TAURANGA ASTRONOMICAL SOCIETY NEWSLETTER

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In August we were fortunate to have Tim Natusch a Senior Lecturer at Auckland's University of Technology (AUT), present an insightful lecture on Radio Astronomy.

July Meeting

July meeting consisted of the usual formalities followed by a DVD on Black Holes. The documentary was enjoyed by those present.

August Meeting

On August 27 we were fortunate enough to have Tim Nautush from the Auckland University of Technology (AUT), Computing and Mathematical Sciences department, deliver a presentation on Radio Astronomy. Due to an excellent write up in the xxx paper, attendance at the meeting was very good with a number of people making this there first time at a meeting held by the Society.

Tim's talk began with a discussion on why radio astronomy is conducted. He explained how visible light made up only a small segment of the electromagnetic spectrum and how analysis of other areas such as the radio spectrum gave us a fuller picture of astronomical objects and processes. It was also pointed out that there are only two parts of the spectrum where the atmosphere is not too inhibiting. Those being at optical, and radio wave lengths. Radio waves are very much longer than visible light waves and are very much lower down on the energy range. By studying both the optical image and the radio image of an object a more detailed picture is formed. Radio astronomy allows us to study the magnetic structures of galaxies and Centaurus A, other wise known as NGC 4128 or the "hamburger galaxy", was used as an example. When viewed

optically the galaxy appears as a large bright elliptical galaxy bisected by a dark dust lane which runs through the middle. When viewed at radio wave lengths to massive lobes extend out in opposite directions and none of the elliptical structure is visible. When combined it shows that there are processes going on that would be completely missed if information in the visible part of the spectrum alone was used.

Other areas of study undertaken with radio telescopes include: Quasars and Active Galactic Nuclei (AGN's), by studying at the wave length of 21cm the H1 or Neutral Hydrogen distribution within our galaxy can be mapped. Radio waves open up other means of investigating what goes on within dusty nebula. Ordinarily interstellar dust effectively blocks lights from reaching us, but radio waves are not greatly affected by dust so they effectively give us a window into an environment which would other wise be beyond our inquisitive stare. Molecules in space have also been identified through radio studies, and it was radio astronomy that gave us "pulsars". These are rapidly spinning Neutron stars which send out beams of energy from there poles like the beam of a light house. When this beam flashes past us a radio "Pulse" is received. This can happen many times a second. The first one to be detected was the neutron star at the heart of the crab nebula (M1). This is the remains of the supernova event which gave birth to the first Nebula in Charles Messiers famous list. When first detected it was suspected that this may be the first signal intercepted from an alien civilisation. It turned out that there were no Little Green Men behind the find but did open up another fascinating area of study.

One of the most important discoveries of Radio Astronomy came with the detection of the Cosmic Microwave Background Radiation. Believed to be the very afterglow of the Big Bang and a cornerstone proof of that theory (although there are other theories on the origin of the universe, the Big Bang has wide mainstream acceptance). Closer to home is the study of sun spots and Jupiter's magnetic field.

The tools of the Radio Astronomer include an Antenna (usually a parabolic dish though may be a dipole or other antenna) to pick up the signals, an Amplifier to increase the signal and finally a down converter and detector to study the signal and record it. The Antenna are usually large and the detectors employed determine the average brightness of the sky within it's beam width. By moving the beam around an area of sky a picture is built up. Brightness's are assigned false colours to aid in the interpretation of images obtained.

Just like optical telescopes, Radio telescope resolution is determined by aperture using the same formula: 1.22 x Lamda / Diameter, where Lamda is the wave length of the electromagnetic radiation under study. Because Radio waves are so much longer than visible light waves they require very large diameters to obtain useful resolution. Tim pointed out that it would require a dish 2 km in diameter to match the resolution of the human eye and it would take a disk with the staggering diameter of 4,500 km to match the resolution of the 10 Metre Keck Telescope. Fortunately there is away around this. It's called Interferometry and works by combining the signals received from two antennas a distance apart. By constructively combing the signals the two Antenna can act as a single antenna with a diameter equal to the distance from the outer most edge of one to the outermost edge of the other. Now the problem is that while it can be done it is not easy and requires some state of the art equipment and deep pockets.

