The Messenger

Mexborough & Swinton Astronomical Society

November 2014

Bubbles in Space assist the Taliban!

In 2002 a United States Chinook helicopter carrying troops on a rescue mission was shot down during the Battle of Takur Ghar. The battle saw three helicopter landings by the U.S. on the mountain top, each greeted by direct assault from al Qaeda forces. Although Takur Ghar was eventually taken, seven U.S. service members were killed and many wounded. The quick reaction force was carried by two Chinooks, Razor 01 and Razor 02. Due to satellite communications difficulties, Military officers based in Bagram, Afghanistan, issued a fateful radio warning to the helicopter crew to stay away from al-Qaeda forces on the mountaintop, but the message was scrambled and lost. Razor 01 was mistakenly directed to a "hot" LZ on the Takur Ghar peak. As Air Force rules prohibited AC-130 aircraft from remaining in hostile airspace in daylight was forced to leave before Razor 01 reached the LZ. Further communications difficulties meant that the pilot of the AC-130 was unaware that Razor 01 was incoming. At approximately 0610 hours, Razor 01 reached the landing zone. The aircraft immediately began taking fire, and the right door minigunner, Sergeant Phillip Svitak, was killed by small arms fire. An RPG then hit the helicopter, destroying the right engine and forcing it to crash land. As the Rangers and special tactics team exited the aircraft, Private First Class Matt Commons, posthumously promoted to Corporal, Sergeant Brad Crose, and Specialist Marc Anderson were killed. The surviving crew and quick-reaction force took cover in a hillock and a fierce firefight began.

During daylight hours in the upper atmosphere, radiation beaming down from the sun rips electrons from their atoms. But once the sun sets, the electrons start recombining with their atoms. This recombination process happens faster in the lower atmosphere because there are heavier particles there, and electrons recombine faster with molecules than they do with single atoms. Since the plasma in this part of the atmosphere is less dense, it rises and burrows into the denser plasma above. This causes giant bubbles of charged particles to form, similar to the way air bubbles rise from a submerged diver. The huge bubbles of charged particles are invisible, but they can bend and warp radio waves. In 2002, the Chinook helicopter was flying over Afghanistan in the spring, which is the height of plasma bubble activity, Kelly said. To figure out what went wrong, in March 2002, Kelly and a team of researchers used data from a NASA satellite mission called TIMED, which launched in 2001 to study the composition of Earth's upper atmosphere."The TIMED spacecraft flew over the battlefield at about the right time," Kelly said in a statement.

Joseph Comberiate, co-author of the study and a physicist at APL, developed a method to convert the 2D images from the NASA satellite into 3D models of the plasma bubbles. The model showed that on March 4, 2002, the day of the Battle of Takur Ghar, a plasma bubble loomed above the unlucky helicopter.

The Thoughts of Chairman Les

Well October is here again and a lot of you might not appreciate why I mention this. For many years now, 31 years I think, there has been a contest between society's entitled ASTROMIND which is a national astronomical quiz. For the last few years it hasn't been as well supported as it was 'back in the day' when there was upward of between 5 / 9 societies taking part. At the end of the quiz a society would volunteer to host the quiz the year after which was taken as an honour to do so, we have hosted quite a few times over the years and have enjoyed the experience.

The hosts for 2014 were Sheffield AS 18th October and there were only three contestants but each one gave it their all to try and take the trophy.



It has become custom and practice that there has been just one quizmaster to give overall integrity to the whole proceedings and that person has been Neil Haggarth for many years now and has done, and I am sure he will continue to so, an excellent job.

The contestants were Darren from Sheffield AS, Michael from MSAS and Marcus from Huddersfield AS. We didn't take the trophy this year but it was pleasing to see Darren take first place as he has been so close for the past few times, well done to you Darren.
Below is a copy of the score sheet from the day, you will notice that the scores are very close in each round, in the final score line only a difference between the three contestants of 8 points.

