

THE CHESTERFIELD ASTRONOMICAL SOCIETY

NEWSLETTER SEPTEMBER 2014

CAS website www.chesterfield-as.org.uk

Registered Charity No. 514048

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Welcome to the September issue of the CAS newsletter.

CAS News

The nights are finally getting darker now so not as long to wait before observing!

This is from Rob McGregor regarding the "Speed of Light" experiment.....

SPEED OF LIGHT SCRAPPARATUS

In astronomy, 99.9% of the information we receive from the sky comes to us in the form of electromagnetic radiation that covers the entire spectrum from gamma rays, through visible light, to radio waves. This radiation travels at the universe's top speed of 300,000,000 metres per second. However we take this as read because we haven't the tools to check this ourselves and we have faith in the generations of scientists that have checked it! Wouldn't it be nice to check it ourselves?

During an astrocamp at Haddon Grove last year, I was chatting with some other campers about the speed of light, and the subject of its measurement using a spinning toothed wheel cropped up.

Afterwards, I got to think that the simplicity of the experiment (developed and carried out in 1849 by Hippolyte Fizeau) should make it easy enough for me to replicate. However the speed of the wheel, the number of teeth required and the distance over which the experiment would need to be carried out (several miles), put me off.

EQUIPMENT

Fizeau's friend, Léon Foucault made improvements that resulted in a method involving a spinning mirror, which in theory was much more sensitive, and therefore could be reproduced with a slower spin rate and a shorter distance. The basic apparatus is as follows:-

A narrow beam light source and a telescope are collimated so that the spot of light from the beam falling on a distant object can be seen in the centre of the field of view of the scope. An eyepiece with a measuring scale is used.

The telescope and light source are pointed at a mirror that can spin at a known rate. Turn the mirror slightly to a different position and the spot of light still appears in the same position in the eyepiece even though the background view has changed.

A large mirror or reflector is placed at a known distance so that the reflected light from the spinning mirror can sweep across it and be reflected back.

With the mirror spinning fast, and because of the time delay for the light to traverse the experiment, the spot of light appears in a slightly different position in the eyepiece. This can be measured on the scale and can give an angle of deviation.

The speed of light can be calculated from the angle of deviation, the rate of spin and the distance between the two mirrors.

Luckily I had plenty of odds and ends, and with help from John Bardwell, and advice from John Rose, Mario Stephenson and Bill Phenix, was able to assemble the equipment we needed.

FRIDAY 31 MAY

In the evening, a small group of us (Bill and Stella, Johns Bardwell and Rose, Mario and myself, went to Highfields Park in Chesterfield. There weren't many people around but we had to be careful where the beam pointed. We mounted the reflector (made from strips off high-viz jackets) and measured out 150m, then set up the rest of the equipment. With the mirror stationary, we measured the position of the spot of light against the scale at 5.0. We set the mirror spinning (thought to be 15-20 revs/sec), and the spot was now at 5.1, about the expected deviation. Bill stayed at the eyepiece as the mirror was switched off and watched as the spot of light returned to its original position. Although an accurate reading for the speed of light could not be obtained, we had detected the time delay between the light leaving the spinning mirror and returning (about a millionth of a second).

THURSDAY 7 AUGUST

Johns Bardwell, Brown, Rose and myself went to the park again with a better idea of the spin rate, and carried out the experiment over 100m, 200m and 300m. Unfortunately the mirror's spin rate was found to be difficult to determine precisely. Nevertheless, from our most reliable results we obtained a speed of 265,000,000 m/s, about 14% out, but we are definitely in the right area.

WHAT NEXT?

I've tried the experiment over a distance of 20m, well within the realms of repeating it in the carpark at the observatory; this would be something to show people on cloudy nights, but we need to improve the spinning mirror. If anyone want to help out in any way, please let me know!

Rob McGregor



Many thanks for this Rob and to the helpers.

