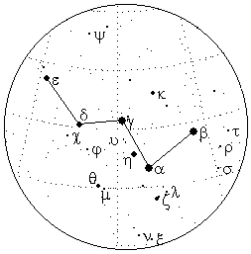


Wadhurst Astronomical Society Newsletter December 2009 Issue

MEETINGS

COMMITTEE MEETING

Members of the Committee are respectfully reminded that there is a meeting of the Committee on January 12th 2010 starting at 1930 at Phil's house.

Any member of the Society is very welcome to attend but please let Phil Berry know before hand.

NOVEMBER MEETING

The meeting on Wednesday the 17th of November 2009 was opened by Phil Berry who thanked those members who had returned the questionnaire asking members what they thought of the present format of the meetings and how they would like to see them in the future.

Phil also announced that there was to be an autumn Moon Watch at his house on Friday the 27th of November. There is a report on this later in the Newsletter

Jan Drodz had recently been to the Science Museum at South Kensington in London to see an exhibition called "Cosmos and Culture – How astronomy has shaped the world". It is open until the end of December. He said that although a small exhibition it was well worth seeing and of course there is also the permanent Space gallery and another gallery specialising in instruments including important exhibits such as Newton's reflecting telescope and an early orrery. The exhibition is free.

Iridium Flares

A talk by Phil Berry

Each month, Brian Mills provides a table of Iridium Flare predictions in the Newsletter. These are often extremely bright flashes that last only seconds but are quite impressive; they are also quite puzzling if one is not aware of their existence. Phil Berry felt it would interest members to learn more about them.

He began with a slide of what could be the very first image that included an Iridium Flare, taken by chance. But what causes them?

The story begins with a communications company called Motorola, started in 1928. It was a Motorola Transponder that relayed the first words from the surface of the moon in July 1969 during the Apollo 11 lunar mission. They were a very successful company.

In 1973 Dr. Martin Cooper, a former general manager, made the very first portable analogue telephone phone call.

Although a great step forward in telephonic communication, coverage was poor, and it wasn't long before Motorola had visions of a global network. In the 1960s the satellite industry had begun and Motorola were soon familiar with Low Earth Orbit satellites through their military contracts. This was where they planned to place their network of satellites.

Phil cleared up the question of the network's name by telling us that the atomic number of the element Iridium is 77 and the original number of satellites needed to cover the Earth was 77. This later was reduced to just 66 but Dysprosium didn't really roll off the tongue in quite the same way, so the original name stayed.

Sadly, from the time of conception, it took 12 years to become operational and by then other systems were available and Iridium was a financial disaster with a data rate of just 2.4 kb/s with bulky and expensive handsets.

But the system could be accessed from anywhere in the world; the middle of the desert, at the poles (since the orbits were polar) and from the middle of the oceans.

Phil took us through the manufacture of the Iridium satellites, particularly at the shape and surface of the main antenna, to which he was going to refer to later.

Each satellite was being assembled in something like three weeks compared with today's geostationary craft that can take up to 3 years to complete.

Every three sided satellite is only about 4 metres long and incorporates a gyroscope to keep the craft facing the Sun from where it gains its power. When on the night side of the Earth it uses star guidance.

The main reason for satellite failure is gyroscope malfunction, and Phil told us that there are a number of spare satellites in orbit at any one time and a malfunctioning one is replaced by a new one and the old one sent into a trajectory which results in burning up and destroyed.

The Proton rockets launched up to five satellites at a time and they would then be released into their approximate orbit, finally being corrected by tiny jet motors using hydrazine propellant. There is 253 lbs of fuel on each satellite and during its life tiny corrections are occasionally needed, but when this is used up, the satellite's life is over.

The satellites operate in 6 equally spaced polar orbits with 11 in each plus spares, and each orbits the Earth in 100 minutes. Each satellite is cross-linked with four other satellites; two in the same orbit.

Each satellite uses 48 spot beams to give an overlapping footprint of 2,800 miles in diameter.

Phil described the satellite's construction and showed the various antennae required to communicate with and control them. He also included statistics that showed just how accurately each satellite was orientated.

The coverage was global and much more important, communication at the poles was now possible, but as Phil went on to explain, the company hadn't really done enough market research and prospective customers found the costs prohibitive with the result that the company went bust.

The system was rescued mainly by the American Department of Defence who found it possible to communicate with the centre of the battlefield at all times despite the restriction of data speed.

