macarthur astronomical society

prime focus

monthly journal of the M.A.S.

Volume 15, Issue 4 **April 2010**

Inside this issue:

President's Report: John Rombi

I would like to welcome all of you to our April meeting and AGM.

This report will be very short as I have included the year's happenings in my AGM report.

Tonight

We will install our committee for the following year.

At the conclusion of the AGM, we will participate in a "Trivia Quiz" compiled by our V.P Trevor Rhodes.

Make sure you brush up on you knowledge!!!

Then, Marc Aragnou will take us through the NEW Starizona Imaging System.

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MAS Dates 2010

April 2010
- 10/4/10 Stargard
- 12/4/10 General Meeting
- 17/4/10 The Forest

May 2010
- 08/5/10 Stargard
- 15/5/10 The Forest
- 17/5/10 General Meeting

June 2010
- 05/6/10 Stargard
- 12/6/10 The Forest
- 21/6/10 General Meeting

July 2010
- 10/7/10 The Forest
- 17/7/10 Stargard
- 19/7/10 General Meeting

August 2010
- 07/8/10 The Forest
- 14/8/10 Stargard
- 16/8/10 General Meeting

September 2010
- 04/9/10 Stargard
- 11/9/10 The Forest
- 20/9/10 General Meeting

October 2010
- 02/10/10 Stargard
- 09/10/10 The Forest
- 18/10/10 General Meeting
- 30/10/10 Stargard

November 2010
- 06/11/10 The Forest
- 15/11/10 General Meeting

December 2010
- 04/12/10 The Forest
- 11/12/10 Stargard

President's Report: John Rombi

I hope you can all attend; it's going to be a great night.

Next Month.

Our speaker will be (our co patron) Dr Ragbir Bhatal.

As always, for the latest news visit our website, at The "What's On" page and of course The Forum.

Clear Skies, John Rombi.

Secretary's Column: Roger Powell

SECRETARY's COLUMN
Roger Powell

The Annual General Meeting will be held at 7.30 pm on Monday 19th April 2010. The Notice of Meeting and Agenda is published with the Annual Reports and on the website. The AGM will include the election of office bearers for 2009-10 and presentation of Annual Reports, which includes the annual financial report and Auditor's statement.

It is worth noting from the Annual Report that our financial situation is very healthy and that is what all members would expect. However, there are some clouds on our financial horizon and the committee believed it prudent to increase the membership fees by a modest amount. Despite that, I still feel that as members we all get excellent value for money.

Nominations for election are now closed - see the website "What's On" page for further details.

The Annual Reports accompany this issue of Prime Focus, including the President's Report and the Treasurer's Report. As there is no Annual Secretary's Report other than this monthly Column, I would like to take the opportunity to pay tribute to the committee members I have worked with. After two years as Secretary, I know that John, Trevor, Tony, Lloyd, Ivan and Stewart are a terrific bunch to work with, totally dedicated to steering MAS along a steady path.

In particular, working under John's leadership has been a very great pleasure. I know how much John loves this Society and I have a good idea of how hard he works, chairing general meetings & Management Committee meetings; twisting arms to get the best guest speakers; organising private and public observing nights, liaising with other organisations; talking to the media; spending time with new members and helping them with their equipment; putting out scores of announcements to members and all the other organisational matters he has to attend to. Well done John, I know every member wants to see you continue in the job for as long as you want!

It is with regret that I inform you that Ivan Fox has decided not to accept re-nomination as a committee member this year. Ivan joined the committee two years ago and has had a very positive influence on us all during that period. Thanks Ivan.

Our recent statement on light pollution (see last month's Prime Focus or go to the website) has been sent to local Mayors and MPs. At the time of writing, we have had one informal response from Campbelltown Council, inviting us to assist in the preparation of their new Development Control Plan, so that is a positive start.

Professor Fred Watson was our visitor again last month and what a great ambassador for astronomy he is. His recent admission to the Order of Australia was long overdue.

I have lost count of the number of times Fred has been our guest at MAS. Certainly he has paid us more visits than any other of our guest speakers over our fourteen year existence, which is quite remarkable, considering his busy schedule and the fact that he is based at Coonabarabran.

This time, he talked us through the construction of the Anglo-Australian Telescope (AAO), it's subsequent four decades of operational service and it's future now that the British are backing away.