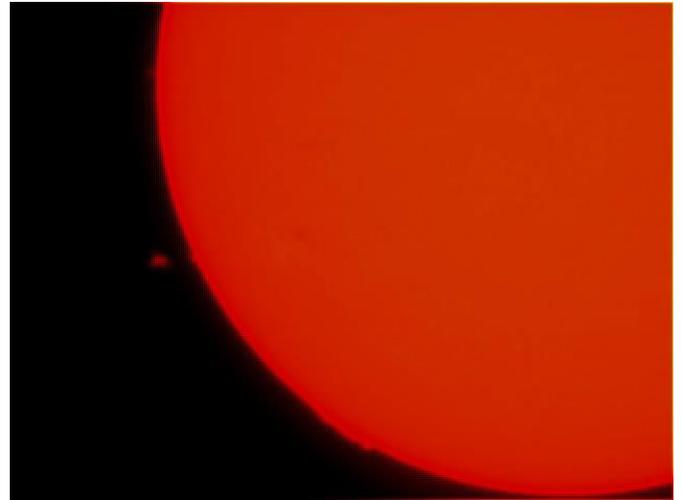
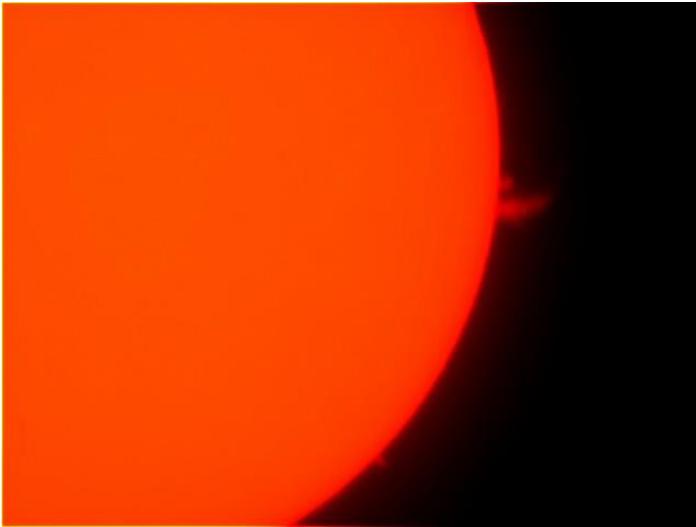
Photo Gallery

This is a
stunner from
Graham
Jenkinson
(Boss).



These are from Peter
Davidson 24/07/14 using the
Society's solar scope.

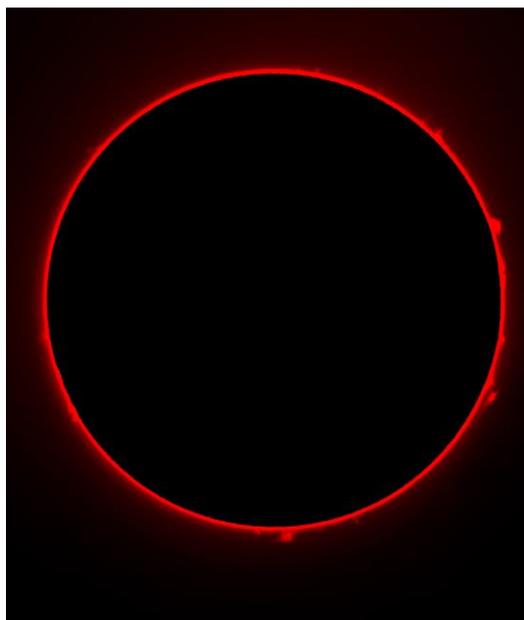
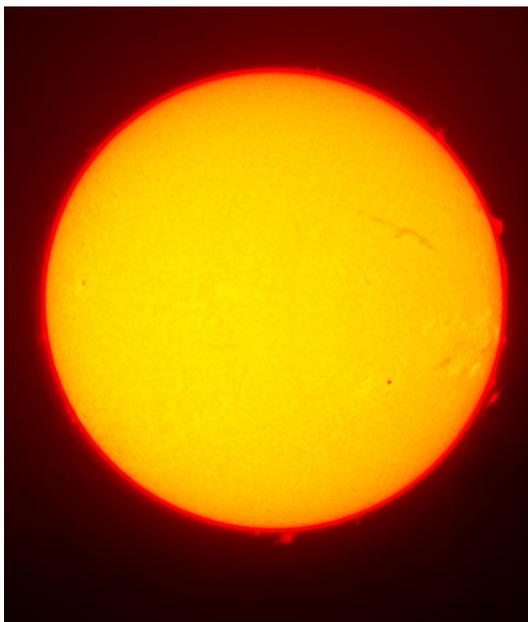




