The Messenger

Mexborough & Swinton Astronomical Society

Christmas 2017



A Merry Christmas & A Happy New Year to all our Members and Other Astronomers.

The Thoughts of Chairman Les



This month has been busy enough starting with our member speaker Peter Jalowiczor giving us plenty to think about comets and their histories. We did another session at RSPB with a very good turn out yet again with lots of feedback from the visitors with Phil Muffett getting a special mention for his professionalism in explaining the night sky via his computer. Phil also gave us a demonstration on Scanning for Meteors via radio with his own self built scanning system which proved to be very good for 'seeing' meteors by radio. Our guest speaker of the month was Prof Dan Tovey who is working on the Large Hadron Collider and gave some of the latest results.
Friday 24 November was a fully booked PVE with a local poet and the group which we were told would be a very special event - at 5.20 on the night there leader rang me to inform say that the evening had to cancelled due illness - what a disappointment it was as we had done a lot of work to make a good night, we also lost £100 in admissions.
Our member speaker to end the month was Andrew, our Observations Officer, informing us on the items we can observe in the 'Winter Sky'.
At our Committee Meeting during the month raised the point that we still need to continue to keep our eyes open for anything that could possibly be a new meeting room as we feel that things are not that good with SWMC Ltd.
We are still trying to get some funding for the Aquarius Project, which if you may have forgot, is the extension to the observatory. However we are not having any success as yet and we need to make some kind of start on site before we lose the planning permission that we have gained. Recruiting and retaining new members seems to at low ebb recently and we are not sure why this is the case, do you as a member have any idea why this might be?
Next year, about June July time, will be our 40 anniversary and we want to make a special celebration of this and if you have any ideas to help us with this please let us know.
I'd like to take this opportunity to wish everyone a good Christmas and a prosperous New Year

Les Marsden

Chairman & Founder Member

Club Committee

Les Marsden – Chairman
Shaun O'Dell – Secretary
Glenn Marsden – IT Officer
Paul D'Silva – Fundraising Officer
Andrew Kirton-Vaughan – Observations Officer
Roy Gunson – Deputy Chair
Mick Collinson – Treasurer
Tony Morris – Curator
Steve Taylor – Programme Coordinator
Phil Muffett – Member without Portfolio

The Canoe of Tamarereti - Maori Folklore



A very long time ago, soon after the first people were placed on the Earth, there were no stars in the sky at night and it was so dark that it was impossible for humans to move around outside at night without tripping into things. Taniwha were creatures lurking in the dark and they liked to feed at night on anything that moved, spending their days asleep at the bottom of lakes and in deep rivers.

At this time lived a great warrior named Tamarereti. He lived at the south end of Taupo lake. One morning, Tamarereti decided that it was about time to go fishing again, he gathered up his fishing lines and baits and put them in his canoe, then set off for his favourite fishing spot. There he started fishing and caught some nice fish he decided to head back to the village for a late breakfast.

Unfortunately the wind had dropped and he was becalmed. It was a beautiful warm day and Tamarereti decided to lie down for a nap. The gentle rocking of the canoe and the sound of the waves lapping against its sides put Tamarereti to sleep.

While he slept, the gentle breeze returned and the canoe with Tamarereti on board sailed quietly all the way to the north end of the lake. Tamarereti slept for a long time. When he awoke he saw himself at the far end of the lake. There was no way he could make it back home across the lake before darkness fell, and then the Taniwha would come and eat him up. Tamarereti was a brave warrior, he was not afraid of fighting with the Taniwha but he'd rather get back home in one piece to his wife and children.

By now he was very hungry. Tamarereti, so he sailed his canoe to a nearby beach, threw over the anchor and paddled ashore with his fish. He skewered his fish onto a stick and baked them over the flames of a fire. When they cooked, he sat on a log eating and contemplating how to get home. He listened to the sounds of the breeze in the trees, the rippling of the little waves as they washed on the beach. It was warm and it felt very peaceful. As Tamarereti gazed into the final dance of the flames of his fire, he noticed that all the pebbles and stones he used in the fireplace stayed shiny with the heat from the flames.