Two very significant events in the life of the AAO are expected to occur later this year:

> First, on 1st July the Anglo-Australian Observatory will shed its bi-national status and become a wholly Australian institution, the Australian Astronomical Observatory, so it will still call it the AAO.
>
> Second, in August a bunch of excited amateur astronomers from Macarthur will park their bus outside and troop inside for an inspection. If you are interested in being one of them, please contact Tony Law as soon as possible to reserve your place.

See you at the AGM and enjoy Trevor's quiz.

HOW LONG HAVE WE GOT?

Roger Powell

To estimate the number of other communicative civilisations in the Milky Way galaxy, the *Drake Equation* uses a number of quantifiable variables which, when multiplied together, provide an 'answer'.

It's not hard maths to do and I still find it quite astonishing that one of the biggest human questions of all – whether are we alone - is actually reduced to such a simple equation. In science, mathematics rules. The potential number of other communicative civilisations in our galaxy (N) is estimated as follows:

N = **R** * x **f** *p* x **n** *e* x **f** *l* x **f** *i* x **f** *t* x **L** , where

R* = Rate of formation of suitable stars per year
f *p* = Fraction of these stars with planets
n *e* = Number of suitable planets per planetary system
f *l* = Fraction of these planets where life develops
f *i* = Fraction of these where intelligent life forms evolve
f *t* = Fraction of these where technology develops
L = Lifetime of communicating civilisations in years

Unfortunately, most of the factors which form this famous equation cannot be pinned down to any real degree of accuracy, although astronomers are able to make a decent estimate of some of them. (For instance, the rate of formation of stars in the galaxy is generally thought to be close to seven per year). So, due to these uncertainties, currently the resulting 'answer' to the equation might be as low as zero other civilisations or there may be the hundreds of thousands of them teeming all over the Milky Way. It depends on the scale of estimates for each variable.

I want to turn the spotlight on the last of these variables, the lifetime of a communicating civilisation, because I see this as the pivotal part of the equation. Given optimistic numbers for the first six variables but a pessimistic number for the lifetime of a civilisation, there could be very few civilisations out there and we may even be alone at this time.

Put simply, the number of civilisations currently in our galaxy is very highly dependent on the longevity of such civilisations. So how do we put a figure on longevity?

The only civilisation that we can study is our own. So first, how long have we been a communicating civilisation? In this 13.7 billion year old Universe, on this 4.5 billion year old planet, humans have been around for perhaps only 150,000 years. Human civilisation is just a few thousand years old at most and we only developed the ability to communicate using electromagnetic waves 115 years ago. The ability to communicate on an inter-stellar scale was only developed in the 1960's, so we have been a communicating civilisation for a mere half a century. During that time we have listened but rarely sent communications powerful enough for other civilisations to hear, so that only barely qualifies us as a 'communicating civilisation'

One certainty is that our civilisation cannot and will not last forever. It will end one day. The most tantalising question is how long will it last for - and maybe that needs another equation of variables in itself.

When the sun begins to expand into a red giant in four billion years time, will advanced humans watch with horror as the oceans start to evaporate away? I doubt if anyone will be around then!

Could our civilisation last another million years? Surely during the course of that time, the odds are high that some tyrannical leader of a rogue country will have us all nuked, leaving survivors to fend off a long nuclear winter, abandoning any inter-stellar communications?

What about 100,000 years? That's short by geological and astronomical standards but still a very long time by human standards. Do we have the resources to last that long? When we've mined all the energy and polluted the atmosphere and oceans beyond redemption or caused a runaway greenhouse effect, will we retain the ability to communicate?

Maybe 10,000 years? Can the world feed everybody for so long? What are the chances of a catastrophic collision with a large asteroid over such a long period? Or a devastating supernova or gamma ray burst in our galactic neighbourhood? If we survive global warming, what would another ice age do to civilisation?

Can we survive a thousand years as a 'communicating civilisation'? What will the world's population be by then? It's growing exponentially now and is already 6.8 billion. How can the world feed hundreds of billions of people? Where would the water come from? Can a way be found to limit the population to a sustainable number? Will racial and religious disharmony send us back to the dark ages? What will we do after we run out of oil resources? Would our problems be so overwhelming that radio astronomy falls by the wayside?

Another hundred years? Will there be a devastating global pandemic? Could civilisation already be on the downward spiral? Is there any chance that world leaders can agree on a way to deal with climate change issues?

The answers to those questions are beyond the scope of this article but if I were forced to make a personal guess at what age our own communicating civilisation could reach, it would not be a very optimistic one and it would certainly be to the lower end of the time scale.