This technology is the basis of the Very Large Array telescope in xxx and the ATCA in New South Wales. The natural extension of this technology is VLBI or Very Long Base Line Interferometry where by dishes 10,000 km apart may be linked or even 50,000 km

using space based telescopes may be possible giving better resolution that the best optical telescopes currently available. Experiments for developing a VLBI capability in New Zealand were first under taken in 2006 using a privately built and operated 6 meter telescope (parts of which were from a sea cat sea to air missile system plucked from a scrap yard). This experiment involved combining data obtained in Auckland with data from telescopes in Australia. The experiment was a success and paved the way for expansion in this area.

AUT is currently installing a 12 metre cassegrain telescope at Warkworth, North of Auckland, on land generously donated by Telecom. The installation should be completed in January 2009. The AUT is also offering an Astronomy Degree next year. This will give students a fantastic opportunity to participate in international studies using the new telescope and to gain a qualification in Astronomy.

The Square Kilometre Array (SKA) is an international collaboration of 17 countries including New Zealand. The aim is to establish a radio telescope with twice the area of anything in existence today. Two countries are in the running to host the project, Australia and South Africa. If Australia gets it the main array will be build in Western Australia well away from the radio noise generated by heavily populated areas. The main telescope will be supplemented by other dishes across Australia and New Zealand (here it would be the 12m AUT dish plus another in the south Island). The information from all sites will be combined by super computer and should offer science an unparallel view of the radio universe. It will be used to study Cosmic Magnetism, When and how did the first stars form? Where else can life exist and to further test General Relativity and Quantum theory of Gravity.

The final segment of the presentation was devoted to Radio Science that is available to the amateur. Tim showed slides of a simple dipole antenna with a receiver that can be assembled at home for a rather modest outlay (around $400 all up). These are available in kit form from Nasa and will allow people to take part in the "Radio Jove" project, where amateurs study the magnetic environment around Jupiter. They are also excellent for monitoring the sun and will detect activity there (such as a Coronal Mass Ejection or CME) as quickly as a NASA satellite in orbit. These kits are available on the World Wide Web at http//radiojove.gsfc.nsa.gov/

Tim’s presentation was well received and appreciated by all those present. His relaxed method of presentation and thorough mastery of the subject matter made it riveting. If anyone out there would like further information about the opportunity to pursue a career in science and Astronomy through AUT the web address is xxx, I am sure they would be more than happy to hear from you!

September Meeting

The talk for September was a look at some science fiction movies which I have enjoyed – and watched more than once – over the years. All too often Hollywood's use of science involves shocking blunders including people exploding in space, to spaceships making whooshing noises in Star Wars , and the journey to the centre of the Earth in The Core . Films like these are great fun and a good adventure romp and shouldn’t be discounted. The more enlightened viewer spots all the blunders and bloopers that are present but it’s a matter of choice. If all these mistakes upset you then don’t go, but the rest of us can turn a blind eye to the errors and just have a good night out !

I picked out six films that go against the grain, but to give credit where it's due they also contain some accurate, plausible science. The stories may not be completely realistic, but they get it right when it matters most.

2001: A Space Odyssey

Released: 1968 Set in the year: 2001 Incorporates an artificial intelligence with a psychosis; a space object in geosynchronous orbit; eating, walking and the generalities of day to day life in a weightless environment; and the crux of the story is the need to know about the possibility of extraterrestrial beings controlling the human race.

Blade Runner

Released: 1982 | Set in the year: 2019 "Replicants" or clones are the norm in future society. The main character is sent to hunt down six replicants who "go bad" . We see our cities in the future and they are not portrayed as bright and shiny, but as dirty, old, and worn out – a more likely scenario. Technology is portrayed in fantastic advertising ventures and it's still possible to get a great stir-fry in the street markets.

I, Robot

Released: 2004 | Set in the year: 2035 Another "cop" story, this time our hero is trying to solve a mystery suicide by the scientist who created the original robots. Asimov's Laws of Robotics are observed, although the masses go renegade because of a virus in the system. Definitely sensationalized and doesn't quite stick to the original story, but worth seeing.

