

Wadhurst Astronomical Society Newsletter October 2013

A SPECIAL MESSAGE

The Society has received a message from Peter Gill of the Eastbourne Astronomical Society with regard to the possible axing of the "Sky at Night" programme on BBC television! A copy of his email follows at the end of this Newsletter with a link to a petition.

MEETINGS

COMMITTEE MEETING

Members of the Committee are respectfully reminded that there is a meeting of the Committee at 1930 on Tuesday the 8th of October at Phil Berry's house.

As always, any member of the Society is welcome to come along, but please let Phil know before hand.

SEPTEMBER MEETING

Phil Berry opened the September meeting and said that for the first time the Society had to cancel the Astro-barbecue because of very heavy and persistent rain, but thanked Jim Cooper for all the work he had put into preparing for it after offering to hold the barbecue in his beautiful garden. We hope the weather will be considerably better next year.

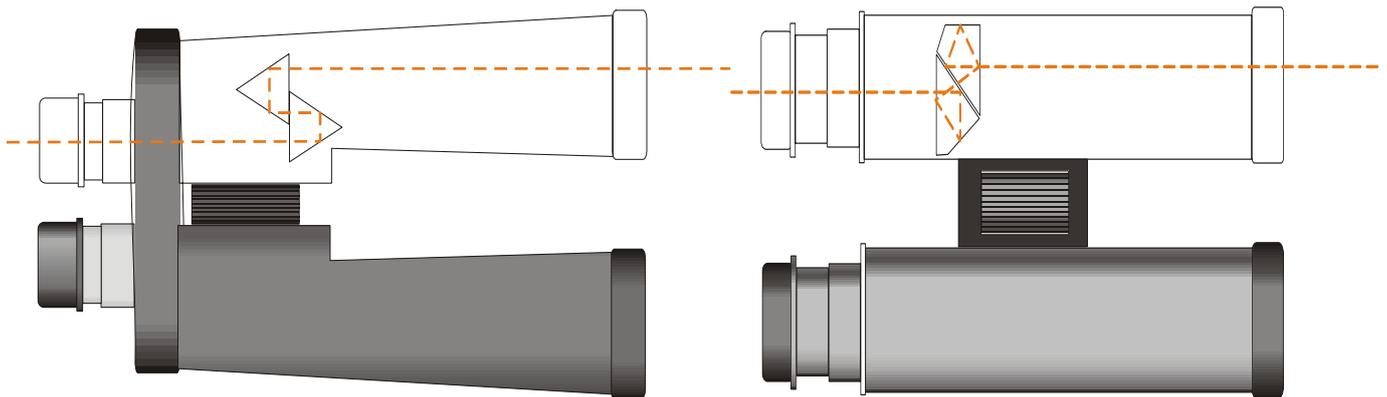
Phil then introduced our speaker for the evening. Stephen Tonkin is well known through his contributions to the Sky At Night magazine and he is also author of "Binocular Astronomy" of which the second edition has recently been published. Steve also presents a number of astronomical talks and gives tuition in astronomy, mathematics and physics. This evening he had come all the way from his home close to the New Forest.

Binocular Astronomy

Stephen Tonkin FRAS

Stephen began by saying that binoculars are a brilliant instrument for the beginner but added a warning to beware of false advertising and as an example showed a slide of a binocular advertisement that used a photograph of the Pleiades with the surrounding nebulosity which he said is something you would not see with binoculars.

Really, binoculars are just two telescopes joined together although they are not ideal for looking at the moon or planets. Their advantages are that they are portable and by using both eyes you have a clearer view than with just one eye by a factor of something like 1.4.



Porro prism binoculars on the left and Roof prism binoculars on the right

There are two main types; The Porro and Roof prism binoculars. In the former, each binocular contains two prisms. They don't have to be too accurately made and they are easy to maintain although they are bulkier and do loose collimation. Roof binoculars on the other hand need to be very accurately built, but they are lighter and compact. Stephen said that the best view of the stars he had ever experienced through binoculars was through a pair of 10 x 50 Swarovski Roof binoculars but costing around £1,800. The image was very crisp and clear although they did belong to a friend. Price for price though, Stephen considered that the best binoculars are going to be Porros.

Because Roof prism binoculars are straight through, the size of the object lens is limited whereas with Porro prism binoculars, the double prisms can separate the light paths much more allowing for larger object lenses to be used.