CONT.	DARREN	MICK	MARCUS
RD 1	7	8	9
RD 2	10	7	10
RD 3	14	12	9
RD 4	6	6	8
RD 5	18	14	
TOTALS	17	15	14
3	31	27	28
4	37	33	36
5	PASS	47	52

We had 9 of our members attend, still the largest contingent, and it was nice to see Geoff after his operation, I am sure we all had a good day out, thanks everyone for making it a nice day,

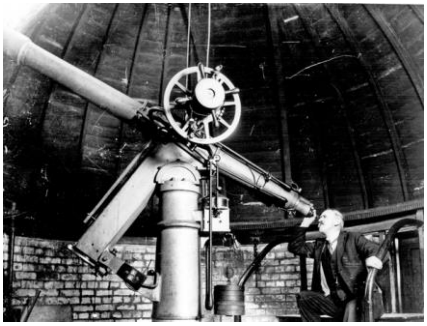
There were two audience participation rounds and Phil won a bottle red wine and Steve won a bottle of white, we have always been good at wining the prizes.

We must give our contestant Michael Waterfield our grateful thanks for all of the hard work and representing our fantastic society.

Les Marsden FRAS

Chairman

The Old Sheffield Observatory – Western Park





Photographs ~1895

Rebuilt in Weston Park to house a large telescope originally owned by Thomas Rawson Barker - donated to the town by his daughter. Opened 20 September 1880. There was a curator who was available Wednesday and Saturday evenings during the winter to supervise visitors & give instruction. It is believed it was removed during WW2.

The telescope was equatorially mounted, was 8ft in diameter focal length and had an object lens 6 inches in diameter. It had nine eyepieces of various powers. It was fitted with a clockwork drive to keep it fixed on an object

2nd.

THE TELESCOPE AT WESTON PARK.—Mr. E. Howarth, the curator of the Weston Park Museum, has presented to the Museum Committee a report on the observatory, with some suggestions as to the best method of using the telescope, formerly the property of the late Mr. Thomas Rawson Barker, and presented to the town by Miss Barker. The telescope has been fixed in an observatory 16 feet in diameter, fitted with a moveable dome and sliding shutter. It is equatorially mounted, is 8 feet in diameter focal length, has an object glass 6 inches in diameter, has 9 eye-pieces of various powers, one of these being fitted inside with cross wires to mark the time occupied by an object in passing across the field of view, and is, in fact, filled with all accessories necessary to finding and observing all the different heavenly bodies. Mr. Howarth says that a new clock will probably be required, the present clockwork, which is worked by a spring, being out of order. An object placed in the field of view would pass out of it in less than a minute, and a clock attached to the instrument would cause it to revolve in accordance with the earth's motion, and thus keep the object in view as long as required. A sidereal chronometer, formerly

The Sheffield Independent – Monday Sep 6th 1880

November Night Sky

Diary

2nd	Neptune is 5"5 west of the Moon
3rd	Moon is at perigee
	Mercury is 5deg. North of Spica
4th	Uranus is 1.3deg. South of the Moon
5th	Taurids meteor shower (southern radiant) peaks
6th	Full Moon
8th	Moon close to Hyades
11th	Planned landing on comet 67P/Churyumov-Gerasimenko
12th	Taurids meteor shower (northern radiant) peaks
14th	Moon at last quarter
18.00	Jupiter is 5deg. North of Moon
18.30	Moon rises with Aldebaran
15th	Asteroid Hebe is at opposition (mag. +8.1)
17th/18th	Leonids meteor shower peaks. Moon at apogee
22nd	New Moon
27th	Moon is at perigee (369, 824km)
	Asteroid Pallas, morning object passing half degree north of globular cluster M2
29th	Moon 1st Quarter