Forbidden Planet

Released: 1956 | Set in the year: 2200 A laugh a minute until you realize that this film was font of ideas used in more recent science fiction movies. The humans use flying saucers and can travel at the speed of light; "Robbie the Robot" makes his first appearance, and then we have a dash of a renegade scientist, and a bit of romance in the air. We also discover that a more intelligent species has lived and died on the planet – the movie sets are fantastic.

The Dish

Released: 2001 | Set in the year: 1969 Based on the true story of the Apollo landing in 1969, but done with an Australian sense of history and humour. Both Parkes Observatory in New South Wales, and NASA, were monitoring and communicating with the astronauts in this joint venture. We are also given a sense of how wondrous an event it was. This film is a real treat.

Sunshine

Released: 2007 | Set in the year: 2057 Our Sun has been infected by a "Q-ball" and it needs a boost to get it going again. A "modern" film that doesn't get too 'dialogue-heavy' and incorporates a very good music soundtrack throughout. We are treated to a view of the transit of Venus, and also get a taste of what it's like to be in a spacesuit. Dr Brian Cox (of the CERN project) was the scientific advisor and most of the science is plausible. Over a cup of tea we had a few lively discussions about science fiction movies over the years. It seemed that most people in the audience had seen 2001, followed by Blade Runner a close second, but few had seen the other films. It is a genre that sparks the imagination but clearly has had a role in some of the developments in technology over the years.

I find it quite fascinating that the design of robots takes on a somewhat humanoid

aspect; why is that? Even more alarming was the article in New Scientist, April 2008, which contained an article about robots and how people are more comfortable with using them if they have a name, and some sort of attire. For example, Duke the vacuum cleaner is a disc shaped object with a trade name of "Roomba". "Not only have his owners dressed him up, they have also given him a name and gender". (Ref; Paul Marks, "Welcome to the era of the emotobot" .New Scientist. April 2008.) Man vs Machine? Perhaps we should take note of the subject matter in the Terminator films ! Far fetched? Yes, for now. But who knows what the future holds?

Ursula Macfarlane, 2008.

West Melton Observatory

This letter to NZ Astronomers was written after the Canterbury Astronomical Society

(CAS) held an open night for families at the R.F. Joyce Observatory near Christchurch in July. The reason for including it in the TAS Newsletter is to show what the Canterbury Astronomical Society can do, and to give members an idea for what we will have to look forward to once the observatory at Fergusson Park is up and running.

Hi All

Just thought I would share with fellow astronomers and all those in the astro-education game.

Last Wednesday we had a rather large group from Kirkwood Intermediate School, Christchurch come and visit our site at West Melton.

We had 185 students, parents and teachers visiting that night. This required having all of our four observatories open plus many members brought out their own scopes, making a total of 14 telescopes in all.

It was a perfect night with a 1st quarter moon, clear sky and not too cold and plenty of objects in the sky to look at.

We are hoping for many more clear night this winter as the school visits and public open nights provide a good source of income for our Society and help maintain and improve our asset out at West Melton. Thank you to all the volunteers who came that night and attend the other public events.

A few thoughts from Dennis

I would like to read you excerpts from two books. The first is from Bill Bryson's Short History of nearly everything. And the other from Alice through the Looking Glass.

I am assuming, of course, that you wish to build an inflationary universe. If you'd prefer instead to build a more old fashioned, standard Big Bang universe, you'll need additional materials. In fact you will need to gather up everything there is, every last mote and particle of matter between here and the edge of creation and squeeze it into a spot so infinitesimally small that it has no dimension at all. It is known as a singularity. In any case, get ready for a really big bang. Naturally, you will wish to retire to a safe place to observe the spectacle. Unfortunately there is nowhere to retire to, because, outside the singularity, there is no 'where'. When the universe begins to expand it won't, be spreading out to fill a larger emptiness. The only space that exists is the space it creates as it goes. It is natural, but wrong, to visualize the singularity as a kind of pregnant dot hanging in a dark, boundless void. But there is no space. No darkness. The singularity has no around, around it. There is no space

for it to occupy, no place for it to be. We can't even ask how long it has been there - whether it has just lately popped into being, like a good idea, or whether it has been there forever. Quietly awaiting the right moment. Time doesn't exist. There is no past for it to emerge from.