Stephen said that binoculars are quoted in two numbers; the first number representing the magnification and the second, the diameter of the object lens in millimetres. For steady viewing up to 8 x 40 binoculars can easily be held; 10 x 50 binoculars can be held by most people although it can help to keep your knuckles close in to your eye sockets whilst holding them and also having the straps around your arms and kept fairly taught to give greater stability.

15 x 70 binoculars can be held for brief periods although Stephen demonstrated the use of a mono pod to help. One of these mounts he showed had a ball joint that enabled different angles to be met more easily. Another mount rested on ones chest with the straps round your neck and the binoculars held on the end of the mount in a convenient position for looking through.

A large pair of 37 x 100 binoculars had been set up at the meeting but these were mounted on a tripod with an offset parallelogram mount. This had the advantage of having the tripod out to one side and not in the way of your feet and also enabled the binoculars to be directed to an object and remain so at different heights of the observer.

One really amazing mount was the "Star Chair". The observer is in a sitting position and uses a joy-stick to orientate themselves. These are from Australia and Stephen said that they would set one back a cool £6,000.



The Star Chair

We were shown comparisons of what can be seen in different sized binoculars, but one advantage of larger magnification binoculars is their greater contrast which is a huge advantage when there is a lot of light pollution about.

We now looked at certain considerations when buying a pair of binoculars, starting with their focusing. With most binoculars the focus control moves both eyepieces leaving one with further adjustment, but he said that unless they are very well made, they are going to change focus once pressure is applied when holding them up to the eye. With better binoculars each eyepiece is focussed independently.

Next, Stephen went into what to look for in the quality of the binocular prisms. The best prisms are quoted with a special identification number. It is worth considering prisms marked as BaK-4. They are made with Barium Crown glass with a very low bubble count. Beware of certain Chinese binoculars that quote BAK4 prisms because this is a much cheaper glass and the bubble count is not so low.

Lenses are often quoted as having a certain number of non-reflecting coatings. It is best to go with something like 7 multi-broadband coatings. This reduces internal reflections considerably at different wavelengths but we were given a warning to keep away from red coated lenses because Steve said these just cover up red chromatic aberration errors.

Covering the object lens with tracing paper and shining a green laser into the eyepiece, reveals a lot about the internal light paths inside the binoculars and also shows the prism cut-off. Steve also said that the manufacturing data in adverts is hardly ever correct and magnification is nearly always lower than stated but there is nothing better than looking through the binoculars to see for yourself if you are satisfied.

One problem with cheap binoculars is their mechanical manufacture. Some of the cheapest require re-collimating whenever they get knocked and we were shown what to look for if you are daring to re-collimated binoculars yourself.

Finally Steve suggested objects to look at through binoculars and said that he had developed his own website at: <http://binocularsky.com/>

On the website are not only charts telling you what to see but having entered your longitude and latitude, give details of what size binoculars are best for a particular object and there are also charts which help you to identify what you are looking at. The website also gives a great deal of other useful information such as what to look for when buying binoculars and even has a section on collimation.

Of course, there is also Steve's book "Binocular Astronomy". Publication Date: August 9, 2013 | ISBN-10: 1461474663 | ISBN-13: 978-1461474661 | Edition: 2nd ed. 2014

Brian Mills' talks for beginners – Jupiter

This was the eighth in his series of talks for beginners and this month we have reached Jupiter, the fifth planet from the Sun and just outside the asteroid belt which he talked about at the last meeting. It is also the largest of our planets.

Because of Jupiter's spin of just under ten hours it is flatter at the poles at 133,500 Km than at the equator where the diameter is 143,000 Km. Because of the low eccentricity of its orbit (0.049) the distance from the Sun varies from between 816,521,000 Km and 740,574,000 Km.

The planet is one of the gas giants and the surface at the equator makes a complete rotation in 9 hours and 50 minutes whereas near the poles it takes a little longer at 9 hours and 55 minutes. A year on Jupiter takes 11.86 Earth years but with a tilt of only 3.1° it has no seasons.

Brian then looked at the physical features of the planet. Although Jupiter is known as a gas planet it does become solid towards the core, so he said the atmosphere is regarded as starting at 10 bars and includes everything at a higher altitude.

The core is rocky metallic surrounded by metallic hydrogen. Brian said that metallic hydrogen is defined as hydrogen that is so compressed that it becomes electrically conductive. Above this layer is a thin layer of liquid and then gaseous hydrogen. The temperature ranges from about 125 Kelvin in the clouds to 20,000 Kelvin at the core. Jupiter's magnitude as seen from the Earth varies between -1.6 to -2.9 depending on the distance from us.