Suddenly this gave him an idea. He loaded as many of these shining stones and pebbles into his canoe as it would hold and pushed off into the lake. He kept thinking, "What if, instead of going back home through the lake I will sail onto the great river from the sky?" Tamarereti sailed towards the river and guided his canoe carefully into the entrance just as the sun slipped below the horizon and darkness descended on the Earth. The current of the river was strong and the canoe moved along at a steady pace.

As the canoe entered the sky, Tamarereti began to scatter the bright luminescent stones and pebbles in all directions as he went along. The wake of the canoe became the Milky Way and the stones and pebbles became its stars.

This is the reason why we have stars in the sky, they say.

Keep Your Eyes Open



Susan Cartwright

Thursday 14th December: GW170817: The birth of a new Astronomy

Gamma-ray bursts are one of the most energetic phenomena in the universe. Astonishingly, the very first neutron star merger observed by LIGO, on the 17th of August 2017, turned out to be associated with a short gamma-ray burst. This GRB was ten times closer than any previously observed short gamma-ray burst, and unusually faint--perhaps because we were looking at it from a slightly less than optimal direction--but it is still enough to provide the "the clearest smoking gun for the compact object merger model". Furthermore, the "kilo nova" outburst predicted to occur as a result of the neutron star merger was observed over the whole electromagnetic spectrum from X-rays to radio.



Roy Gunson

Thursday 28th December

"I'm Sorry I Have Some Blankety Blank Astronomy For You"

A rather Pointless Quiz that will Countdown our Universally Challenged teams to their Tipping Point until we find their Weakest Link and they fall over the Tipping Point!



Albert Zijlstra

Thursday 11th January

Albert Zijlstra, Professor in Astrophysics at the University of Manchester and Director of the Jodrell Bank Centre for Astrophysics
Research interests include late stages of stellar evolution: mass loss, circumstellar matter; AGB stars; Planetary nebulae; Nearby galaxies

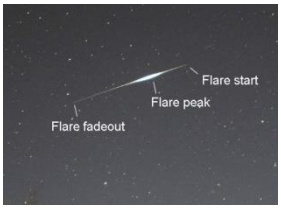
(See diary page on web site for times and location)

Dan Tovey – November 23rd



Dr Dan Tovey of the University of Sheffield presented a talk on the Large Hadron Collider. Dr Tovey reminded us about the 'Standard Model' and then explained how the Atlas experiment was used to provide the evidence for the Higgs Boson finishing off with future plans for the LHC.

The End of Iridium?

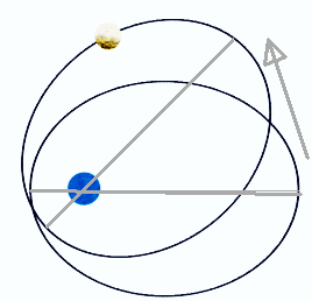


The brief bright flashes predictable night sky events seen with the naked eye are caused by sunlight bouncing off Iridium communication satellites, a constellation of 72 probes launched between 1997 and 2002.
A new generation of satellites are now being launched and if successful the existing fleet will be allowed to re-enter and burn up over the next few years. The guidance and orientation will also be turned off for the remaining fleet of satellites so those remaining in orbit for up to 5 years or more will become unpredictable in the flares that may be seen from the ground.

Full Moon – Supermoon and Lunar Perigee

The "Supermoon" will occur on Sunday, 2017, December 3

This full moon will take place unusually close to the time of month when the Moon makes its closest approach to the Earth – called its perigee. This near coincidence between a full moon and lunar perigee will mean that this full moon will appear slightly larger and brighter than usual in the night sky. Full moons such as this are sometimes called "Supermoons" and occur roughly once every 13 months.