Having offered that for your consideration, I now turn to when she meets the Queen and asks how old she is;— 'I'm just one hundred and one, five months and one day.' "I can't believe that" said Alice. "Can't you?" the queen said in a pitying tone. "Try again; draw a long breath, and shut your eyes." Alice laughed. "There's no use trying," she said: "one can't believe impossible things." I daresay you haven't had much practice," said the Queen. "When I was your age. I always did it for half-an-hour a day. Why, sometimes I've believed as many as six impossible things before breakfast."

I thought that we might consider a sub-committee to devote its self to practising believing impossible things, and I have one or two items for your consideration.

The first is the expanding universe theory, which I believe is based on the motor cycle engine. Prior to this theory, I had thought that the change in note as it became close, and then receded, was caused by slight damage to the ears, caused by the sheer volume of noise generated, which, naturally meant that the noise was fainter, but it seems now to be something to do with red and blue or green shifts, possibly something to do with traffic lights, or maybe a girl in a shift crossing the road. A fruitful field for discussion, perhaps.

My next suggestion concerns time. It came as a complete surprise to me when there was so much made of this relativity theory, with the fishing net stretched out holding a cannon ball which was supposed to show how time is distorted by something or other. I mean, we all know that time does not go at a constant rate. Is there anyone here who has not woken up at 2 o'clock in the morning, and having lain awake for an hour or so, found that it is then ten past two. And in the morning, when we turn over, for another 5 minutes at 7.30, the hands of the clock race around to 8.29.

Well I don't think that E=MC2 warranted all that, especially when that C squared is such a big number. That brings me to another thing - these numbers get bigger and bigger. In 1923 Mr Hubble, of telescope fame showed that a puff of distant gossamer known as M31 wasn't a gas cloud, but a galaxy in its own right and it was 100,000 light years across, and at least 900,000 light years away.

This made the universe a very, very big place. So light years, which is plenty big enough for me, was superseded by parsecs (equal to 3.26 light years) but, they are now using megaparsecs equal to 1million parsecs - I don't know why they bother, when most of their figures are a best guess anyway. To illustrate this, in 1956, astronomers calculated that the earth was between 7 and 20 billion years old, which I would have thought was a fair margin of error, just the odd 6 billion years either way from 13 billion. In 1944 a team from Carnegie, decided that it was 8 billion. Then in 2003, a team from NASA and Goddard flight centre decided that the age is 13.7 billion, plus or minus 100 million or so.

If you can stand me burbling on, there are a few other matters deserving the attention of this sub-committee.

In the 1930s a man named Zwicky realized that there wasn't enough visible mass in the universe to hold galaxies together and there must, therefore be some other gravitational influence. So he invented dark matter. This stuff cannot be detected by any known means, but it is said that at least 90%, and perhaps as much as 99% of the universe is composed of this Dark Matter. Recent evidence suggests not only that the galaxies of the universe are racing away from us, but that they are doing so at a rate that is accelerating. It appears that the universe may be filled, not only with dark matter but with dark energy too. Scientists sometimes call it vacuum energy, or quintessence. Whatever it is, it seems to be driving an expansion that no-one can altogether account for. The theory

is that empty space is not so empty after all - that there are particles of matter and antimatter popping into existence and popping out again, and that these are pushing the universe outwards at an accelerating rate.

It seems that we are living in a universe whose age we can't quite compute, surrounded by stars whose distances from us and each other we don't altogether know, filled with matter we can't identify, operating in conformance with physical laws whose properties we don't truly understand.

How to make an eyepiece box

The following step by step guide to making a foam lined container to store those prized eyepieces comes from Dave Allan in the United States, care of Noel Peterson.