Finally Phil went on to explain how it is possible to predict the reflection of the Sun off the main mission antennae, The precise positioning of each satellite meant it was now possible to calculate not only the time of an Iridium Flair for any point on the Earth's surface, but also how bright it is likely to be.

Today, this information is available free through the "Heavens Above" website at:
www.heavens-above.com

We were shown how to create a new user account on the website by calling up the "New User" dialogue box and completing the required fields, one of which asks for the precise

coordinates and altitude of your location, then hitting the Submit button.

Phil demonstrated the use of Heavensabove to predict Iridium Flairs. Not only will the site predict events to be seen from your location, but there is also a facility that tells you in which direction you might need to travel to see the flair at its brightest.

The faintest star that can be seen with the naked eye has a magnitude of up to +8 and the Sun has a magnitude of -26. Venus can have a magnitude of about -5. Iridium flairs can reach a magnitude of -9 making it a possible daylight event!

During his fascinating talk Phil related one story of an Iridium satellites being hit by a Russian COSMOS satellite with an impact speed of 26,000 miles an hour on February the 10th 2009!

The debris from the collision now circles the Earth and at least 500 pieces are still tracked by NASA but there is a considerable amount of "shrapnel" up there although at present there is little threat to the International Space Station.

Following Phil's talk, there was a short talk about Finder Scopes. The talk is shown under "Other News and Information".

DECEMBER MEETING

Wednesday 16th December 2009 - Paul Treadaway is giving another of his talks, this time called "Building the T200".

He will be talking about the 400th anniversary of the telescope; how the Newtonian telescope works and he will be giving some notes on mirror grinding, testing and figuring.

He will also be talking about telescope making.

Being the month of Christmas, there will also be the seasonal mince pies to go with our coffee.

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 relax before the talk.

The venue as always is 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)

FUTURE MEETINGS

Tuesday 12th January 2010 – There will be a meeting of the Committee from 1930 at Phil's as mentioned earlier in the Newsletter.

Wednesday 20th January 2010 – Jan Drodz is a member of the Society and has spoken to us about the Environment and how the World's survival as we know, it relies on our care. This time he returns to talk about "Jan and His Instruments".

This is also the Society's Annual General Meeting and all are welcome.

Wednesday 17th February 2009 – Details to follow

OTHER NEWS AND INFORMATION

TELESCOPE FINDERS

Having settled on a particular telescope, it is going to be necessary to locate objects in the night sky. Nowadays many telescopes are computer driven and if the name of the object is known, it is only a question of telling the telescope where to look. But in more general terms we need to know how to find objects quickly and easily without the direct aid of a computer.

The simplest and cheapest method is to use homemade cross-hairs and a sight to look through and align with the object.

Head-up finders use a reflex method, again using no magnification. Here the observer looks at the object through a glass sloping at 45 degrees and on to the glass is projected a red dot from a variable intensity LED. Providing the telescope has been previously lined up with the finder, the object should be in the centre of the telescope's view.

The TelRad also uses a reflex system but a group of concentric red rings is superimposed on the glass instead of a red dot. The inner ring marks ½ º of the sky, the middle ring marks 2 º and the outer ring, 4 º.

In a reflex system, it is arranged optically that the dot or rings are in focus when the eye is focussed on the distant object at virtual infinity.

These three finders have real orientation and don't reverse the view ad is as the eye views the sky.

As the telescopes magnification is increased it is going to be necessary to locate objects more and more precisely.

This is done using a finder telescope with a wide angle of at least 5 degrees and low magnification of at least 7 times. If the target star is low magnitude it may well be that the finder needs to have something like a 60 to 80 mm objective lens. Using a refracting finder usually means that the orientation is reversed, but then that I usually the same as the astronomical telescope itself. The cross hairs can often be illuminated at night, with the ability to vary their brightness, making the finder scope even more useful.

It is quite common to use a reflex finder for general location and then a refracting finder with higher magnification to refine the position of the target and be more precise.

When lining up the finder with the telescope, it is better to start in daylight with a distant easily recognisable object such as a television aerial at least two hundred yards away and then repeating the alignment on an object as far away as possible. The moon in daytime is good but Venus is even better if it is visible because of its size.

Once it is dark, a bright star enables a more precise alignment to be made This should now be accurate enough for most purposes although it is a good idea to make sure that the finder and telescope remain in alignment when looking in all directions. This identifies errors caused by mountings left too loose.