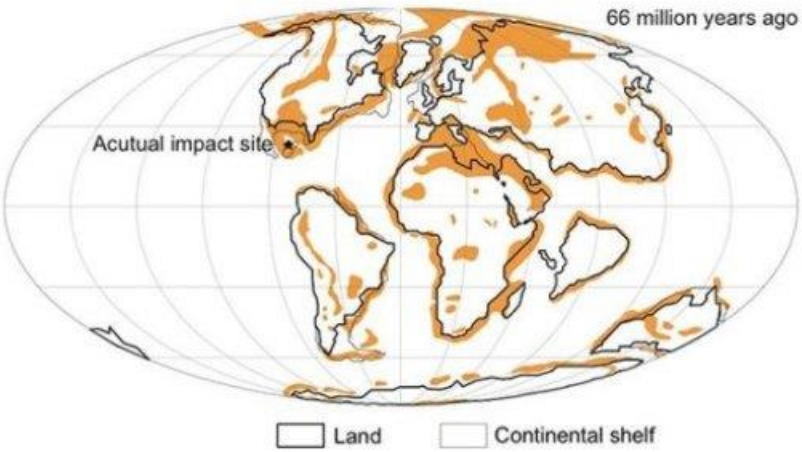
As the moon's orbit is not circular, the perigee is that point in the elliptical orbit when the moon is closest to the Earth. At Apogee (the furthest from the Earth) the moon will be 252,711 miles away from the Earth, and at Perigee it will be 221,456 miles away.
Now there is something called the Apsidal precession (sounds complicated but it's not!) . This means that the position of line drawn through the perigee point to the apogee point, and passes through the centre of the orbit, centre of mass of Earth-Moon system, rotates around this mass centre. For the Moon this rotation of the Apsides take 8.85 years, and our Phil will be pleased to note that this is actually noted by the ancient Greek astronomer Hipparchus and is apparently corrected for in the Antikythera Mechanism! (Note the Earth's Apisidal precession around the sun takes some 23,000 years!)
Full Moons are traditionally given names according to the season in which they fall, and this will be the third full moon of autumn 2017, traditionally called the Oak Moon.

The Winter Solstice

Year	Time of solstice
2013	21 Dec 17:07 GMT
2014	21 Dec 22:57 GMT
2015	22 Dec 04:40 GMT
2016	21 Dec 10:34 GMT
2017	**21 Dec 16:16 GMT**
2018	21 Dec 22:09 GMT
2019	22 Dec 04:05 GMT
2020	21 Dec 09:48 GMT
2021	21 Dec 15:46 GMT

The Earth orbits the Sun once every 365.242 days, and this is the time period over which the cycle of solstices and equinoxes, and consequently all the Earth's seasons, repeat from one year to the next.
In any year which is not a leap year, the solstices occur roughly 5 hours and 48 minutes – just under a quarter of a day – later from one year to the next.
This is why the seasons would drift later in the year if it was not for an additional day being inserted into every fourth year on 29 February.
The chart below shows the day of the month when the December solstice falls in each year. The gradual drift of the four-year cycle earlier in the month is due to the equinoxes repeating 12 minutes less than a quarter of a day later each year.

THE CHIXULUB IMPACTOR



Map of the Earth at the time of the impact – the orange areas indicate the biotic rich areas at that time

The asteroid, also known as the Chicxulub Impactor, Which h it Earth some 66 million years ago, causing a crater 180 km wide. The impact of the asteroid also heated organic matter in rocks and ejected it into the atmosphere, forming soot in the stratosphere. New research by Tohoku University Professor Kunio Kaiho, suggests that the impact site was doubly unfortunate as it impacted on an area rich in Bio material and hydrocarbon rich sediment. This led to a very large amount of soot being sent high into the stratosphere accentuating the global cooling.

The soot being a strong, light-absorbing aerosol and caused global climate changes that triggered the mass extinction of dinosaurs, ammonites, and other animals, and led to the macroevolution of mammals and the appearance of humans.

Based on results of the new study, the researchers say that the probability of the mass-extinction occurring was only 13 percent. This is because the catastrophic chain of events could only have occurred if the asteroid had hit the hydrocarbon-rich areas occupying approximately 13 percent of Earth's surface.