That's a depressing thought in it's own right but if all the galactic civilisations that ever existed (assuming there have been any) live short life-spans of maybe just a few hundred years, then the *Drake Equation* makes it quite clear that there will not be very many other civilisations out there at any single point in the lifetime of our galaxy.

It might explain why SETI scientists have not detected any intelligent galactic signals yet. After decades of searching, there may be none coming at all. That's all the more reason to keep looking.

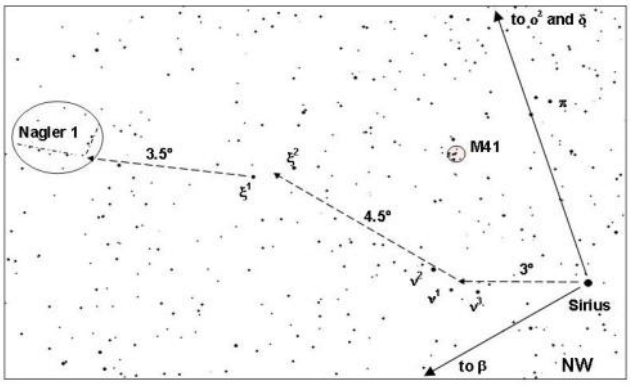
Two Interesting Asterisms: Bob Bee

Afraid I was becoming a 'backslider', I set up my 254mm Dob in my Mt Annan backyard on Friday night (19th March) to take advantage of the beautiful moonless night and do some observing. Ah, the joy of being back into it. Oh, the frustration of being so rusty after such a long time between drinks.

With my MP3 pumping soothing classical music into my ears, I alternated between viewing with binoculars and the Dob, with no special project in mind. I just wanted to get back into enjoying the night sky. But after visiting the 'old favourites', I decided to seek out two asterisms I had read about earlier and noted for future viewing. And tonight was the night.

First was a novel asterism called **Nagler 1**, according to Sue French from S&T (Feb 2008 issue, pages 74-76). I was particularly interested because she claimed it was visible in binoculars and I was looking for new objects for my binocular book's new edition. Perhaps this one?

Nagler 1 is located in Canis Major which will still be visible in April if you want to check it out. The chart below shows how to locate it.



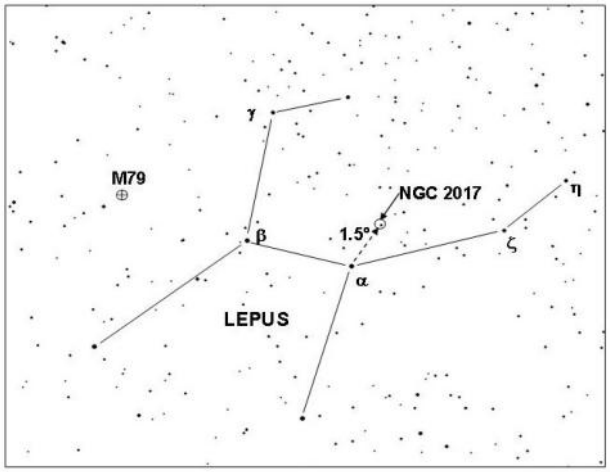
Starting from Sirius, locate the triple star system $\nu^{1,2,3}$ westward 3° from Sirius, move on another 4.5° to the double system ξ^1 and ξ^2 and dog-legging slightly (as shown) move another 3.5° to the asterism. The good news is that it is visible in your finder scope so you'll know when you have it.

What makes Nagler 1 interesting is its shape. Fans of Stargate will love it as it has been described as a chevron and that's a good description, though it's not a perfectly uniform one, its sides being of unequal length. But good enough. What you see is a shallow V shape (similar to the single stripe on a lance corporal's arm) pointing north, about 15' x 45' long. With my 254mm Dob at x40 power, I was able to comfortably count 6 stars in the short arm and 11 stars in the long arm, ranging from mags 7 to 10, with some nice variations in colour. Larger scopes might reveal more. There were also some pleasing wide doubles amongst these.