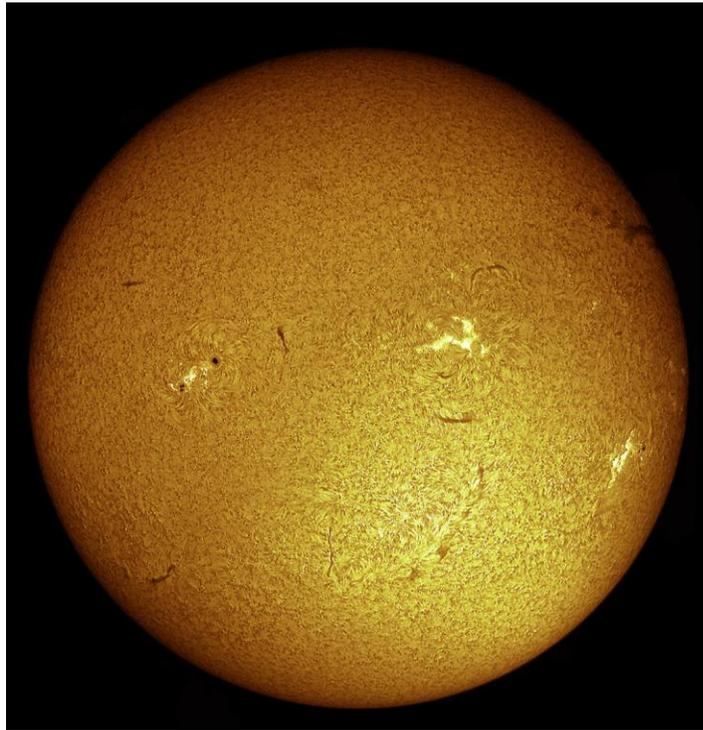
The image of the full disc of the Sun was taken using my Canon 20d digital camera, and the other two images were taken using my Phillips webcam then stacked using Registax.

These are great Peter, thanks.

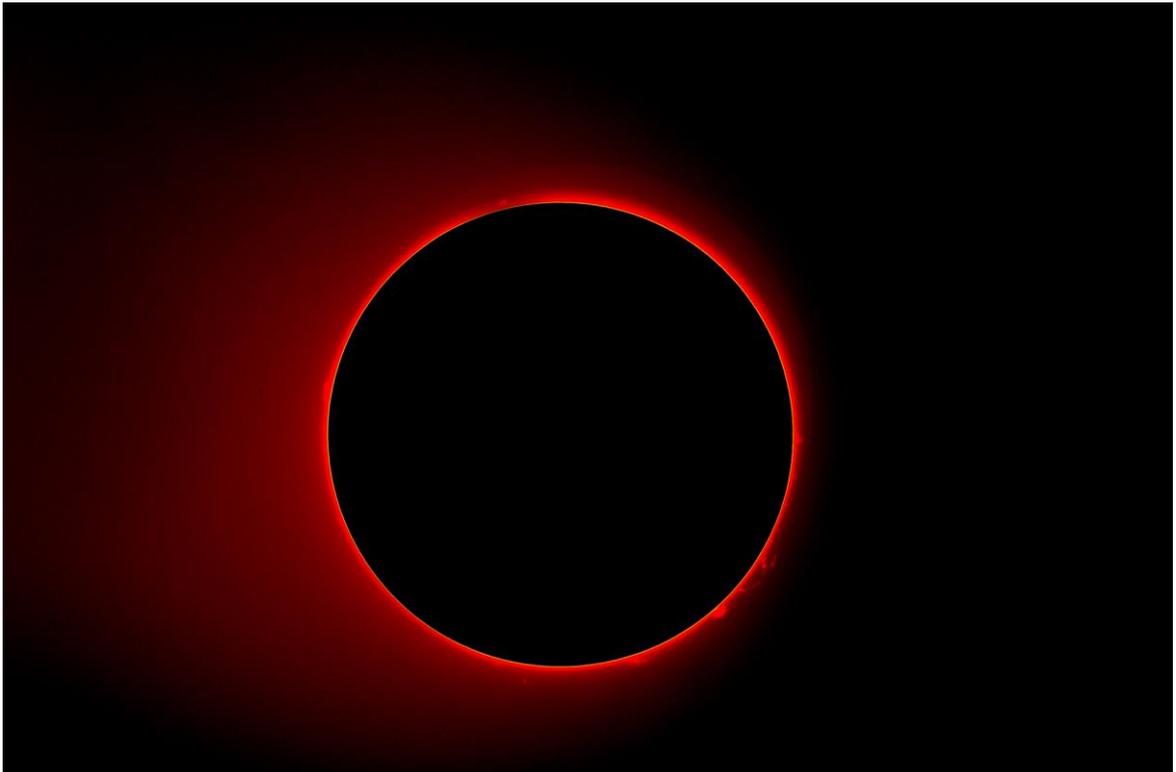
These two are from Graham Leaver - focal plane plus a 3x teleconverter, this time reducing the ISO to 100 rather than using 6400 ISO and a fast shutter speed and the exposure was 1.3sec to 1.6sec seemed to give the best image of the prominences etc. Seeing or the time of day or that it is Ha let me get away with the long speed.