Green laser pens are becoming more available, although their misuse is causing some concern. They are ideal for pointing out stars, nebulae and galaxies to small groups of observers. The laser illuminates any particle in its path making the beam visible along its length which can reach several miles.

By pointing the laser at the target object is often good enough for an adjacent telescope to locate the same area of the sky to quite a close approximation. Some amateurs have mounted a green laser to their telescope and after lining it up can use it to quickly aim at certain objects. This also helps nearby observers to see what area of the sky the telescope is looking.

One word of warning! At present there is no legislation in the UK governing the ownership of green lasers but their misuse by irresponsible people probably means that they may well be outlawed one day in the not too distant future.

Geoff Rathbone

AUTUMN MOON-WATCH

On Friday the 27th November 2009 the Society held its Autumn Moon-watch, hosted by Phil Berry and his wife Nicky in their garden. It was attended by both Society members and local residents. We were also delighted to see interested people from Uplands College.

There were several telescopes including the Society's "Ian Reeves" telescope, and Phil had coupled a digital camera to

one of the telescopes in his dome and arranged for it to be projected live onto a screen.

Sadly Jupiter was behind cloud but the moon cleared to give very clear views. The moon was just over half full so the terminator revealed a number of conspicuous craters.

Phil had provided a pair of stabilised binoculars looking down onto a surface-coated mirror which made observing the sky very comfortable although the image was inverted.

On the occasions that the moon was obscured by cloud, the projector showed a software programme that allowed the user to identify features on an image of the moon and also providing details and data.

There were a number of Astro-photographs, a working orrery built by Phil, and a TV monitor showing continuous pictures and descriptions of the story of space and the night sky.

Despite the cold evening, we were well looked after with gallons of warm soup, fresh bread and plenty to keep one well fed.

Many thanks Phil and Nicky for a well organised event.

SUBSCRIPTIONS 2010

Come January, we enter a new session of the Society, and again, the subscriptions remains the same as in recent years. Membership for the year is still £15.00 and £20 for two members within the same family. Children and students are free and always welcome.

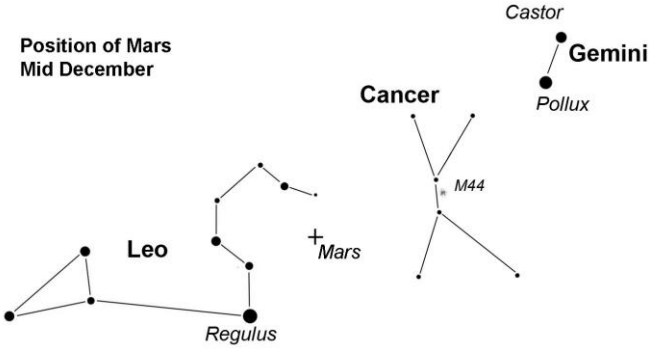
SKY NOTES FOR DECEMBER

Planets

Mercury reaches its greatest eastern elongation on the 18th, but will be very low down in the south west setting just an hour after the Sun. **Never** sweep the horizon in search of Mercury until the Sun has set. In 2010 the planet's best evening showing will be during March/April whilst it will be best in the morning during September/October.

Venus is still a morning object but is moving rapidly into the solar glare. At the beginning of December Venus rises only 45 minutes before the Sun and will be lost to view as it approaches superior conjunction on January 11th. The planet is well placed during a large part of 2010 being visible for three hours after sunset during May/June.

Mars lies in the constellation of Leo at magnitude -0.4 although it is gradually brightening and it's apparent diameter is increasing. At the middle of the month it rises at just after 20.00hrs and can be found in the position shown close to the "sickle" of Leo. On March 20th the planet is briefly stationary before it begins to move retrograde (east to west).



Jupiter is visible in the early evening at magnitude -2.2 in Capricorn and is still easily the brightest object in the south/south western sky. However it is moving slowly towards a conjunction with the Sun on February 28th so the opportunities for observation are gradually decreasing. At the end of December Jupiter will have set by 20.00hrs.

Saturn lies in the constellation of Virgo at a magnitude of +0.9 although it is brightening slowly. It is still technically a morning object although by the end of the month it will rise just before midnight.