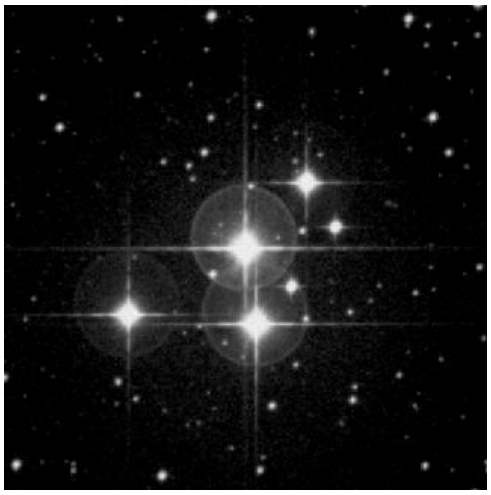
Because of its stars' relative faintness, it doesn't 'jump out' at you, but it is still an interesting asterism to add to your collection. So 'lock it in'.

The second object was completely different. I had read in the *Collins Stars & Planets* book that **NGC2017 in Lepus** was 'a small but remarkable' cluster so thought I'd check it out. It was… small. Also very interesting. Its remarkableness depends on your criterion. Its location is shown on the chart below, located just 1.5° from α Leporis.

In your finder scope, you will only see just the one star as shown on the circle. However, small powered eye pieces will reveal more and added umph may allow you to split some of the stars.



An image of what to expect is shown here.



NGC2017

Two Interesting Asterisms: Bob Bee

Just using my x40 power eye piece, I was able to comfortably see the four brighter mag 6 stars (in a sort of skewed 'Y' shape), then my x140 gave me the two more, making the prescribed 6. On my Dob, I didn't have the power to split any of them (or my collimation is off).

Collins suggests the brightest star has a mag 7.9 companion (needing > 200mm to split), while one of the mag 9 stars is a close double. (How close? An internet site suggests around 1.5". That's close. The others appear to be closer so it will test your double star skills.) There is also a 12 mag component so the group has at least 8 stars. Why not try it out and tell us what you can split and how many you can see. I'm going to try it on my SCT which can give me up to x260. Even that may not be enough.

However, I am satisfied that at least I've seen this 'remarkable' cluster and have started to reverse my backsliding.

I think the 'remarkable' factor comes in when you are told that this is not a 'true' cluster but a line-of-sight asterism because the stars are at a wide range of distances from us and travelling in different directions. A chance alignment. Grab it while you can.

It Is Amazing Who You Meet on the Moon Part 3 Craters Lepaute, Lalande and Clairaut: David M Jones

Conversation enriches the understanding, but solitude is the school of genius – *Edward Gibbon*

Crater Lepaute - Latitude -33.3° - Longitude -33.6°. Approval Date – 1936. Nicole-Reine De Labrière Lepaute French astronomer (1723-1788).

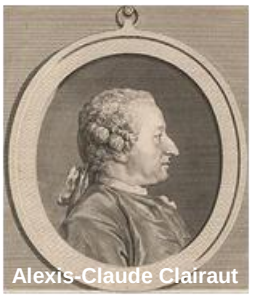
Crater Lalande - Latitude -4.4° - Longitude -8.6°. Approval Date – 1935. Joseph-Jérôme Lefrançais de Lalande; French astronomer (1732-1807).

Crater Clairaut – Latitude -47.7° - Longitude 13.9°. Approval Date – 1935. Alexis Claude Clairaut; French mathematician (1713-1765). (Blue, 2010)

This month I intended to look at the crater named for, MME.Nicole-Reine Etable de Labrière Lepaute. However, not too far into my research, I discovered her name to be inextricably linked with that of both Alexis-Claude Clairaut and Joseph-Jérôme Lefrançais de Lalande.

The story of Clairaut, Lepaute, and Lalande actually begins with Edmund Halley (1656–1742), whose fields were astronomy, geophysics, mathematics, physics and meteorology. Halley was an early supporter of calculus; but according to D.A.Grier, in his article, *"The Human Computer and the Birth of the Information Age"*, Halley's cometary research led to (mathematical) problems that surpassed his capacity to answer. These tribulations arose when Halley tried to compute the orbit of the comet that now carries his name. The crux of Halley's predicament arose when he realised the comet's orbit would be influenced by the joint gravitational interaction of the Sun, Saturn and Jupiter. Halley struggled for many years to find a simple mathematical expression that would enable him to make an accurate forecast of the comet's orbit. Whilst he did arrive at a rudimentary estimate of the comet's orbit, he eventually admitted defeat and opted to refer the challenge to the next generation of scientists. Halley wrote of his failed efforts: "*I shall leave them to be discussed by the care of posterity, after the truth is found out by the event."* (Grier, 2001) Halley, naturally, boasts a lunar crater in his honour – but that's another story.