Planets

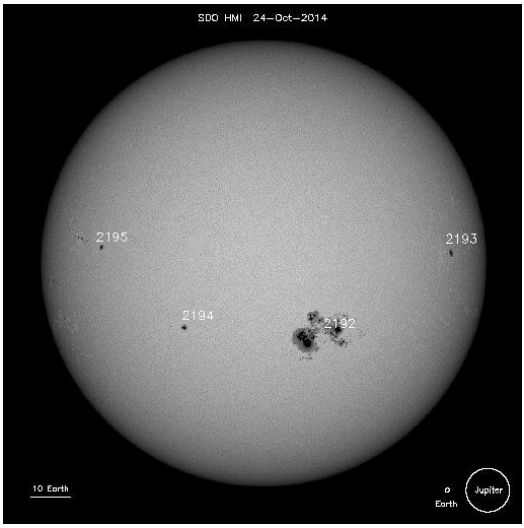
Mercury	Early morning (06.00 1st Nov.) for first two-three weeks, brightening from mag. -0.5 to -0.8 by the 21st, look for thin crescent Moon to the north of Mercury on the 21st,
Venus	Lost in the solar glare
Mars	Keeps ahead of the evening twilight (18.00) and passes north of Lambda Sagitarii on 3rd. Passes close to several deep sky objects: On the 1st-2nd lies very close to globular cluster M28. On the 3rd it lies above Lambda Sag. moves below under the 'Teapot' asterism by the 13th to 23rd on 26th it is joined by the crescent Moon on 25th approaching M75
Jupiter	On the 14th Jupiter forms a triangle with the Moon and Regulus (Leo)
Saturn	Lost in the solar glare
Uranus	Good viewing (21.00) in Pisces, south of delta Pisces and HIP 3765,approx. mag. +5.7
Neptune	Good viewing (18.00) in Aquarius close to Sigma Aqu., approx. mag. +7.8

Galactic Goodies

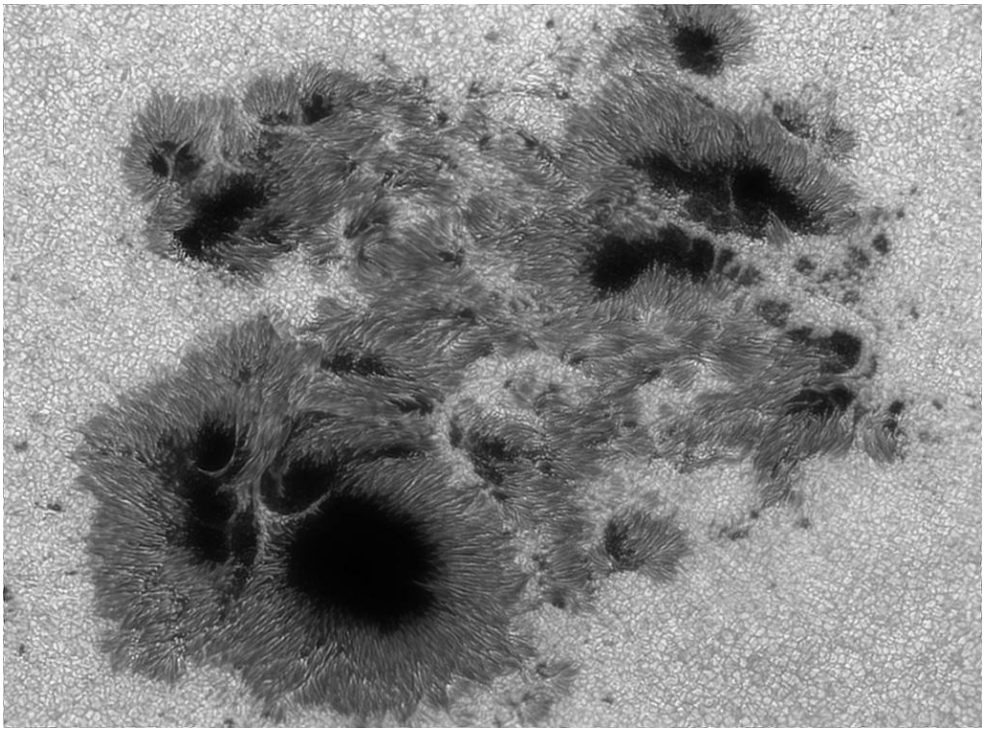
M22	(also known as NGC 6656) is an elliptical globular cluster in the constellation Sagittarius, near the Galactic bulge region. It is one of the brightest globulars that is visible in the night sky:- (RA: 18h 36"23.94', Dec. -23deg54"17.1')
M28	Globular cluster in Sagittarius:- (RA: 18h24m32.89s, Dec: +30deg 39m 36.7s)
M33	also known as the Triangulum Galaxy: -(RA: 01h 33m 50.02s, Dec: +30deg 39m 36.7s)