This a combined one from Graham Leaver and Steve Ibbotson. Two merged into one.



This is with a Pentax and 2 x converter. == Thanks Graham.



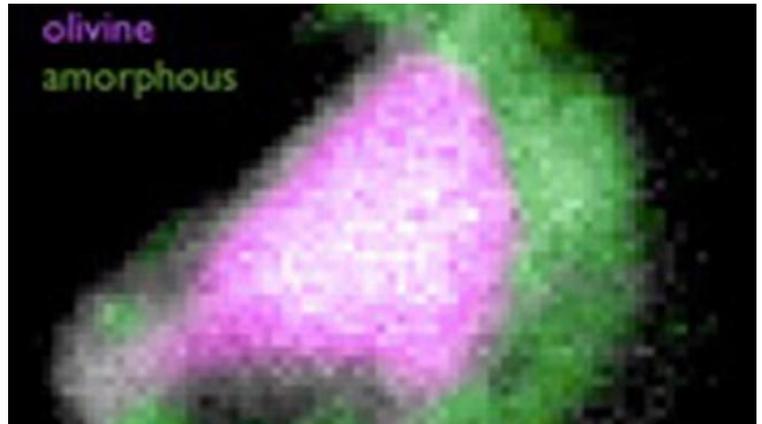
Things to see in September.....

- Tuesday 9th The Moon reaches its full phase 15 02:38. As this is the closest full Moon to the September equinox, which occurs on the 23rd, it is known as the Harvest Moon.
- Thursday 11th The Moon makes a close pass of Uranus this morning. At 2:10 the mag. +5.7 planet is just 4 arcminutes below the Moon's southern limb.
- Monday 15th Now is the time to start looking for comet C/2012 K1 Panstarrs which may be visible in Hydra low in the east as dawn breaks.
- Wednesday 17th The Andromeda Galaxy, M31, is about two-thirds of the way up the sky around midnight, just to the east of south.
- Saturday 20th Early risers will be greeted by the magnificent sight of the waning crescent Moon (14% lit) sitting a fraction under 6° south of mag. -1.7 Jupiter. Look east at 04:00.
- Sunday 21st The bright star visible to the left of the waning crescent Moon (8% lit) in the eastern sky this morning is mag. +1.4 Regulus, the brightest star in the constellation of Leo.
- Saturday 27th The waxing crescent Moon (11% lit) is 5.5° west of Saturn this evening. Spot the pair around 20:00 very low in the west-southwest.
- Sunday 28th Mars meets its rival – Antares. The star's name literally means 'Rival of Mars' and for good reason as its orange hue means it looks just like the Red Planet. The pair are 3° apart and of similar brightness.
- Tuesday 30th If you have never seen the Teapot asterism in Sagittarius before now is a good time. It is 15° to the left and slightly below the waxing crescent Moon (38% lit) this evening. Look for it just to the west of south a little after 20:00. (Sir Patrick could never get this one!).

ASTROSTUFF

'Stardust motes' carried to Earth

Seven visitors from outside the Solar System have been carried to Earth by a NASA spacecraft, scientists believe. If their identity is confirmed, it will be the first time scientists have ever caught and studied genuine motes of stardust. "They are very precious particles," said lead researcher Dr Andrew Westphal, from the University of California at Berkeley.



"Fundamentally, the solar system and everything in it was ultimately derived from a cloud of interstellar gas and dust. "We're looking at material that's very similar to what made our Solar System."