Jupiter - Facts and Figures

Diameter
Polar = 133,500 km
Equatorial = 143,000 km

Distance from the Sun
Aphelion = 816,521,000 km
Perihelion = 740,574,000 km
Orbital eccentricity = 0.049
Day on Jupiter = 9h 50m (equator)
9h 55m (poles)
Year on Jupiter = 11.86 years
Axial tilt = 3.1°

Atmosphere (base = 10bar)
75% Hydrogen, 24% Helium, 1% Methane, Ammonia, Hydrogen Sulphide and water.

Temperature range = 125k to 20,000k
Magnitude range = -1.6 to -2.9
Apparent size = 29.8" to 50.1"



Image of Jupiter by Damien Peach

Jupiter's clouds consist mainly of ammonia crystals, sulphur, phosphorous and hydrocarbons in a layer 50 Km deep but there are three distinct layers in constant flux creating some of the dark and light bands and zones we see. The most pronounced feature is the rotating Great Red Spot which has been known for 183 years although Brian said there is a possibility of it being at least 400 years old and is believed to sit at the top of the clouds. In size, it is about the same as the diameter of the Earth and it completes a rotation in something like 6 Earth days.

So far a total of 67 moons have been discovered. The first four moons were found by Galileo in 1610 and are known as the Galilean moons; Ganymede which is bigger than Mercury, Callisto, Io and Europa. In fact Brian told us that the mass of these four moons makes up nearly 100% of the total mass of Jupiter's moons. The planet does have a faint ring system first observed by Voyager 1 in 1979.

Finally Brian looked at the missions that have explored Jupiter.

Exploration of Jupiter

Pioneer 10 & 11	.....	1973/1974	First close ups of Jupiter and its moons. Studied magnetic field and atmosphere.
Voyager 1 & 2	.....	1979	Discovered ring system, several new moons. Revealed GRS as a giant rotating storm.
Ulysses	.....	1992	Made measurements of Jupiter's magnetosphere. (No cameras carried)
Cassini/Huygens	.....	2000	High resolution images.
New Horizons	.....	2007	Studied the inner and Galilean moons. Also the magnetosphere and ring system. Volcano on Io.
Galileo (orbital)	.....	1995 to 2003	Observed the Shoemaker-Levy impacts. Released a probe to study the atmosphere. Galileo itself was crashed into the planet.

Currently there is just one mission on its way to Jupiter and that is Juno launched in 2011 and due to arrive at the planet in 2016. It is intended to study the magnetic field, the magnetosphere and to try find out more about the core.

Brian then gave the sky notes for October which follow later in the Newsletter

OCTOBER MEETING

Wednesday 16th October 2013 – James Fradgely FRAS calls his talk “The Birth of the Solar System”. James has spoken to us previously and is well known for his entertaining and detailed approach to astronomical subjects.

Meetings begin at 1930 although members are invited to arrive anytime after 1900 as this is a good time to exchange ideas and discuss problems and also relax before the meeting.

The venue as always is held in the Upper Room of the Methodist Church at the east end of Wadhurst Lower High Street, opposite the entrance to Uplands College. (For those with SatNav – the post code is TN5 6AT)

Anyone is welcome but non-members are asked if they wouldn't mind contributing £2 towards costs.

FUTURE MEETINGS

Wednesday 20th November 2013 – Tony Roberts FRAS tells us about “The History of the Telescope up to 1960”

Wednesday 11th December 2013 – (the second Wednesday of this month only) Our Director of Observations, Brian Mills FRAS takes as his theme “The Star of Bethlehem”.