Mike Hall

The Big Sunspot in October



One of the largest seen for some time crossed the face of the sun in late October. A video of the sunspot was shown on APOD (Astronomy Picture of the Day) website on 22nd October. The sunspot has given rise to several X level flares which are amongst the strongest possible usually resulting in coronal mass ejections.
As I write this though nothing seems to be coming our way for those aurora watchers!



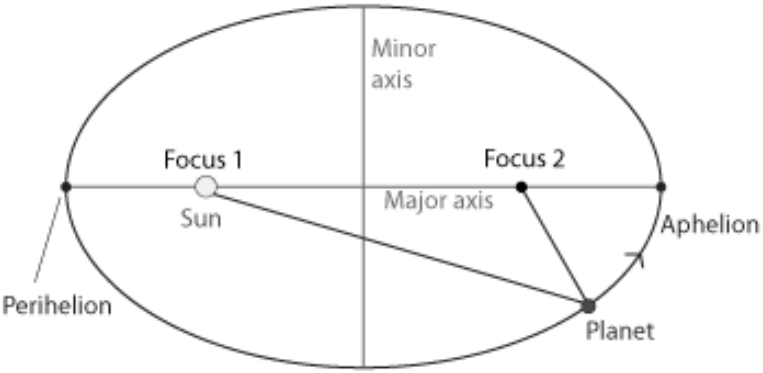
Kepler's Laws

By Brian Ventrudo

Once Kepler got his hands on Tycho's measurements, he worked diligently to make sense of the data and to develop a solid framework for the workings of the solar system. He succeeded. Working for more than a decade, crunching numbers with pen and paper, he laid out three simple mathematical laws that account for the motion of the planets. Kepler's Laws were descriptive, so they didn't explain the physical basis for celestial motion. That task fell to an even more astute mathematician: Isaac Newton. But "Kepler's Laws" are rigorous enough to account for most planetary motion, and are still taught to high-school and college students all over the world. Here's what they're all about…

Kepler's First Law

As mentioned in the short biography of Kepler, his first law was a result of a great insight: that planets did not necessarily move in perfect circular orbits, which had been long assumed. Using Tycho's measurements of the motion of Mars across the sky, Kepler discovered planets move in elliptical orbits with the Sun not at the centre of the ellipse, but at one focus (the other focus is empty). It's a deceptively simple law that took astonishing insight and five years of hard work.

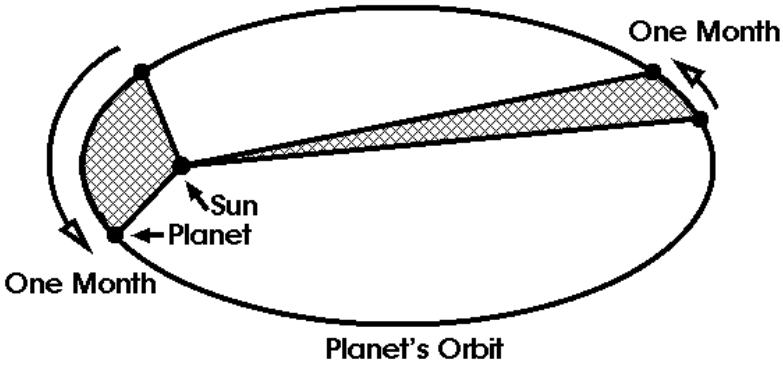


An elliptical orbit of a planet
(greatly exaggerated)

Kepler's First Law states that planets move around the Sun in an elliptical orbit with the Sun at one focus of the ellipse.