The American space agency Nasa's Stardust spacecraft was launched in 1999 to fly through the coma - the envelope of gas and dust - surrounding comet Wild-2. Using a "fly paper" technique, it was designed to catch cometary dust in tiles of soft aerogel separated by pieces of aluminium foil. A similar collector was placed on the rear of the probe to collect particles from streams of interstellar dust flowing through the galaxy. Both collectors were dropped by parachute and recovered after Stardust returned to Earth in 2006.

Volunteers with home computers known as "dusters" were invited to help the professionals scan more than a million dust-track images. The citizen science project, Stardust@home, proved critical to the needle-in-a-haystack search. Scientists identified just seven particles that were likely to have had an interstellar origin. Three either lodged or left traces within the aerogel while the remains of four others were found in pits in the aluminium foil. These particles were a tenth of the size of comet dust, measuring up to two thousandths of a millimetre across, and varied in composition. Some of the larger ones had a snowflake-like "fluffy" structure, said the researchers, writing in the journal Science.

"The fact that the two largest fluffy particles have crystalline material - a magnesium-iron-silicate mineral called olivine - may imply that these are particles that came from the disks around other stars and were modified in the interstellar medium," said Dr Westphal.

"We seem to be getting our first glimpse of the surprising diversity of interstellar dust particles, which is impossible to explore through astronomical observations alone." Three particles also contained sulphur compounds which some astronomers argue should not be found in interstellar dust. Describing the dust residues discovered in the foil, Dr Rhonda Stroud from the US Naval Research Laboratory said: "They were splattered a bit but the majority of the particles were still there at the bottom of the crater. "Their diversity was a surprise, but also these fluffy particles, sort of like a tossed salad, were complex, an agglomeration of other particles, rather than one dense particle suggested by the simplest models of interstellar particles."

Interstellar dust thrown out by exploding stars is believed to scatter the heavy elements necessary for life, such as carbon, nitrogen and oxygen, across the galaxy. In this sense, everyone on Earth is partly made from stardust.

FUN STUFF

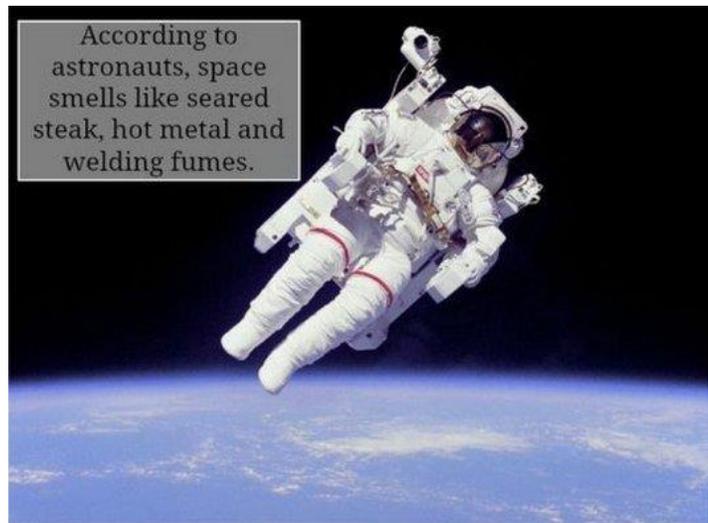
An astronaut about to go into space was asked by a reporter, "How do you feel?" "How would you feel," the astronaut replied, "if you were stuck up there, on top of 20,000 parts, each one supplied by the lowest bidder?"

Two aliens landed their ship on a golf course and watched a young man golfing. First he hit it into the high grass, mumbling and cursing he retrieved his ball. Then he hit it into the sand bunker, shouting curse words he retrieved the ball. Next he hit a perfect hole in one. The first alien then said to the second, "Uh-oh cover your ears he's going to be really mad now"!

Two astronauts were in a space ship circling high above the earth. One had to go on a space walk while the other stayed inside. When the space walker tried to get back inside the space ship, he discovered that the cabin door was locked, so he knocked. There was no answer. He knocked again, louder this time. There was still no answer. Finally he hammered at the door as hard as he could and heard a voice from inside the space ship saying. "Who's there?"

That's all folks.

Sue



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This newsletter is sent out to all present members without whom the Society could not survive. Also to previous members and people with an interest in astronomy in the hope that they may wish to join/re-join the Society.

If you no longer wish to receive this newsletter by e-mail please let us know. Thank you.