SKY NOTES FOR SEPTEMBER

Planets

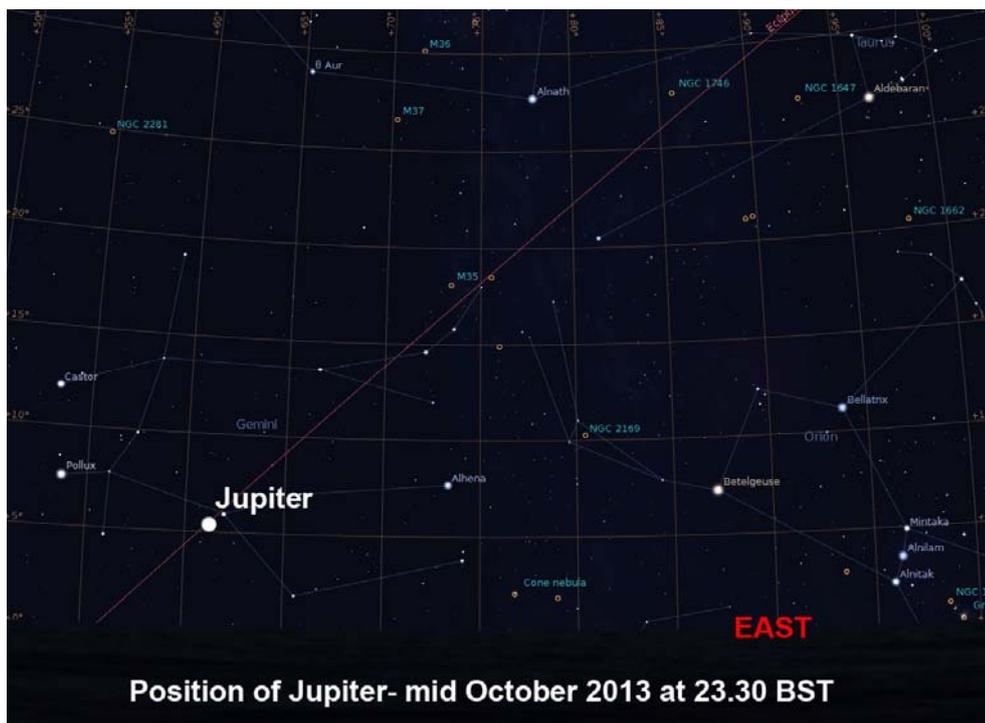
Mercury is an evening object and reaches greatest eastern elongation on October 9th. Unfortunately the planet is so low that it is effectively unobservable from the latitudes of the UK. In fact, on the day of elongation Mercury has already set at the end of civil twilight (Sun 6° below the horizon). Following this poor showing Mercury passes through superior conjunction on November 1st and moves west of the Sun to provide us with the best morning apparition of 2013.

Venus is a brilliant evening object but suffers the same altitude problem as Mercury although it has the advantage of being considerably brighter at magnitude - 4.2 compared to 0.0 for its smaller neighbour. The amount of the sunlit hemisphere (the phase) presented to the Earth decreases throughout the month whilst the apparent size increases. The diagram gives an indication of the variation in the size of Venus compared to phase. The planet reaches greatest western elongation on November 1st after which it begins to draw back towards the Sun. However because the angle that the ecliptic makes with the horizon is increasing, Venus becomes better placed for observation later in the year.



Mars is a morning object in Leo at magnitude +1.5. As the month begins it rises at 02.30 BST, but by the end of October this has become 01.30 GMT and the planet lies at an altitude of more than 35° with the Sun 6° below the horizon. As the year continues it gradually increases in both brightness and apparent size as it approaches opposition in 2014.

Jupiter



Jupiter is technically an evening object as October begins, rising just fifteen minutes before midnight BST. By the end of the month it rises at 20.45 GMT and is 30° high by midnight, with culmination (crossing the meridian) occurring just after 04.30 at a very respectable altitude of 60°. The map above shows its position, not far from the “Twins”, in the middle of the month at 23.30 BST. The planet increases in brightness slightly during October from -2.2 to -2.4 as it also approaches opposition in 2014. If you have binoculars do try and follow the nightly changes in the positions of the four Galilean moons - Io, Europa, Ganymede and Callisto.

Saturn is lost to view from the UK as it heads towards a solar conjunction on November 6th. It will reappear as a morning object in December although it will be mid February 2014 before it is once again visible in the evening skies.

Lunar Occultations

In the table below I've listed events for stars down to magnitude 7.0 that occur before midnight although there are many others that are either of fainter stars or occur at more unsociable hours. DD = disappearance at the dark limb. The column headed “mm” (millimetres) shows the minimum aperture telescope required for each event. **Times are in BST.** Please remember that the Society has telescopes that members can borrow, all of which are suitable for the following events.

Oct.	Time	Star	Mag.	Ph	Alt °	% illum.	mm
9 th	18.36	ZC 2456	6.3	DD	15	25	70
11 th	19.38	V4198 Sagittarii	6.3	DD	19	48	50
14 th	00.06	Nu Sagittarii	4.5	DD	13	72	40

Phases of the Moon for October

New	First ¼	Full	Last ¼
5 th	11 th	18 th	26 th

ISS Below are details of passes of the International Space Station (ISS) that occur before midnight and are magnitude -2.0 or brighter. The details of all passes including those visible from other areas can be found at:

www.heavens-above.com

Please remember that the times and directions shown below are for when the ISS is at it's *maximum* elevation, so you should go out and look a few minutes beforehand. **Times are in BST.**