The researchers came by their hypothesis by calculating the amount of soot in the stratosphere and estimating climate changes caused by soot using a global climate model developed at the Meteorological Research Institute. The results are significant because they explain the pattern of extinction and survival.

If the asteroid had hit a low-medium hydrocarbon area on Earth (occupying approximately 87 percent of Earth's surface), mass extinction could not have occurred and the Mesozoic biota could have persisted beyond the Cretaceous/Paleogene boundary.

The site of the asteroid impact, therefore, changed the history of life on Earth.

According to the study, soot from hydrocarbon-rich areas caused global cooling of 8-11°C and cooling on land of 13-17°C. It also caused a decrease in precipitation by approximately 70-85 percent on land and a decrease of approximately 5-7°C in seawater temperature at a 50-m water depth, leading to mass extinction of life forms including dinosaurs and ammonites.

Mike Hall's Skynopsis



The Moon over this period
Sun rises 07:58 on Dec 1st, sets 15:49

Sun rises 08:21 on Jan 1st, sets 15:55

Sun rises 07:50 on Feb 1st, sets 16:46

The Planets

Mercury	Difficult to observe – is at "Dichotomy" – (half phase) on 27th December– however only some 6° above the horizon at dawn it gets to greatest elongation west on 2nd January – but still only 6° above horizon.
Venus	At superior conjunction on 9th January – not observable
Mars	Rises 3:40 am on Dec 1st and 3:20am on Feb 1st – so a very early morning object for this entire period.
Jupiter	Rises at 5:15am on Dec 1st, getting better through this 2 month period and rises at 2:08am on Feb 1st.
Saturn	Not visible
Uranus	Early evening object - can be seen low down in South east until about 8:30 pm
Neptune	Another evening object, low in south-east – may catch it up to about 7:45pm

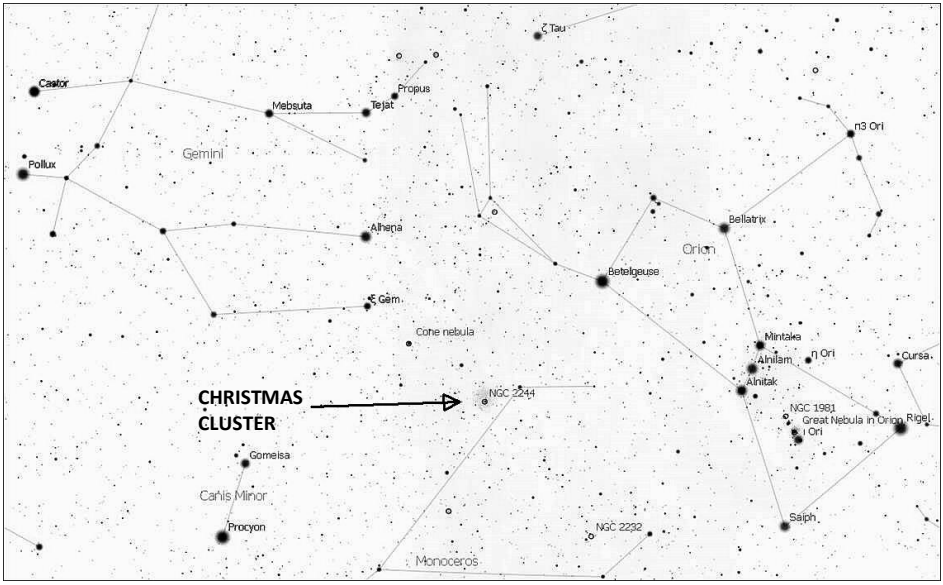
The **Geminids** meteors will be on Thursday Dec 14th, its forecast to be a good show this year as the moon is an early morning crescent.

The **Ursid** meteor shower on December 22nd (usually spread between 17th and 25th December) – not expected to be spectacular – may see between 5 and 10 an hour after midnight. The young moon will have set and won't interfere with observations.

