The Messenger

Mexborough & Swinton Astronomical Society June 2016

THE TRANSIT OF MERCURY

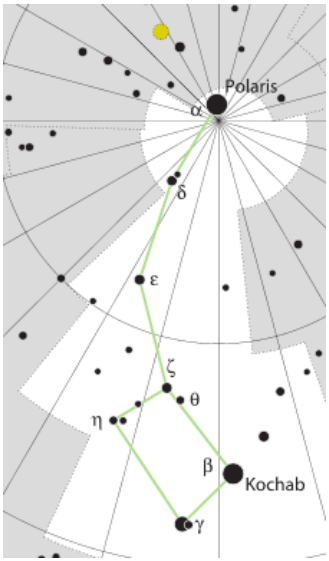


Another one off the Chairman's "Bucket" list!

Stars in the Rotherham Sky

1: Polaris

Polaris (α Ursae Minoris) is the brightest star in the constellation Ursa Minor.



It is very close to the north celestial pole, making it the current northern pole star.

The Hipparcos satellite parallax measurement calculates a distance to Polaris of about 433 light-years (133 parsecs)

Polaris is a multiple star, comprising the main star, α UMi Aa, which is a supergiant; two smaller companions, α UMi B and α UMi Ab.

α UMi Aa is F7 supergiant and a Cepheid variable, with a period of 4 days varying from 1.9 to 2.1 magnitude. Measurements show a surface temperature of 6020 K, a mass 5½ that of the sun and a radius some 38 times the sun (a little smaller than the mean orbital distance of Mercury from the Sun)

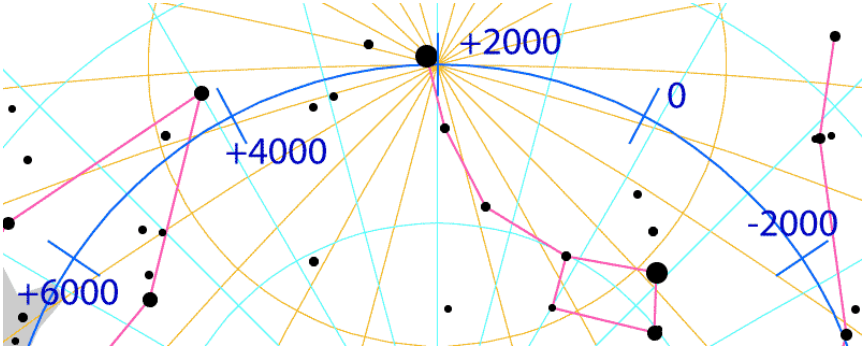
α UMi Ab orbits 18.5 Au from α UMi Aa (Similar to the distance Uranus is from the sun). This star is a main sequence F6 star, with a mass 25% greater than the Sun, and radius no more than 5% greater than the Sun. The star was discovered spectrospically in 1929 and subsequently imaged by the Hubble telescope in 2006.

α UMi B orbits 2400 AU from α UMi (About $^{1}/_{20}{}^{th}$ light Year) is another main sequence star, F3, mass and radius both about 40% greater than the Sun. α UMi B was discovered in 1780 by William Herschel

Through amateur telescopes only Polaris itself and the B star are visible forming a notable double. The B star shines at magnitude +8.7 with a generous separation of 18 arc seconds from its much brighter companion. Polaris B is an easy object when viewed through a scope of 80mm (3.1 inches) aperture or more. A magnification of 75x easily splits the pair.

It is thought that 2000 years ago it was a whole magnitude dimmer than it is now and this may be due to mass transference between the Aa Star and the Ab companion.

As the Earth rotation precesses Polaris will gradually become further from the “pole” as shown on the diagram below in about 8,000 years Deneb will be close to the pole.