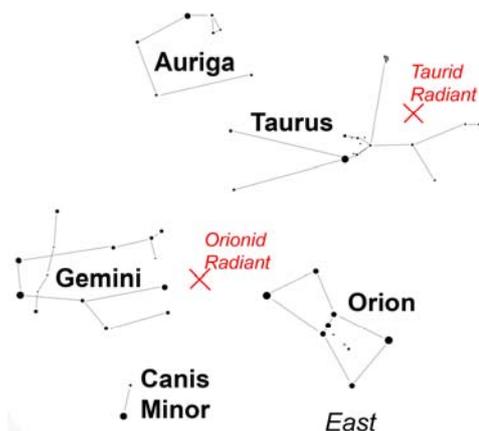
Oct.	Mag	Time	Alt°	Az.		Oct.	Mag	Time	Alt°	Az.
11 th	-2.6	19.58	38	SSE		18 th	-3.3	19.03	82	N
12 th	-2.0	19.09	27	SSE		19 th	-3.4	19.51	86	N
13 th	-3.3	19.57	66	SSE		20 th	-3.3	19.01	79	N
14 th	-2.9	19.07	49	SSE		21 st	-3.3	19.48	69	SSW
15 th	-3.4	19.55	88	N		22 nd	-3.3	18.59	85	SSW
16 th	-3.3	19.05	78	SSE		23 rd	-2.4	19.46	41	SSW
17 th	-3.3	19.53	78	N		24 th	-2.8	18.57	57	SSW

Iridium Flares

The flares that I've listed are magnitude -2 or brighter although there are a lot more that are fainter or occur after midnight. If you wish to see a complete list, or obtain timings for somewhere other than Wadhurst, go to www.heavens-above.com . Remember that when one of these events is due it is sometimes possible to see the satellite before and after the “flare”, although of course it will be much fainter at those times. **Times are in BST.**

Oct.	Time	Mag.	Alt°	Az°		Oct	Time	Mag.	Alt°	Az.
1 st	20.27	-3.4	53	115 ESE		19 th	19.06	-2.3	50	165 SSE
2 nd	20.21	-4.2	52	116 ESE		20 th	19.00	-2.7	49	164 SSE
8 th	19.54	-5.8	54	133 SE		25 th	18.23	-2.1	12	281 W
13 th	19.33	-3.1	53	149 SSE		25 th	18.38	-3.1	45	176 S
14 th	19.27	-8.2	53	151 SSE		26 th	18.08	-5.1	14	278 W

Meteors



The Orionids are active from October 16th to the 30th with a very long flat maximum that lasts from the 21st to the 24th when the zenithal hourly rate is expected to be around 25. Unfortunately we are unlikely to see those sorts of numbers for two reasons. Firstly, the radiant rises at 22.15 BST and culminates a little after 05.00 at an altitude of only 55°. Secondly, the waning Moon will be in the same region of the sky as the radiant around the time of maximum. This shower produces very fast meteors, many of which leave an ionised train behind them for several seconds so it is possible that some of them will beat the moonlight.

The Taurids begin whilst the Orionids are still at their peak, so there will be two active showers in the same area of the sky at the same time. The Taurids begin on October 20th and last until November 30th and are associated with debris left behind by comet Encke, a body that has an orbit lasting only three years, making it the shortest period comet that we know. Due to the comet having made many passes, the trail of dust left behind has become very diffuse resulting in a very lengthy shower with two separate maxima. As they both occur in November we will look at them again in the next Newsletter.

The Night Sky in October (Written for 22.00hrs BST mid month)

In the east we see that the harbinger of winter, the Pleiades, is now visible some 25° above the horizon. In fact all of Taurus has risen and with it Auriga which contains the brilliant Capella, the sixth brightest star in the night sky. It is in fact not a single star but a complex system made up of two pairs of binaries. One reason for its brightness is that it is comparatively close to us, being only 42 light years distant. Above Taurus and Auriga is Perseus with the lovely double cluster NGC 869 and NGC 884 that is so well seen in binoculars. Andromeda is riding high with the great spiral galaxy M31, now at an altitude of 65°. This is the most distant object visible to the naked eye and is a star system much larger than our own Milky Way, containing around one trillion stars.



The image of M31 above was taken by an amateur astronomer using a moderately sized telescope and CCD camera which brings out much more detail than can be seen with the naked eye.