Step 1 – Identify what you want to store & make templates of outline

Step 2 – Arrange Layout for Foam

Step 3 – Wet the foam (not soaking – just damp) Put in freezer for a couple of hours until 'crisp' Cut with a sharp knife – hold square

Step 4 – Continue cutting – but the foam is thawing all the time Re-freeze if necessary

(took me two times)

Step 5 – Make box. Mine's made of Oak. ½" thick sides and ¼" plywood top and bottom ~ $8.00 total

Other Tips

• I cut the foam eyepiece holes 1st • Then made the box • Then cut the foam to final size after the box was made • The box has dovetail joints so it's a bit difficult to get the internal dimensions exactly right • I used three layers of foam in total. – ½" thick in the lid and base (solid – no cut-outs) – 1" thick with the cut-outs – Polyurethane Foam Sheet from www.mcmaster.com • 1" Thick, 12" X 12", Firmness Rating 5, #8643K604 • ½" Thick, 12" X 12", Firmness Rating 5, #8643K504 • Note that Firmness 5 is quite hard, but I think its ideal for this application • I like messing with wood – all my stuff has custom boxes • Other folks have used the freeze foam technique to make custom fitted cases using pelican boxes and haliburton cases.

Constellation up close: Andromeda

This issues constellation up close comes care of the RASNZ web site and is reproduced here with the kind permission of Alan Gilmore, given in the RASNZ newsletter.ANDROMEDA pronounced an-DROM-eh-dah.

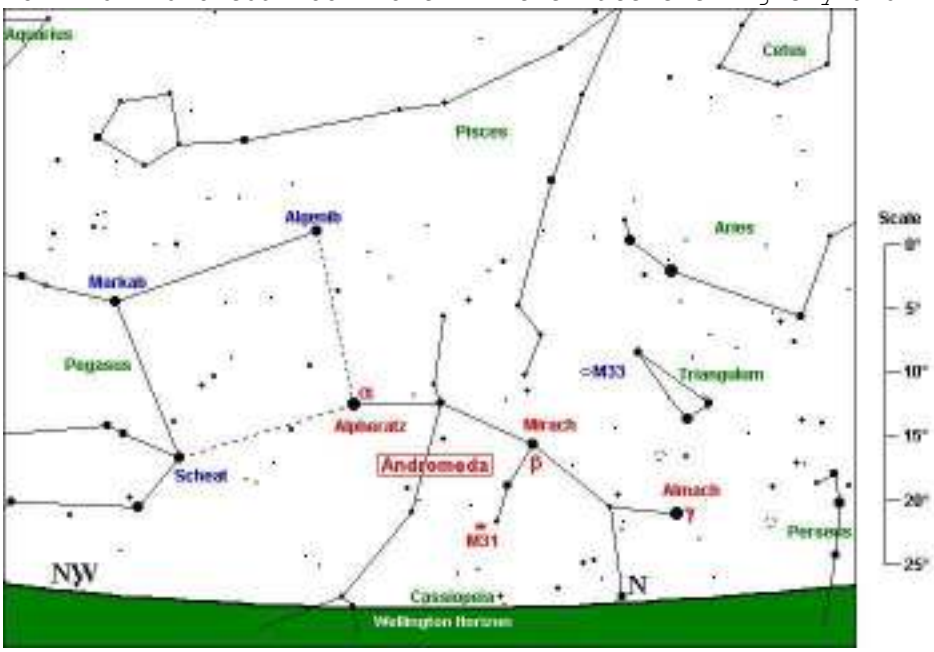
The constellation Andromeda represents the daughter of Queen Cassiopeia and King Cepheus, who was chained to a rock as a sacrifice to the sea monster Cetus, until saved by the hero Perseus, whom she subsequently married.

This large northern constellation was recognised by the Greek astronomer Ptolemy in 150 AD. The unaided eye only sees an irregular line of the four brightest stars extending north-east (right and down) from the great square of Pegasus. Alpheratz (a Andromedae) forms one corner of the great square. This star, which is also known as Sirrah, marks the head of the chained Andromeda; another star in the line, Mirach, represents her waist, and a third, Almach, is her chained foot.

The most celebrated object in the constellation is the Andromeda Galaxy M 31, a spiral

galaxy like our Milky Way, but larger, recognised as the most distant object visible to the unaided eye. Two stars leading from Mirach act as a guide to finding it. It is low down in the northern sky in New Zealand, and virtually impossible to see from the lower part of the South Island.