The Sky in June

On the 1st June the **Sun** rises is at 04:42am and sets at 21:23pm, the timings are similar at the end of the month being 4:40am and 21:36pm respectively. Technically we will always be in "astronomical twilight" during the month.
The **Earth** will officially reach its summer solstice (the sun directly overhead on the Tropic of Cancer) at 0:27am (BST) on the 21st June.
The **Moon** will be new on the 5th June, and full on the 20th.
Mercury will be at the greatest elongation west on Sunday 5th June but even though it is at magnitude -2 it will be lost in the glare of the long pre-dawn rising sun
Venus is not visible all month
Mars is still a viable object, unfortunately low in the southern sky only reaching some 14° above the southern horizon. It is now just past opposition that was on 22nd May (so it's getting smaller); its next opposition will be on 27th July 2018 and will still be poorly placed, low down in the southern skies at this time.
Jupiter is still well placed for observation even though it is now well past opposition. Jupiter is now receding into evening twilight. At dusk, around 9:30pm it will be some 40° above the south-western horizon. It will then sink towards the horizon, setting around 2:15am on the 1st and just after midnight on the 31st.
Saturn is at opposition on the 3rd of June, but is unfortunately low on the southern horizon; only some 15° above it in the constellation of Ophiuchus It will be at magnitude +0.8 and have an angular size of 18.5". The rings are reaching their maximum tilt as seen from the Earth, being inclined over 25°. Around opposition the rings may be seen brighter than at other times due to something called the "Seeliger Effect" or "Opposition Surge". It is attributed to something called "shadow hiding". At opposition the earth is directly between Saturn and the sun, so we see only the fully lighted particles, all those in shadow of other ring particles (hence darker) cannot be seen as neither can shadows on the visible particles. This is also known as "Shadow hiding".
Uranus is not visible at present and **Neptune** rises only shortly before the sun, however **Neptune** will be well placed for a September opposition.

Guest Speakers For June



Speaker: Paul Money "*The Solar System in Fiction*"
Thursday, 2nd June 2016 7:45pm

We take Science Fiction to be a modern concept but in this talk Paul looks at how the major objects of our Solar system and modern ideas of space fiction have been portrayed over the centuries.

Solstice Dinner



Speaker: Dr Allan Chapman

Friday, 17th June 2016 (19:45 - 22:00)
Venue: Rockingham Arms, Wentworth.

Alan Chapman is a historian by training and his special interests are astronomy and scientific biography, for most of his career he has been based at Wadham College (Oxford University).He is an accomplished author and public speaker and has made many television appearances, presenting Gods in the Sky and Great Scientists and as a guest on The Sky at Night.

Allan is Honorary President of the Mexborough & Swinton Astronomical Society.

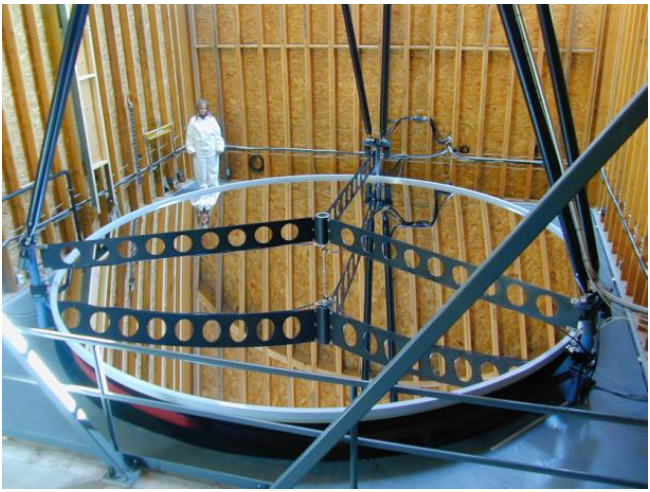
“The Really Big Liquid Metal Telescope” (Large Zenith Telescope)

It has a six-meter diameter and weighs three metric tons, the Large Zenith Telescope is the third-largest optical telescope in North America and the largest liquid mirror telescope in the world. It was completed in 2003, and the telescope is housed in the UBC Liquid-Mirror Observatory at Malcolm Knapp Research Forest, overlooking British Columbia's Fraser Valleyabout 50 miles east of Vancouver. The project includes astronomers from Institut d'Astrophysique de Paris and Columbia University in USA.

