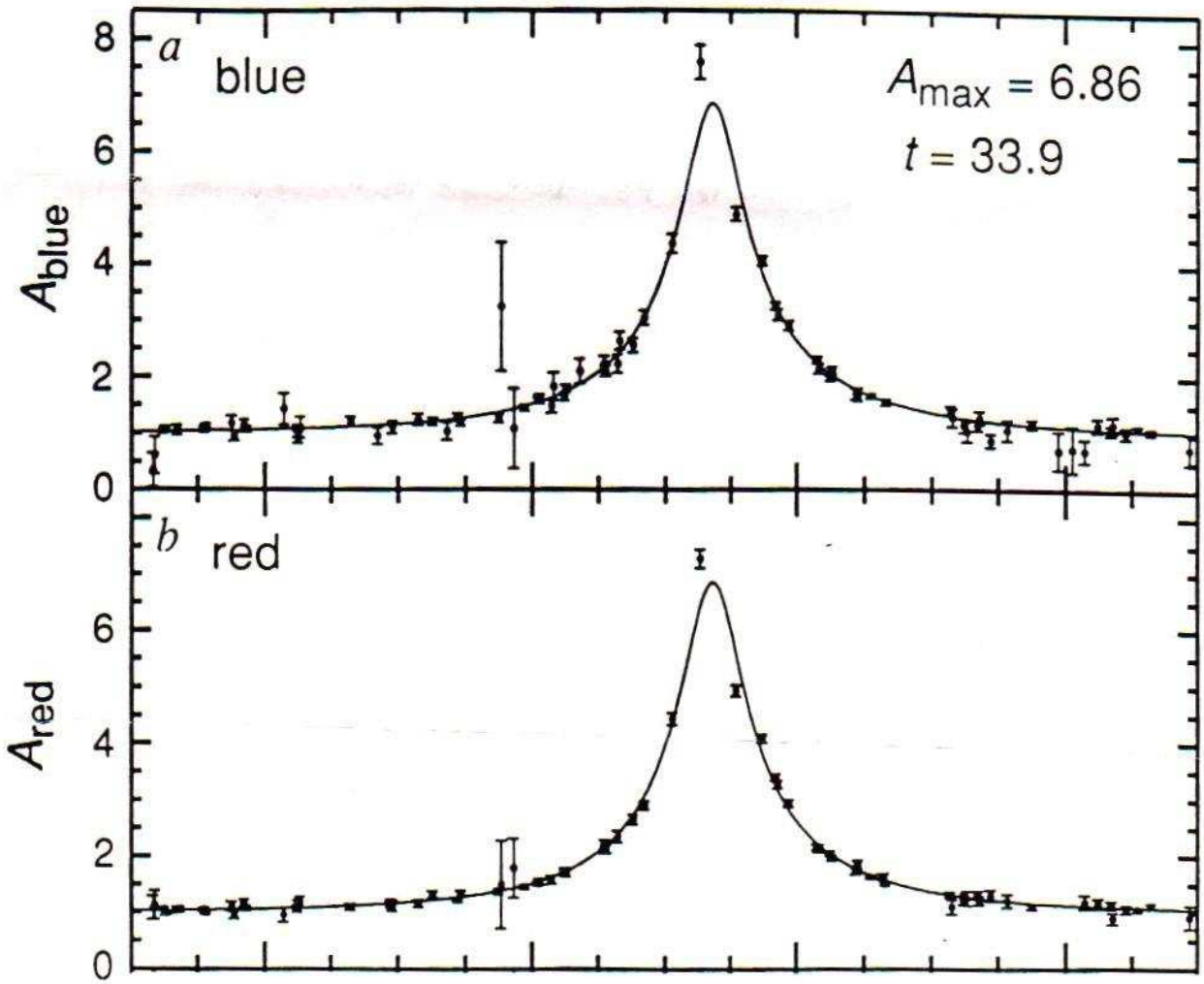
Therefore if you watch enough stars, and wait long enough, one might have a MACHO pass in front of it. The concentrating effect then causes a characteristic symmetrical brightening in the star, that then fades back to exactly its original brightness after the MACHO has passed. This is exactly what the astronomers found. The attached diagrams show the original results when recorded in both red and blue light. A variable star should not show a symmetrical change in brightness identical in more than one colour.

The detected star, at a brightness of magnitude 19 (that's very very faint to begin with), increased in brightness by a factor of 7 for about a month. before returning to normal. The characteristic signature of the event ruled out the possibility of it being a variable star.

Using the known distance of the Large Magellanic Cloud, the team estimate the MACHO was about 10% the mass of our Sun. The hunt continues.

Incidently, the telescope used was originally the Old Melbourne Observatory telescope from last century from the Royal Botanic Gardens in Melbourne. Of course, it has had a little rework since then, and is producing world class results.