Time and again during the course of my reading, I came across the words – '*compute' – 'computation'* – or *'computer',* all related to people, rather than the machines we more commonly associate with such words today. It is worth mentioning that the first *'computers'* were, in fact, *people* who were employed as 'number crunchers', long before the idea of our modern technology was ever considered.



Alexis-Claude Clairaut

Circa 1758, Alexis-Claude Clairaut finally produced a new mathematical model for the orbit of Halley's Comet. Clairaut – no stranger to advanced mathematical concepts – was a child prodigy, who, at the age of twelve had written a memoir on four geometrical curves. He made such rapid progress under his father's tuition in the subject

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It Is Amazing Who You Meet on the Moon Part 3 Craters Lepaute, Lalande and Clairaut: David M Jones

that, by the age of thirteen, he read a description of the properties of the four curves he had discovered in front of the Académie Française. (LunarMark, 2008)

The model produced by Clairaut used a lengthy numerical method to calculate the orbit of Comet Halley. Unlike the instant answers given by today's computers, the computations required – using people – involved a long-winded and arduous process. In the early summer of 1758, knowing the difficulties that lay ahead, Alexis Clairaut enlisted the help of two friends to undertake these computations. Clairaut, assisted by Joseph-Jérôme Lalande and MME.Lepaute, laboured at a table in the Luxembourg Palace for almost five months, calculating the distance of each of the two planets, Jupiter and Saturn, from the comet, individually for each successive degree for 150 years! On 14th November 1758, Clairaut announced to the Academy of Sciences that Comet Halley would attain its perihelion, the point of its orbit nearest to the sun, by mid April, 1759. It actually reached perihelion on the 13th of April 1759, within the margin of error given for the prediction. (JJ.O'Connor 2008)


Joseph-Jérôme Lalande

Not all scientists were content with such complex calculations and at least one, Jean le Rond d'Alembert (1717–83), criticised the "*spirit of calculation*". He argued that computation was not a fitting substitute for careful analysis and that Clairaut's work was "*more laborious than deep*". When, according to David Grier, Clairaut's forecast missed the true perihelion by thirty-one days; d'Alembert was quick to claim that calculation added naught to the understanding of comets. Eventually, few people shared d'Alembert's reservations and soon others were organising computing groups. (Grier, 2001)

Whilst all of the above characters have their own historical stories, at this point, I'd like to focus on MME.Nicole-Reine Etable de Labrière Lepaute. MME.Lepaute was actually born at the Palais du Luxembourg, where her father was employed in the service of Elisabeth d'Orlèans, the Queen of Spain. It was at the Palace she met her husband-to-be, a clockmaker, Jean-Andre Lepaute; they married on the 27th of August 1749. They continued to live and work at the Luxembourg Palace throughout their married life. MME.Lepaute helped her husband with his work – initially, maintaining the family accounts.
It was at this time, early in her marriage, that Jérôme Lalande, a law student, arrived on the scene. Lalande, developed a fascination with astronomy, and had been given a room above the porch of the Luxembourg Palace to use as an observatory. Lalande was soon befriended by the Lepautes.

In 1753, on returning to Paris from a successful trip to the Cape of Good Hope, where he had carried out a series of astronomical observations; Lalande was elected to the Academy of Sciences. In the meantime, Jean-Andre Lepaute had designed a clock with a new kind of escapement; Lalande was asked by the Academy to evaluate the clock for its astronomical use. It was at this juncture that Jean-Andre Lepaute became involved in building astronomical clocks, and he published *Traité d'Horlogerie contenant tout ce qui est nécessaire pour bien connoître et pour régler les pendules et les montres.* Very roughly translated... *(Treated (or treatise) Clock industry containing all that is necessary for good Knowledge and to regulate the pendulums and the watches).* It is this work that contains the first mathematical work by Nicole-Reine Lepaute who calculated the tables of oscillations of a pendulum, which were contained in her husband's work.

In 1759 Lalande took on the editorship of the astronomical almanac *Connaissance des temps (Knowledge of times).* He remained editor from 1760 until 1776; Nicole-Reine Lepaute supported him in computing the tables in this annual journal of the Academy of Sciences. Whilst much of her work is unknown, she is credited for her contributions to the *Ephémérides des mouvements celestes* (*daily table of celestial movements*) which provided tables of the sun, the moon and planets covering a period of ten years. MME.Lepaute was mainly accountable for producing Volume VII, covering the period 1775-1784, and Volume VIII, covering the period 1783-1792. It is reliably reported that Nicole-Reine Lepaute made all of the computations for the positions of the sun, moon and planets for the last volume.