Kepler's Second Law

As you may have surmised, if a planet traverses an elliptical orbit, its distance from the Sun changes during an orbit. Kepler noticed, using Tycho's real-world observations, that planets seemed to speed up in their orbits when they are closer to the Sun and slow down when they're further away. The effect was subtle but unmistakable. But a verbal description was insufficient. Kepler had to quantify this motion, and did so by stating that "a line joining a planet and the Sun sweeps out equal areas during equal intervals of time." See the following diagram …



Kepler's 2nd Law: The line from the Sun to a planet sweeps out equal areas (in grey) in equal times.

"Who cares", you might ask? Well… this doesn't affect your everyday life and enjoyment of the night sky, but Kepler's 2nd Law is a) Critical for predicting where we can see planets in the sky, and b) A direct consequence of the great universal law of "conservation of energy". As a planet gets closer to the Sun, it has less "potential energy" and more "kinetic energy", and as it moves away from the Sun, it has the opposite. Without this law, we'd still be scratching our head about where and when the planets appear in the night sky.

Kepler's Third Law
Planets farther away from the Sun have larger orbits, so even if they moved at the same speed as the closer-in planets, you'd expect them to take longer to move around the Sun. And they do. But they also move at a lower rate of speed, which further lengthens the time is takes to revolve around the Sun. What Kepler discovered, to be exact, is that the square of the orbital period (P) of a planet is directly proportional to the cube of the semi-major axis of its orbit (T):

$$P^2 \sim T^3$$

Now stay with me here… this means, in plain English… that planets move slower when they're farther from the Sun, and whatever influence makes planets go around the Sun weakens with distance. It was left to the great British scientist and world-historical genius, Isaac Newton, to explain this relationship with his own law of gravity, a law upon which all of modern physical science is based.

And here's the most amazing thing of all… Kepler's three laws appear to hold not just in our own solar system, but in all circumstances where one body moves under the influence of another's gravity. They are general universal relationships.

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Programme November & December 2014

Date	Time	Location	Subject & Speaker
Tue Nov 4th	17:00	Hicks Building	**Cosmic History** *Prof Carlos Frenk*
Thu Nov 6th	19:45	Club Room	**A Guide to Pixinsight** *Harry Page*
Wed Nov 12th	19:45	Club Room	**Executive Meeting**
Thu Nov 13th	19:45	Club Room	**Constellation Corner** *Michael Waterfield*
Thu Nov 20th	19:45	Club Room	**Night Scenes of 2015** *Paul Money*
Tue Nov 25th	18:00	Observatory	**Hoyland Beavers Visit** *Alan Birch*
Wed Nov 26th	18:00	Observatory	**Grenoside Beavers Visit** *Alan Birch*
Thu Nov 27th	19:45	Club Room	**Winter Sky** *Mike Hall*
Fri Nov 28th	19:45	Observatory	**PVE** *Les Marsden*
Sat Nov 29th	18:00	Wentworth Castle	**Public Outreach** *Les Marsden*
Tue Dec 2nd	17:00	Hicks Building	**Using Cosmic Rays to help Climate Change** *Prof. Lee Thompson*
Thu Dec 4th	19:45	Club Room	**An Astronomers Guide to Chile** **Gary Gawthorpe**
Wed Dec 10th	19:45	Club Room	**Executive Meeting**
Thu Dec 11th	19:45	Club Room	**Big Bang Party** *Hannah Hudson-Lee*
Thu Dec 18th	19:45	Club Room	**History of Observing in Britain** **Bill Leatherbarrow**

Astrophotography Section meet virtually every Tuesday
Observatory at 19:30 - (See Alan Birch/Mike Scollan for details)

TBC – Subject to be confirmed
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
Hicks Building – University of Sheffield, S10 2TN
PVE – Public Viewing Event

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