The **Quadrantids** meteor shower on January 4th, should get 30 – 40 meteors per hour, however the moon is two days past full and will play a large part in reducing visibility!

The Christmas Tree Cluster

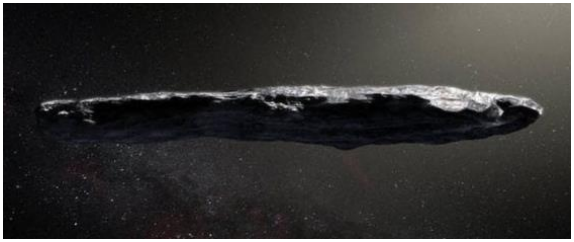
The Christmas Tree Cluster (NGC 2264) at magnitude 4½ can be seen with your unaided eye in dark sky and it is easily observable in binoculars. The cluster was never included in the Messier list, and remained overlooked by modern stargazers. William Herschel was the first to catalogue this cluster in 1784. At first, he only saw the stars. Upon a second look, on the day after Christmas in 1785, he first noted the faint nebulosity near the cluster's brightest star. Officially, NGC 2264 includes both star cluster and nebula.





The Christmas-tree shape of NGC 2264 is hard to see in binoculars, but it will jump out in a small telescope at low power. The photographic image here shows the stellar "Christmas Tree" on its side, along with the surrounding nebula. The brightest star in this image, 15 Mon, marks the base of the tree and the wedge-shaped Cone Nebula forms the apex. You will NOT get this view looking through a telescope. Though you will easily see the tree-shape of the stars. And you may see some ghostly white nebulosity in a 4-inch or larger scope and dark sky.

'Oumuamua, Our First Interstellar Visitor



Oumuamua was first spotted on Oct. 19, by astronomers using the Pan-STARRS1 telescope in Hawaii. The smallish object was first classified as a comet but then regarded as an asteroid, after further observations revealed no evidence of a coma (the fuzzy cloud of gas and dust that surrounds a comet's core).

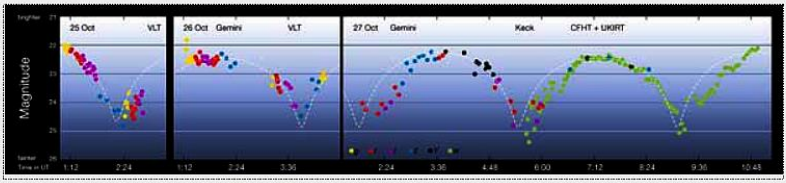
Analysis of 'Oumuamua's trajectory soon revealed that it was on a hyperbolic path — that is, one that will take it out of the solar system. And the object doesn't seem to have had any gravitational encounters with planets that could have nudged it onto such a path, which strongly suggests that 'Oumuamua came from interstellar space, researchers have said.

ESO's Very Large Telescope was immediately called into action to measure the object's orbit, brightness and colour more accurately than smaller telescopes could achieve. Speed was vital as `Oumuamua was rapidly fading as it headed away from the Sun and past the Earth's orbit, on its way out of the Solar System. There were more surprises to come.

The team of astronomers found that `Oumuamua varies dramatically in brightness by a factor of ten as it spins on its axis every 7.3 hours. This unusually large variation in brightness means that the object is highly elongated: about ten times as long as it is wide, with a complex, convoluted shape. We also found that it has a dark red colour, similar to objects in the outer Solar System, and confirmed that it is completely inert, without the faintest hint of dust around it. This suggests that `Oumuamua is dense, possibly rocky or with high metal content, lacks significant amounts of water or ice, and that its surface is now dark and reddened due to the effects of irradiation from cosmic rays over millions of years. It is estimated to be at least 800 metres long and 80 metres wide'

Preliminary orbital calculations suggested that the object had come from the approximate direction of the bright star Vega, in the northern constellation of Lyra. However, even travelling at a breakneck speed of about 95,000 kilometres/hour, it took so long for the interstellar object to make the journey to our Solar System that Vega was not near that position when the asteroid was there about 300,000 years ago. Astronomers estimate that an interstellar asteroid similar to `Oumuamua passes through the inner Solar System

The IAU also created a new class of objects for interstellar asteroids, with this object being the first to receive this designation. The correct forms for referring to this object are now: 1I, 1I/2017 U1, 1I/`Oumuamua and 1I/2017 U1 (`Oumuamua). Note that the character before the O is an okina. So, the name should sound like H O u mu a mu a. Before the introduction of the new scheme, the object was referred to as A/2017 U1.