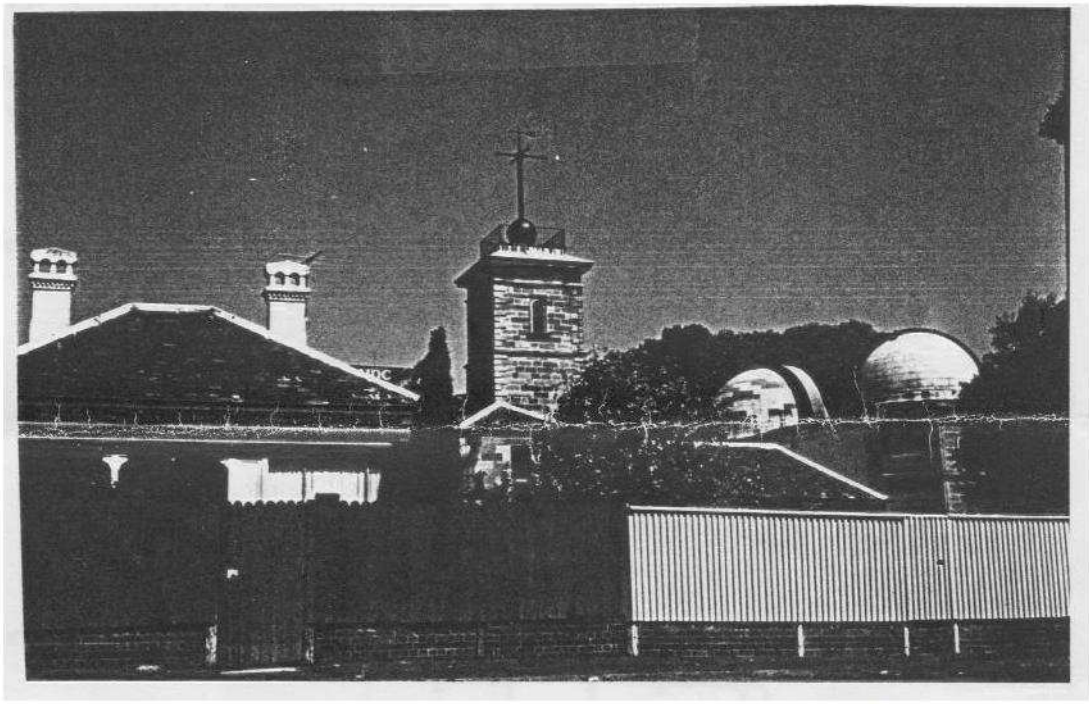
Peter Skilton



SYDNEY OBSERVATORY by John Cleverdon

During the September/October school holidays, we went on holidays again, this time to Sydney. The first location I visited was not the Sydney Observatory, but the remains of the Parramatta Observatory at Parramatta Park. This observatory was set up by Governor Thomas Brisbane in 1822 (being the first permanent observatory in Australia), and was closed in 1847. An obelisk was erected near the site in 1880 at John Tebbutt's insistence to commemorate the observatory. All that remains of the observatory are the pillars from a transit instrument.

I didn't get around to the Sydney Observatory until the second week the holidays. At the observatory, I went on a tour of the North and South Domes, which contain the telescopes. In the South dome is a historic 29 cm (11.5 inch) refractor built at Hamburg, Germany, in the 1870's. Our group looked through it at Balmain Town Hall, 3.5 kilometres away. The North Dome had a more modern telescope; specifically a computer-controlled Celestron C-14 35 cm (14 inch) Schmidt-Cassegrain. It was aimed at the Sun. The entire Sun was visible through the finder (along with 3 or 4 sunspots), while through the eyepiece the edge of the Sun was visible, and one could watch flares and prominences appear from the Sun's surface. Also, there is a transit instrument under restoration at the Observatory. As well as the telescopes, there are also exhibits on astronomy and science at the Observatory. You can find out exactly how fast or slow your watch is (I confirmed that mine is fast), or test your knowledge of astronomy with a computer. There are also several other hands-on displays. (A sign of the times is that a leaflet about the Observatory is printed in Japanese as well as English.) That morning, I had gone out to Dover Heights to look for signs of the old radio interferometer (dating from the 1940's and 50's), but there was nothing left. At the Sydney Observatory I found out that a plaque laid on the site about four years ago had been vandalised and not yet been replaced. A few small flat concrete areas are however visible near the cliff edge. As well as visiting the Observatory, I made it along to one of their night tours, on the last night we spent in Sydney. The tour began with a brief look at the exhibits, and then our group watched two short videos. The first was based on the "Powers of Ten" book, and showed the scale of the Universe, while the second was about the outer planets, and contained some Voyager footage. Questions about the videos, and astronomy in general were answered by the staff. From there, the group of 20-30 was split into two, and we were taken to the separate domes. Unfortunately, I had chosen the cloudiest night of our two weeks in Sydney to come along, so the Celestron C-14 at first was aimed not at the sky but at a red light on top of the Sydney Harbour Bridge. In the other dome, the historic refractor was also aimed groundwards, this time at the nearby Maritime Services Board's Control Tower. Through the telescope one could read the labels on soup packets and the like. We were told that staff in the tower could also be seen at times. (I wonder if they knew we were watching them!!) Later on, the sky cleared up enough for us to go back to the Celestron C-14 and have a look at Saturn. At 100 times magnification, the rings were clearly visible, but the cloud made Saturn look fuzzy. There was also a Full Moon that night, but at the time it was hidden behind buildings. On our last day in Sydney, I also got around to visiting the Powerhouse Museum, which now runs the Sydney Observatory. They have an interesting display on Space, with the largest display being a mock-up of the Space Shuttle interior, that also shows videos of Shuttle missions. Also in the Space display are many replicas of satellites and spacecraft. Unfortunately, the two weeks of holidays ran out (far too quickly!!!). There wasn't enough time to visit the John Tebbutt Observatories, nor the replica of the Dawes Observatory at Old Sydney Town. Oh well, there's always next time.....



Above - Transit of Mercury at Ballam Park on 6th November 1993 Photo - *By John Cleverdon*