MME.Lepaute is also accredited with publishing a memoir containing observations of the transit of Venus across the disk of the sun in 1761. A further piece of work which is definitely due to Lepaute is the calculation relating to the annular eclipse of the sun on 1 April 1764. For this she created a chart predicting the path of the eclipse across Europe; this was published in the Jesuit journal the *Mémoires de Trévoux* in June 1762. The chart required her to prepare a table of parallactic angles (*the angle of displacement of an object caused by a change in the observer's position*); her comprehensive account of which was published and widely distributed by the French government. (JJ O'Connor 2008)

MME.Lepaute, it is recorded, created a group of catalogues of the stars which were essential to the future of Astronomy. She is honoured today in three ways: the beautiful rose, Hortensia, is named for her, as is asteroid

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It Is Amazing Who You Meet on the Moon Part 3
Craters Lepaute, Lalande and Clairaut: David M Jones

7720 Lepaute – and, of course, the lunar crater – Lepaute. (Wikipedia, 2010)

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Wikipedia. (2010, February 1). *Nichole-Reine lepaute*. Retrieved August 3, 20010, from Wikipedia: http://en.wikipedia.org/wiki/Nicole-Reine_Lepaute.

Translations from French to English courtesy of Microsoft Translation Service.

IMPORTANT! PLEASE READ

AND NOTE CHANGE FOR SUBMISSIONS

Prime Focus
Article Submission

Deadline for article submissions for the next edition of Prime Focus is

Monday 10th May 2010

In my absence, John Rombi will be publishing the May edition of Prime Focus

All Articles can be submitted via email president@macastro.org.au

Or via snail mail to the MAS Postal address

PLEASE NOTE THE CHANGE OF EMAIL ADDRESS FOR SUBMISSIONS!!!

DOIN' IT IN THE DARK:

Trevor Rhodes

It has been, shall we say, humorous at Stargard lately.

We couldn't help but have a chuckle when Sarkis turned up quite late. Turns out he'd been all the way to The Forest before figuring out it was a Stargard night. Then a couple of weeks ago I saw Sarkis sitting in his chair looking at his charts. I wandered over and asked if he was looking for anything interesting. He was trying to get used to the star maps by aligning them to what he could see in the sky. I've done this many times myself. The trouble was that he couldn't figure this one out. It was of Leo and he'd found what he thought was the brightest star in that constellation but when he looked at the map, it was in the wrong position and nothing lined up.

Trevor to the rescue. Well, not really. You see, it took another 20 minutes before I figured out that 'bright star' that we couldn't get to line up was actually Saturn. Oh great God of Agriculture, you mock me. Putting all that behind us, the following night was just as good.

John and I were out in the field till quite late. You could not have wished for a better night. Pity my battery went flat. I decided to buy a second one so that it wouldn't happen again. Yeah, sure. As soon as I got the new battery home, I went to move the older one so I could charge it only to find that the old battery was leaking acid. No wonder it was going flat. Ok, ok, enough of the silliness, let's get on to real astronomy.

Saturday 10th at Stargard. Cloud, cloud and more cloud. At least until Geoff left. Then the sky cleared and we got on with the night. Thanks Geoff. We were all going along just fine till I was thinking about leaving myself. I'd asked if anyone else had keys. Noel did, but went off to check that they still worked. Never to be left in the dark, Noel had his trusty LED flashlight with him. It is a bit hard to hold a padlock and a key whilst trying to shine the torch on the desired object though. So Noel proceeded to place said flashlight on the top of the pole to which the padlock and chain were attached. Noel will be buying himself a new flashlight. The old one now resides approx 1.5 metres down inside the pole. It didn't have top. Funny that.

Is that enough for you? No? You want more funnies? Ok, one more. I was watching Sarkis set up his 16" dob, yes Sarkis again, and he'd just tilted the scope up a little when we heard this strange metallic sound. It was the filter slide. When you don't attach them properly they tend to fall. Now, the filter slide is of course situated inside the UTA, so you can guess where it fell. Yes, straight down the tube on a direct collision course with the mirror. But no, it didn't hit the mirror. Thankfully for Sarkis, he hadn't yet removed the mirror cover.

So yes, astronomy has been a barrel of laughs lately. Maybe you should join us and get in on the fun?