This plot shows how the interstellar asteroid `Oumuamua varied in brightness by a factor of 10 during three days in October 2017. The colored dots represent measurements through different filters, covering the visible and near-infrared part of the spectrum. The dotted line shows the light curve expected if `Oumuamua were a cigar-shaped ellipsoid with a 1:10 aspect ratio. The deviations from this line are probably due to irregularities in the object's shape or surface albedo.
ESO / K. Meech et al.

No Halleymites in the Main Belt!



I enjoy trawling through quality old vinyl to buy, and sometimes real gems can be found such the one I came across recently to my amazement (and some amusement): a 7" vinyl single commemorating the return of Halley's Comet in 1986 with a children's book feel to the cover…
Yes, we're real Halleymites from the Comet Halley and Yes, You've never heard of us before but we've been around the Galaxy for thousands of years...
How prophetic. I certainly have never heard of them. At the time Comet Halley came around in 1986, I was a first year Physics Student at the University of Sheffield. This astronomical event was big news. A few years later, I would engage in a slice of Postgraduate research for P1/ Halley under one of the academic staff who was a World expert in his field at the time.
But the Halleymites somehow kept quiet…

The Talk

Over thirty years later and we have Comet Hunters; it is a project I have contributed towards alongside other Zooniverse projects (mainly P4). By classifying images whenever there were a few minutes. Recently, I had the opportunity of collating materials from Comet Hunters for a talk to be given at my local Astronomical Society: the MSAS (the Mexborough and Swinton Astronomical Society). The society is situated ~20km from Sheffield (pop, 570,000), England and was founded in 1978. Every Thursday evening is a social occasion centred on a lecture. Members, such as me are encouraged to give talks. Usually about once a month, an academic visits the society to present on an aspect of Astronomy.
The evening was divided-up into four parts:

I. Q & A from the Planet Four talks at MSAS
II. Presentation – based largely on the blogs Peter Jalowiczor
III. Presentation – material kindly provided by Meg Schwamb
IV. Q & A.

Q & A from the Planet Four talks at MSAS

This was a chance to review the Q & A to make sure anyone, who had missed these questions posted on the P4 blog.

The Presentations

Started with an introduction to Comet Hunters as a citizen science project. The project was initiated to greatly increase the discovery rate of these objects. The first such object was found in 2006 and there are only 12 known at present.

This followed with a discussion about Asteroids and Comets with the distinct examples of Gaspra and Halley being given in these categories. However, where do we draw the distinction between these objects? Comets were always assumed to have come from the outer Solar System beyond the orbit of Neptune. Asteroids have generally thought to be from the Main Belt.

Next came a discussion of the two different searches: the HSC Survey or the Archival Data Search. A discussion of the instruments: Suprime Cam and the Hyper Suprime-Cam used in the search for these objects.

The Subaru telescope - this also included Meg's detailed description about life for Astronomers at this wonderful observatory; one of the best observing sites in the World. The difficulties experienced by Astronomers at such high altitudes over 4,600m asl. Anyone working at the summit of Mauna Kea cannot stay up longer there longer than 14 hours needing to descend to mid-altitude for safety and health reasons. Sandwiches left for more than 20 minutes become stale giving all the water to the air (as the one left by Meg). This prompted one of the members to jokingly suggest Rhyita might be a better option next time. Another of the society members has travelled the world specifically visiting observatories and had the privilege of visiting the observatory in 2012 at the time of the transit of Venus.