Lunar Occultations

As usual in the table I've only included events for stars down to around magnitude 7.5 that occur before midnight. DD = **d**isappearance at the **d**ark limb and RD = **r**eappearance at the **d**ark limb. **Times are all GMT.**

Dec.	Time	Star	Mag.	Ph	PA °
1st	17.37	SAO 76366	7.4	DD	106
1st	19.51	GSC01814 01648	5.7	DD	74
1st	19.52	SAO 76425	5.5	DD	74
4th	21.51	SAO 79294	3.5	RD	293
19th	16.56	SAO 163445	5.3	DD	61
23rd	23.07	SAO 128188	6.3	DD	61
23rd	23.14	SAO 128186	4.9	DD	22
23rd	23.21	GSC00578 01213	4.9	DD	5
28th	16.35	SAO 75945	6.2	DD	47
28th	20.45	SAO 76029	6.7	DD	94

Phases of the Moon

Full	Last ¼	New	First ¼
2nd	9th	16th	24th
31st			

ISS

There are no suitable evening passes of the ISS this month with all those as seen from Wadhurst taking place in the early hours of the morning. Due to sunrise occurring at just after 08.00 by the end of December it is possible to see the ISS in

the morning before the sky is fully bright. Details of all passes can be found at:
www.heavens-above.com

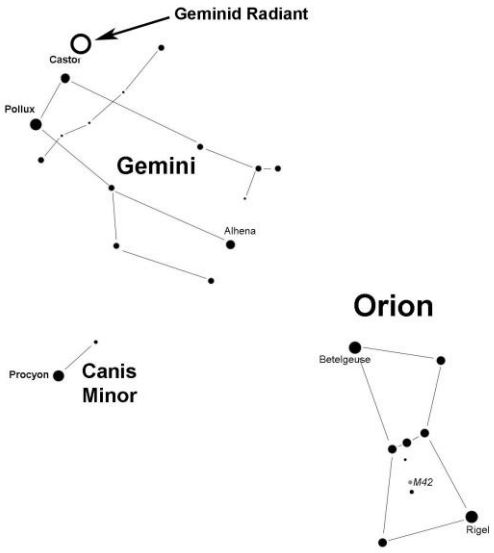
Iridium Flares

The flares that I've listed are magnitude -3 or brighter. The events where the magnitude is predicted to be -8 or -9 should be spectacularly bright. The two events on Christmas day should be interesting as they occur in the same part of the sky but only 40 seconds apart, with satellites Iridium 90 and 96 being responsible. There are many more flares that are fainter, occur at lower altitudes and also after midnight. If you wish to see a complete list, go to www.heavens-above.com **Times are all GMT.** Remember that when one of these events is due it is often possible to see the satellite in advance of the "flare", although of course it will be much fainter at that time.

Dec	Time	Mag	Alt°	Az.
6th	16.39	-8	68	ENE
7th	16.33	-5	70	ENE
8th	16.27	-8	70	ENE
10th	18.16	-8	45	NE
14th	17.55	-3	51	NE
15th	17.49	-3	51	NE
15th	17.50	-9	53	NE
16th	17.43	-4	53	NE
20th	17.24	-9	60	NE
24th	17.03	-3	65	ENE
25th	16.57	-3	64	ENE
25th	16.57	-5	67	ENE
31st	18.25	-3	44	NNE