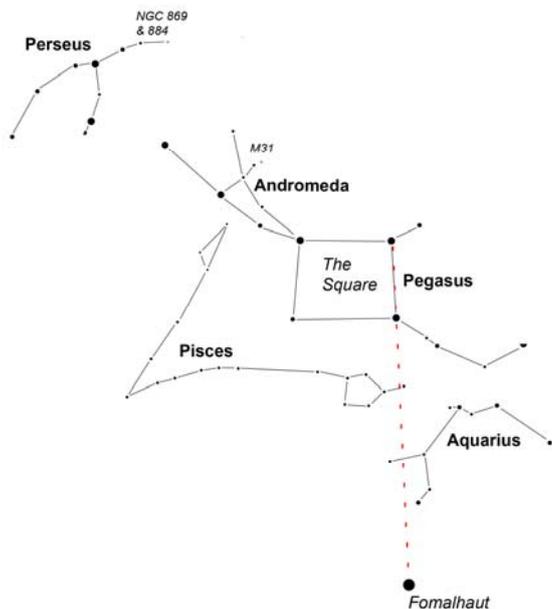
Looking South Pegasus is on the meridian, and below it lies one of the fishes in Pisces. The “head” of that particular fish is easy

to identify as it consists of five stars in the shape of an irregular pentagon, and is referred to as the “Circlet”.

A little lower is Aquarius (where Neptune currently resides) whilst lower still is the constellation of Pisces Austrinus (sometimes referred to as Pisces Australis) which is the Southern Fish. This contains the bright star Fomalhaut, the 19th brightest in the night sky and one that is easily located using the two most westerly (rightmost) stars in the Square of Pegasus. If you draw an imaginary line through them and continue it on towards the southern horizon you will reach Fomalhaut as shown in the diagram.

Turning to the west, we find the Summer Triangle still prominently displayed with Deneb in Cygnus almost due west and at an altitude of 70°. The other two members of that particular asterism (Vega and Altair) lie closer to the horizon and to either side of Deneb. The Milky Way runs through this area of the sky and is a superb sight when seen from a reasonably dark location. Hercules and Corona Borealis are both still visible but Boötes and the bright star Arcturus have set.

In the North the familiar shape of the Plough can be seen on the meridian and at it's closest to the horizon. On the opposite side of the celestial pole and close to the zenith is Cepheus with Cassiopeia just to its right (east). Draco, the Dragon, begins with its tail between the two bears and ends with its head close to the previously mentioned Hercules.



Comet C/2012 S1 (ISON)

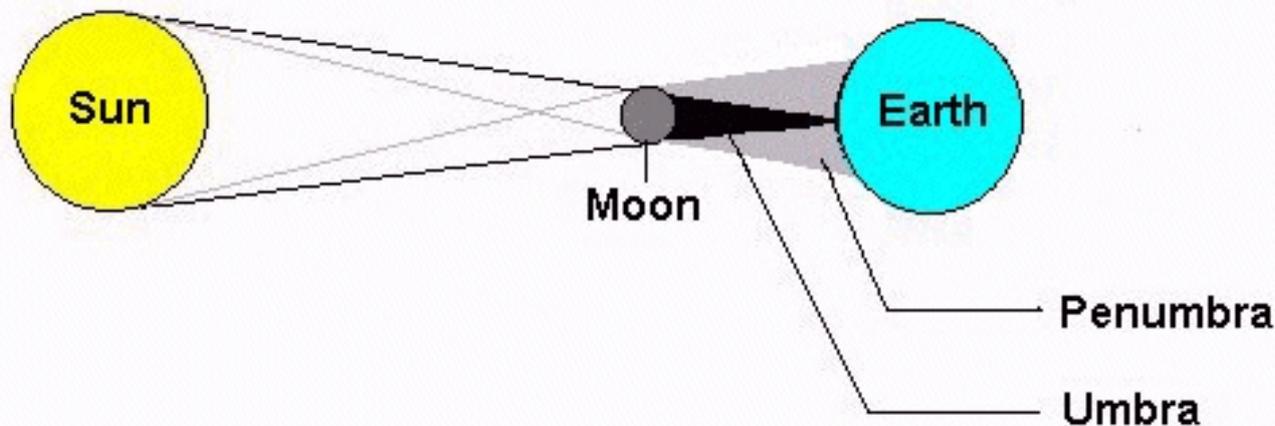
The wild predictions made only a matter of months ago about ISON being the “Comet of the Century” have now been downgraded considerably leaving us unsure of what we ought to expect. The current thinking is that by the end of October it should be around magnitude 9 as it continues to gradually brighten. It passes around the Sun on November 29th after which, providing it hasn't been ripped apart by the gravitational forces it encounters there, we hope it will be a naked eye object as it moves north. Of course everything that we know of comets tells us that pretty much anything could happen as was the case with comet Holmes a few years ago. In that case the comet brightened literally overnight and took it from obscurity to being an easy object for the amateur astronomer's DSLR. As I've said before, the orbits of these bodies can be calculated with extreme accuracy but their brightness is very much a case of wait and see. The positions given in the last Newsletter still apply.