Conclusions

- Hyper Suprime-Cam search launched in June 2016.
- 0ver 8,000 volunteers have contributed to the project to varying degrees, inspecting HSC for main belt comets.
- 4,877 main belt asteroids located in the HSC wide survey fields have been searched for cometary activity.
- Assuming a detection efficiency of 20% an upper limit of 1% is placed for the occurrence rate of MBCs in each of the sample of asteroids.
- Simulated MBC observations are planned to measure the detection efficiency.

Q & A

A variety of questions were asked following the two presentations.

Snow Line – how exactly is the boundary of the snow-line worked out? What is its relevance? It seems that there is water (albeit in different forms) such as lots here on the Earth both inside and outside the snowline?

Regarding the MBCs isn't there a possibility that the surface ices over geological time would have sublimated from the outside (of the object)? We would then be left with ice at the centre perhaps covered with rock/dust?

Classification: What is the point of the reference images: the ones to the right of the main image when we are really looking at the central object?

What is the file size from the updated camera (i.e. Hyper Suprime-Cam)?

In the charts showing the 'Tail Visible in One of the Images' and 'Tail Visible in Two of the Images' what exactly does this data represent?

The presentations certainly opened up some debate during and after the talks. A number of members noted that if we look at the current definition of Comets and Asteroids, there does not seem to be a clear boundary. How would Enceladus fit in this category? After all, it is ejecting water.

On an ending note, I also think that it is safe to say that there are no Halleymites in the Main Belt…

Peter Jalowiczor

Diary

Date	Time	Location	Subject / Event	
Thu Dec 7th	**19:45**	**Club Room**	**TBA**	
Wed Dec 13th	**20:00**	**Club Room**	**Executive Committee Meeting**	
Thu Dec 14th	**19:45**	**Club Room**	**The Birth of a New Astronomy**	*Dr Susan Cartwright*
Thu Dec 21st	**19:45**	**Club Room**	**The past year in Space & Science**	*Jez Robinson*
Thu Dec 28th	**19:45**	**Club Room**	**I'm Sorry I Have Some Blankety Blank Astronomy for You**	*Roy Gunson*
Wed Jan 3rd	**22:00**	**Observatory**	**Quadrantids Meteor Shower**	
Thu Jan 4th	**19:45**	**Club Room**	**Light**	*Ed Bothamly*
Wed Jan 10th	**20:00**	**Club Room**	**Executive Committee Meeting**	
Thu Jan 11th	**19:45**	**Club Room**	**TBA**	*Albert Zijlstra*
Sat Jan 13th	**16:30**	**Old Moor RSPB**	**Nature & the Night Sky**	*Phil Muffett*
Thu Jan 18th	**19:45**	**Club Room**	**Deep Sky Observing; Equipment & Techniques – Part 1**	*Tony Morris*
Wed Jan 24th	**19:30**	**Club Room**	**Aquarius Project Meeting**	
Thu Jan 25th	**19:45**	**Club Room**	**Annual MSAS Astroimaging Competition**	*Tony Morris*
Fri Jan 26th	**19:45**	**Observatory**	**PVE**	*Les Marsden*
Thu Feb 1st	**19:45**	**Club Room**	**Astro Clinic**	*Various*
Fri Feb 2nd	**19:45**	**Club Room**	**TBA**	*Allan Chapman*
Thu Feb 8th	**19:45**	**Club Room**	**Stars Part 3 : Age and Development**	*Roy Gunson*
Wed Feb 14th	**19:45**	**Club Room**	**Executive Committee Meeting**	
Thu Feb 15th	**19:45**	**Club Room**	**Deep Sky Observing; Equipment & Techniques – Part 2**	*Tony Morris*
Thu Feb 22nd	**19:45**	**Club Room**	**Spring Sky**	*Andy Kirton-Vaughan*
Fri Feb 23rd	**19:45**	**Observatory**	**PVE**	*Les Marsden*

Old Moor RSPB – Manvers Way, Barnsley, S73 0YF
TCP - Thryberg Country Park
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
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