To find Andromeda look north in the late evening sky and find the Great Square of Pegasus. The lower right corner of the Great Square is Alpheratz. The diagram is the view from Wellington. Aucklanders will see more of Andromeda, but conversely, South Islanders will see less.Some stars and interesting objects in the Constellation. a Andromedae (Alpheratz or Sirrah) is a magnitude 2.1 blue-white star 97.1 light years away. ß And (Mirach) is a magnitude 2.1 red giant star 199 light years away. And (Almak or Almach), is an outstanding triple star 355 light years away. Its two brightest components (mags. 2.2 and 5.0) form one of the finest pairs elegantly seen on small telescopes, with colours of orange-yellow and pale blue (by contrast). The fainter blue star has close 6th mag. blue companion. Unfortunately it is very close to the horizon for New Zealand observers.



M 31 (NGC 224) the celebrated Andromeda Galaxy is visible to the unaided eye from a dark sky site in the northern hemisphere. It was recorded in the 10th century by the Persian astronomer Al Sufi. It is an immense spiral galaxy, similar to the Milky Way in size and general composition. Binoculars or low magnification in a telescope help show the brightest central portion of this famous galaxy from northern parts of New Zealand. If the entire Andromeda Galaxy were bright enough to be seen by the unaided eye, it would appear five or six times the diameter of the full Moon. M 31 is accompanied by two small satellite galaxies, M 32 (NGC 221) and NGC 205, the equivalent of our Magellanic Clouds.

Telescope for sale

I have a 10 inch telescope of 1675mm focal length (F6.7) for sale. This is a great telescope for observing planets and has a VERY good primary mirror 1/8th PV wave front error (1/16th wave surface error) and .97 Strehl, independently tested by a very experienced telescope maker. See this link below for an explanation if required: http://www.rfroyce.com/standards.htm

It has a crayford style focuser (from Bintel in Australia) an 11x60 straight through finder and active cooling (CPU fan to the back of the primary), as well as a curved vane spider. I also have available, if required, the makings of a good German Equatorial Mount project for this scope (40mm thick steel shafts, precision bearings in pillow blocks on 10mm thick steel plates and an 8 inch diameter worm gear for the RA).

This scope including the primary was made by myself and has been an absolute joy to use, optically superior to the mass produced Chinese scopes flooding the market at the moment. I was hoping for around $900 for this scope but if you think that’s a bit price feel free to make me an offer (any offer considered). For more details or if you are interested please email me (Andrew Walker) at andrew32walker@yahoo.com or phone 07 579 5656

Back Page

The Tauranga Astronomical Society holds a monthly meeting on the fourth Wednesday of each month at the Otumoetai Soccer Club rooms, Fergusson Park, Tilby Dr, Matua.

The meeting begins at 7.30pm and all are welcome.

Newcomers are invited to attend two meetings free of charge, however, after this a charge of $5.00 per meeting will apply if membership of the society is not taken up.

Current membership fees are below and may be paid to the treasurer on any club night.

Full Time Student $15

Ordinary Membership $20

Family $30

Meetings consist of a presentation of roughly one hour either by a society member or an invited guest on an astronomical subject. After light refreshments this is followed by viewing through one of the society's telescopes, weather permitting, or the screening of an Astronomical DVD.

The Tauranga Astronomical Society Newsletter is published quarterly each January, April, July and October. The editor welcomes contributions from members provided they are on an Astronomy related subject and are original. Articles for the newsletter may be submitted electronically by email too: andrew32walker@yahoo.com

T.R.O.G (Tauranga Roving Observers Group)

TROG is a list of persons interested in observing from a dark sky site. We have been currently meeting approximately once a month at the editor's home in rural Te Puke. Another location previously used is Bell Road Papamoa and other sites are welcomed.

If interested in observing contact either Ursula Macfarlane 5767283 or Andrew Walker 5738550. The group is informal and no previous experience is required. Just bring along a telescope or binoculars if you have them, any star charts you might need and your enthusiasm.

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