A Zenith telescope has a major disadvantage in that it can only look straight up , the design of this telescope means that for its size 6 meters diameter it is relatively cheap.The mirror is composed of spinning liquid mercury (highly toxic!) bath. It turns once every 6 minutes. Isaac Newton first advanced the idea for a liquid telescope. He realized that a liquid made to rotate inside a container would take the form of a paraboloid (shaped like an oval cup), precisely the shape needed for the primary mirror of a telescope. Unfortunately for Newton, without a stable source of rotation such as an electric motor, building such a telescope was not possible.

Using today's technology, however, the scientists and engineers at the Large Zenith Telescope have realized Newton's aspirations. The LZT employs a six-meter dish filled with a thin layer of mercury. A motor rotates this liquid mirror at a constant rate of six revolutions per minute, and walls at the edges of the dish prevent the mercury from spilling over the sides. To support the massive mirror, a special air-bearing was engineered which can withstand a ten-metric ton load. This bearing differs from conventional ones in that it uses a thin film of pressurized air to reduce the friction at the interface of the two surfaces. The mirror is turned by a built-in brushless DC motor. An optical encoder provides feedback to the control system. With closed-loop control, the rotation speed can be precisely controlled to within one part per million.

Land-based liquid mirror telescopes have several advantages and disadvantages compared to their solid mirror counterparts. The major advantages of a liquid mirror telescope are that it is relatively inexpensive; costing about one percent of a conventional mirror, and it can be built much larger. The disadvantages are that the mirror can only point straight up towards the zenith, because it would lose its shape if it were to tilt, and the most common metal employed, mercury, is highly toxic to humans and animals. Extra-terrestrial liquid mirror telescopes are advantageous as well, and NASA hopes to one day put one on the moon.



The scientific topics investigated at the LZT include cosmology, the large-scale structure of the universe, and the evolution of galaxies. With a telescope that can only point overhead, the scientists are somewhat limited in what they can study.

http://www.astro.ubc.ca/lmt/lzt/

The Thoughts of Chairman Les



We continue to be busy with our programme of events.

In April we excavated a couple of holes in the observatory car park to investigate what the ground was like a couple of metres down. We didn't find anything that would prevent us from installing a water supply and foul sewer tank in our plans for the observatory extension. May 10th saw us having a site meeting with Yorkshire Water Services to discuss our water supply and foul sewer tank. The people we met under the leadership of Mr Mallinson were from the water 'provider team' and the meeting went well. They didn't have any objections to our requests only that 'the tank' would need to be by the Western gate post and the length of the tank running West by the side of the Southern fence. They are getting back to us with their notices which will enable us to continue. Another site meeting that Phil and I attended took place May 20th with a water and drainage contractor, a local company, D B DRAINAGE LIMITED who stated that they couldn't see anything that would prevent the work being done. They will get back to us in a couple days or so. We are still awaiting a reply from YWS.





The Transit of Mercury at J A Jones Observatory

Les Marsden



Monday 9th May was the day of the Mercury Transit. Members were arriving from about 9.30am to prepare for the public arriving at 11.30am. A number of telescopes were set up to give as clear a view as possible for everyone. The day ran through and after putting everything away and tidying the site I think the last member left about seven o'clock in the evening. We had decided forehand that the day would be a booking event and the number of people interested and bookings very encouraging. A lot of visitors were from the scouting fraternity and proved to be very interested in the day as a whole, there were a lot of adult visitors who had made a booking and we had a very busy cloudless day. I have to tell you that on the Sunday night I had a call from a chap wanting to attend on the day, I told him that we didn't have a problem with that an he would be most welcome. He then told me that he would be travelling up from London on the day as our area was the only one that wouldn't have any rain and that was his reason. He had purchased a PST over the weekend and he was going to use that. I asked his name so that I could on my time sheet, Yubraj Sharma he said, which of course I had to ask him to spell for me. He duly arrived in the morning on the day and told me that he left London at 8am and he stayed the whole day and left for home at about seven o'clock in the evening. He had had the best observing session ever and was very happy. On seeing the attendance of juniors in particular it didn't take long before a couple of members decided that a presentation was needed to show everybody just what was happening with Mercury together with other items of astronomical interest. This proved so popular that the observatory was very rarely empty and it became an active conversation item with everybody. I had decided to make a certificate to commemorate this Mercury Transit for every visitor where possible. As it was the first of this century with another 13 to follow throughout the century I thought I was worth celebrating and everybody agreed and were very pleased to receive theirs and thought it was a fantastic idea. I told them that I wouldn't be at the next one.