Eclipses

There will be a penumbral eclipse of the Moon on October 18th/19th. The Earth enters the shadow at 22.51 BST and leaves the following morning at 02.50 BST with maximum immersion of 76% occurring at 00.51 BST. To the seasoned observer it may be apparent that the southern limb is darker, but a casual glance from members of the general public will reveal nothing untoward at all.

Far more unusual is the eclipse of the Sun that takes place on November 3rd, and although sadly there is no portion of it visible from the UK, parts of southern Europe will see a small partial. The event is unusual because at the time the Sun and Moon appear to be almost exactly the same size in the sky or in other words the umbral shadow only just touches the Earth's surface. In such cases

the curve of the Earth is enough to make the shadow fall short so that the Moon, instead of blotting out the Sun entirely, leaves a small annulus of sunlight remaining. This type of eclipse is known as a "Hybrid" because it is annular at one point and total at another. The track of central eclipse begins in the Atlantic and only makes landfall once it has reached the African coast of Gabon. It then passes over The Republic of Congo, The Democratic Republic of Congo and Uganda before concluding close to the Ethiopia/Somali border. Greatest eclipse occurs at 13.46 BST when totality will last for just one minute and forty seconds.



Although we will see nothing from the UK we will have an observer, our Secretary Phil Berry, in place aboard a cruise ship stationed on the eclipse track who we hope will be rewarded with not only a clear sky but also the presence of mind to remove the filter from his camera at the moment of totality. Totality can last for a maximum of 7.5 minutes depending upon the positions of the bodies involved, so just over 1.5 minutes doesn't leave much room for error. We look forward to seeing some stunning images on Phil's return.

BST Ends

Don't forget that British Summer Time ends on Sunday October 27th at 02.00 and clocks go back by one hour.

Brian Mills

NASA SPACE PLACE

How to hunt for your very own supernova!

By Dr. Ethan Siegel

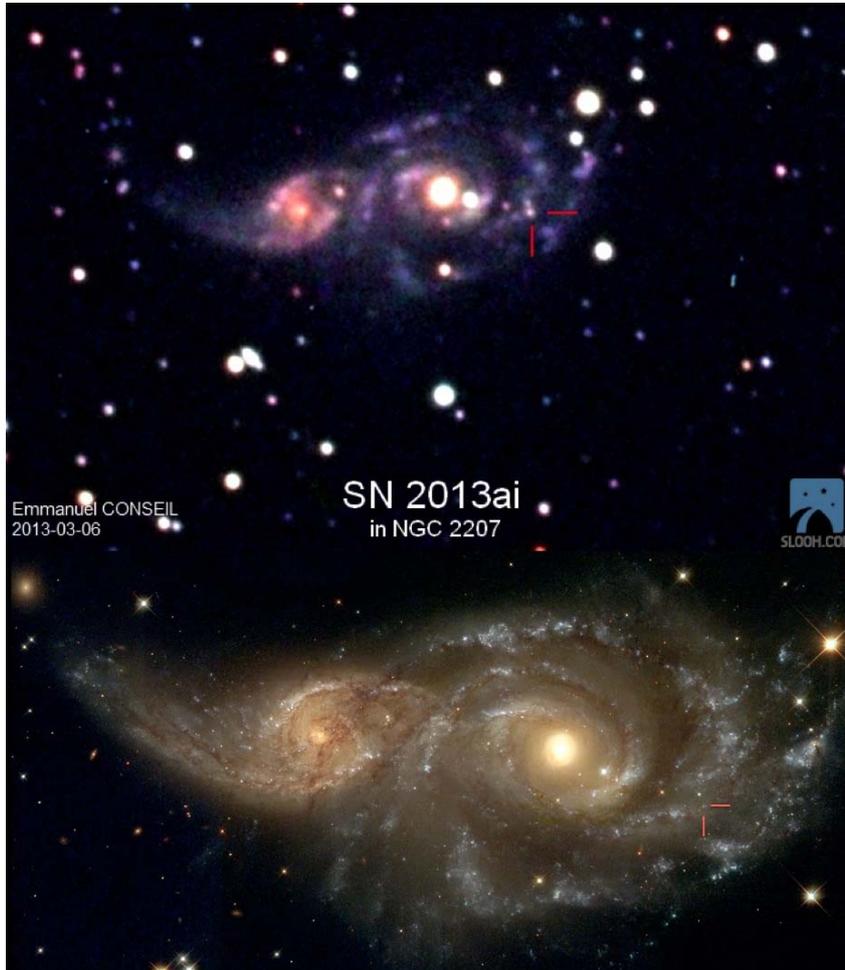
In our day-to-day lives, stars seem like the most fixed and unchanging of all the night sky objects. Shining relentlessly and constantly for billions of years, it's only the long-term motion of these individual nuclear furnaces and our own motion through the cosmos that results in the most minute, barely-perceptible changes.