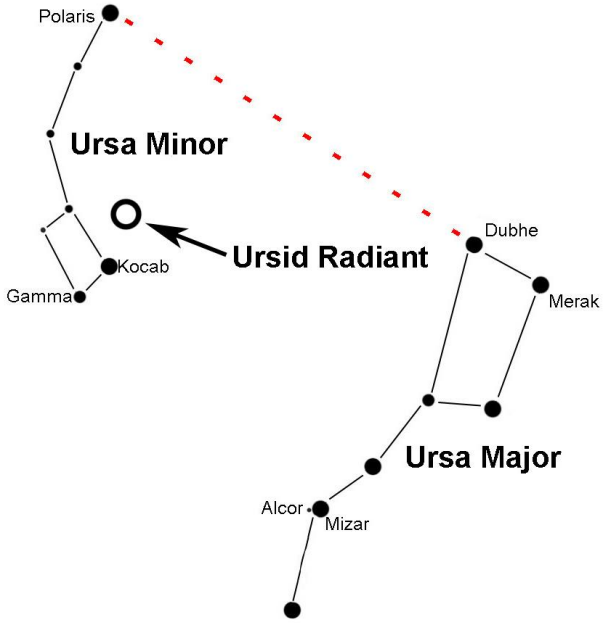
Meteors

1. The Geminids.



This Geminid shower is active from the 7th to the 16th of December with maximum occurring on the night of the 13th/14th and unusually the Moon will not be a problem this year. The shower is associated with an asteroid rather than more normally with a comet so the type of debris left behind lends itself to more leisurely entry speeds and thus the meteors are visible for longer. Predictions of rates vary but most seem to suggest a ZHR of 100 to 120. Because the maximum is spread over quite a long period it is very likely that rates will be high on the nights before and after the 13th/14th. The position of the radiant (the point that meteors appear to radiate from) is shown in the map above and rises in the late afternoon.

2. The Ursids.



The Ursids run from December 17th to the 25th with the maximum occurring on the 22nd (when the Moon will have set by 22.45 so won't interfere too much). A ZHR of around 10 to 12 is anticipated, and it's always worth a look in case there are outbursts like the ones in 1982 and 1986.

Partial Lunar Eclipse

On the evening of December 31st there is a partial eclipse of the Moon where only 8% of the disc is covered by the Earth's shadow. The event lasts from 18.52 until 19.54 with maximum coverage occurring at 19.23 and will be seen as a small "chunk" missing from the southern edge of the Moon.
When a lunar eclipse occurs the Moon will always be full. This month there are (as you can see from the above table) two full Moons - the extra one being termed a "blue Moon".

Brian Mills

NASA'S SPACE PLACE

A Cosmic Crash
by Patrick Barry and Dr. Tony Phillips

Two small planets hurtle toward each other at 22,000 miles per hour. They're on a collision course. With unimaginable force, they smash into each other in a flash of light, blasting streams of molten rock far out into space.

This cataclysmic scene has happened countless times in countless solar systems. In fact, scientists think that such collisions could have created Earth's moon, tilted Uranus on its side, set Venus spinning backward, and sheared the crust off Mercury.

But witnessing such a short-lived collision while pointing your telescope in just the right direction would be a tremendous stroke of luck. Well, astronomers using NASA's Spitzer space telescope recently got lucky.

"It's unusual to catch such a collision in the act, that's for sure," said Geoffrey Bryden, A cosmic Crashspitzer_an astronomer specializing in extrasolar planet formation at NASA's Jet Propulsion Laboratory and a member of the science team that made the discovery.

When Bryden and his colleagues pointed Spitzer at a star 100 light-years away called HD 172555, they noticed something strange. Patterns in the spectrum of light coming from nearby the star showed distinctive signs of silicon monoxide gas — huge amounts of it — as well as a kind of volcanic rock called tektite.

It was like discovering the wreckage from a cosmic car crash. The silicon monoxide was produced as the high-speed collision literally vaporized huge volumes of rock, which is made largely of silicon and oxygen. The impact also blasted molten lava far out into space, where it later cooled to form chunks of tektite.

Based on the amount of silicon monoxide and tektites, Bryden's team calculated that the colliding planetary bodies must have had a combined mass more than twice that of Earth's moon. The collision probably happened between 1,000 and 100,000 years ago — a blink of an eye in cosmic terms.

The scientists used the Spitzer space telescope because, unlike normal telescopes, Spitzer detects light at invisible, infrared wavelengths.

"Spitzer wavelengths are the best wavelengths to identify types of rock," Bryden says. "You can pin down which type of rock, dust, or gas you're looking at."

Bryden says the discovery provides further evidence that planet-altering collisions are more common in other star systems than people once thought. The "crash-bang" processes at work in our own solar system may indeed be universal. If so, Spitzer has a front row seat on a truly smashing show.

See Spitzer Space Telescope's brand new Web site at: http://spitzer.caltech.edu/.

Kids can learn about infrared light and see beautiful Spitzer images by playing the new Spitzer Concentration game at http://spaceplace.jpl.nasa.gov/en/kids/spitzer/concentration.

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

Caption:
Artist's rendering of cosmic collision involving two objects whose combined mass was at least twice that of our Moon. Discovered using the Spitzer Space Telescope in the planetary system of a star called HD 172555 100 light-years away.

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SAGAS web-site www.sagasonline.org.uk

Any material for inclusion in the January 2010 Newsletter should be with the Editor by 28th December 2010