I think everyone will agree that we could call it another success. We had a total of close on 80 visitors, even though the was no charge for the day we still got a nice amount of cash from our collecting buckets, obviously everyone was very generous which I think showed their interest in the day as a whole.

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Paul D'Silva keeping our visitors well informed



Yubraj Sharma, our visitor from London



A very happy looking group on the day informed



It looks like everybody has deserted Paul



Tony Hood setting up to get lots shadow



Alan Birch praying for a good day I think informed

Programme for June & July 2016

Date	Time	Location	Subject / Event	
Thu June 2nd	**19:45**	**Club Room**	**The Solar System in Fiction**	***Paul Money***
Sun June 5th	**14:00**	**Observatory**	**CAE – Solar Observing**	
Wed June 8th	**19:45**	**Club Room**	**Executive Committee Meeting**	
Thu June 9th	**19:45**	**Club Room**	**AGM**	
Sun June 12th	**10:00**	**Old Moor RSPB**	**PO - View the Sun as never before**	
Thu June 16th	**19:45**	**Club Room**	**Observatories of UK Part 2**	***Steve Taylor***
Fri June 17th	**19:30**	**RA**	**Solstice Dinner - Keynote Talk**	***Alan Chapman***
Thu June 23rd	**19:45**	**Club Room**	**Astro Images**	***Tony Morris***
Sun June 26th	**10:00**	**Thrybergh CP**	**PO - Thrybergh Park Fun Day**	
Thu June 30th	**19:45**	**Club Room**	**Astronomy Quiz**	***Les Marsden***
Sun July 3rd	**14:00**	**Observatory**	**CAE – Solar Observing**	
Thu July 7th	**19:45**	**Club Room**	**Gravitational waves discovered**	***Dr Ed Daw***
Wed July 13th	**19:45**	**Club Room**	**Executive Committee Meeting**	
Thu July 14th	**19:45**	**Club Room**	**Astronomy News**	
Sun July 17th	**10:00**	**Old Moor RSPB**	**View the Sun as Never Before**	
Thu July 21st	**19:45**	**Club Room**	**TBA**	***Phil Muffett***
Thu July 28th	**19:45**	**Club Room**	TBA	***TBA***

Old Moor RSPB – Manvers Way, Barnsley, S73 0YF
RA – Rockingham Arms, Wentworth
Clifton Park –Clifton Lane, Rotherham, S65 2AA
Thryberg Country Park – Doncaster Rd, Rotherham, S65 4NU
PVE – Public Viewing Event – Bookable Only
CAE – Community Access Event
PO – Public Outreach
TBA – To be announced – (otherwise – We don't know!)
Web site: http://msas.org.uk
Meeting room is at Swinton Working Men's Club, Station Street, Swinton, South Yorkshire, S64 8AU.
Observatory is at Lee Brook Lane, Hoober, S62 7SH
Mexborough & Swinton Astronomical Society is Registered Charity N° 1064103 in England & Wales

For submissions to The Messenger - Editor: Roy Gunson: royg@gmx.co.uk

DONT FORGET SOLSTICE DINNER
FRIDAY JUNE 17TH ROCKINGHAM ARMS, WENTWORTH
7PM START FOR 7:30 MEAL