Unless, that is, you're talking about a star reaching the end of its life. A star like our Sun will burn through all the hydrogen in its core after approximately 10 billion years, after which the core contracts and heats up, and the heavier element helium begins to fuse. About a quarter of all stars are massive enough that they'll reach this giant stage, but the most massive ones -- only about 0.1% of all stars -- will continue to fuse leaner elements past carbon, oxygen, neon, magnesium, silicon, sulphur and all the way up to iron, cobalt, and, nickel in their core. For the rare ultra-massive stars that make it this far, their cores become so massive that they're unstable against gravitational collapse. When they run out of fuel, the core implodes.

The intruding matter approaches the centre of the star, then rebounds and bounces outwards, creating a shockwave that eventually causes what we see as a core-collapse supernova, the most common type of supernova in the Universe! These occur only a few times a century in most galaxies, but because it's the most massive, hottest, shortest-lived stars that create these core-collapse supernovae, we can increase our odds of finding one by watching the most actively star-forming galaxies very closely. Want to maximize your chances of finding one for yourself? Here's how.

Pick a galaxy in the process of a major merger, and get to know it. Learn where the foreground stars are, where the apparent bright spots are, what its distinctive features are. If a supernova occurs, it will appear first as a barely perceptible bright spot that wasn't there before, and it will quickly brighten over a few nights. If you find what appears to be a "new star" in one of these galaxies and it checks out, report it immediately; you just might have discovered a new supernova!

This is one of the few cutting-edge astronomical discoveries well-suited to amateurs; Australian Robert Evans holds the all-time record with 42 (and counting) original supernova discoveries. If you ever find one for yourself, you'll have seen an exploding star whose light travelled millions of light-years across the Universe right to you, and you'll be the very first person who's ever seen it!



SN 2013ai, via its discoverer, Emmanuel Conseil, taken with the Slooh.com robotic telescope just a few days after its emergence in NGC 2207 (top); NASA, ESA and the Hubble Heritage Team (STScI) of the same interacting galaxies prior to the supernova (bottom).

Read more about the evolution and ultimate fate of the stars in our universe:
<http://science.nasa.gov/astrophysics/focus-areas/how-do-stars-form-and-evolve/>.

While you are out looking for supernovas, kids can have a blast finding constellations using the Space Place star finder:
<http://spaceplace.nasa.gov/starfinder/>

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

HELP PREVENT THE AXING OF THE “SKY AT NIGHT”

The following is a copy of an email received from Peter Gill of the Eastbourne Astronomical Society:

Dear all,

Please see:

<http://www.change.org/en-GB/petitions/the-bbc-please-do-not-axe-the-sky-at-night>

...I hope you don't mind my alerting you to this, but it's something that I thought you should be aware of (if you're not already). The campaign has been running for just over 24 hours, yet the petition has already received over 5000 'signatures'

My own feelings on this are not wholly positive, as I have indicated in my statement on the website, namely:

'The Sky At Night' is a unique programme with a pedigree unrivalled by anything else. While it has lost something of its 'personal' touch since the introduction of a plethora of presenters, it still fulfils an important role in catering for the increasing number of people interested in astronomy. Patrick used modestly to say that the programme had survived for so long because by being broadcast once a month late at night it didn't 'get in the way' of anything else. I am appalled that axing it should even be considered and hope that the powers that be come to their senses!'

But while I think improvements could be made to the current format of the programme, it would be a great shame if it were to be axed.

With all very best wishes,
The Eastbourne Insomniac

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Wadhurst Astronomical Society website:
www.wadhurstastro.co.uk

SAGAS web-site www.sagasonline.org.uk

Any material for inclusion in the November 2013 Newsletter should be with the Editor by October 28th 2013