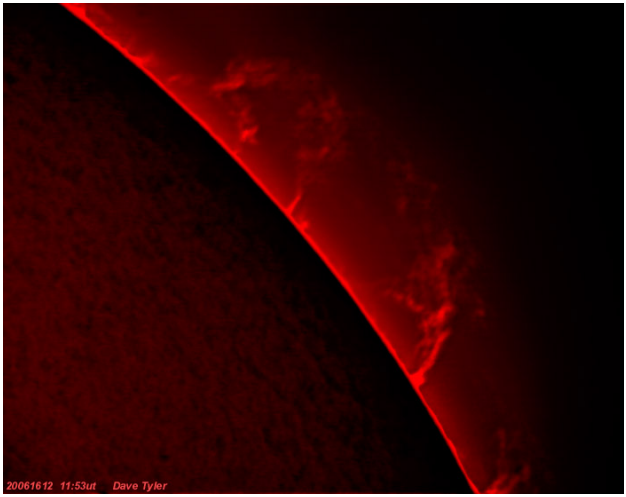


Solar prominence on the 16th Decemeber 2006. Dave Tyler

# Urania

Herschel
Astronomical Society
Journal

# February 2007

www.herschel-astrosoc.co.uk

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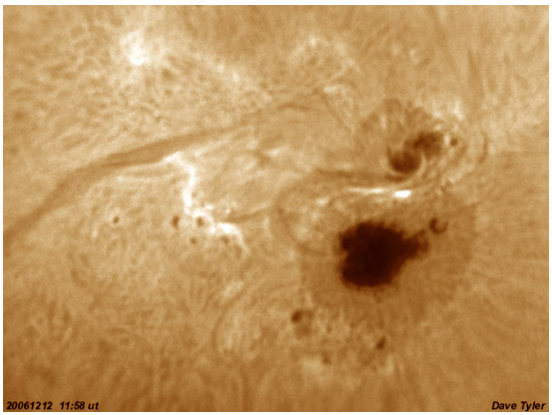


Sunspot 0930 on the 12th December 2006. Dave Tyler

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***Subscriptions*** *£12 per family*
***Meetings*** *Sep - May, 7.45 pm, 2nd Friday of each month*
*Marten Building, Common Lane, Eton College*

**HAS Programme 2006/2007**
**7.45 pm Marten Building, Common Lane, Eton College**

| Date | Lecture | Speaker |
|---|---|---|
| Sep 8 | Solar Eclipse | Chris Law & Ian |
| Oct 13 | Sci Fi to Sci Fact<br>Digital Photography<br>Van Allen Belts | Peter Sell<br>Chris Hall<br>Chris Law |
| Nov 10 | William Herschel | Brian & Ian |
| Dec 9 | Christmas Party | At Ian's |
| Jan 12 | The Glory of Star Clusters | Guy Hurst |
| Feb 9 | Saturn Cassini - Details of the satellites | Gerry Workman |
| Mar 9 | The Sun - a model star? | Chris Law |
| Apr 13 | Intelligent Life | Barrie Jones - Open University |
| May 11 | AGM | |

## Dates For Your Diary

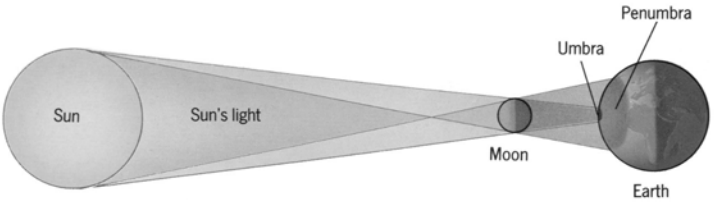
| | |
|---|---|
| 9th/10th February | Astrofest - Kensington Town Hall, Hornton Street, London. www.astronomynow.com/astrofest. Doors open 9am - 6pm. |
| 3rd March | Total Eclipse of the Moon, totality begins at 22:43 and ends at 23:58. |
| 23rd-25th March | Public viewing at Observatory - subject to confirmation by Eton College. |

## Meeting Summaries

### 8th September 2006
### March 2006 Solar Eclipse - Chris Law and Ian Bruce

This talk was opened with the question: When was the last Eclipse? It was quite apt that early last night there was a partial eclipse of the Moon, which a small number of us had seen and thought it was a cloud, following the Moon! An eclipse of the Moon is when the Moon passes through the Earth's shadow in space.

Using a variety of props, Chris explained the basic mechanics of the Sun, Earth and Moon, which produces an Eclipse of the Moon and the Sun. It was noted that due to the sizes of the Sun, Moon and Earth and the distances between them, the Earth is



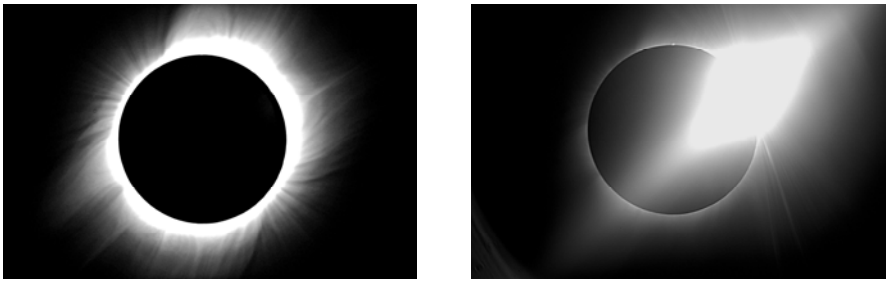

the only place in the Solar System where a Total Eclipse of the Sun is possible. The periodicity and recurrence of eclipses is governed by what is called the Saros cycle. The Saros cycle has a period of about 18 years 11 days 8 hours (approximately 6585⅓ days) and can be used to predict eclipses of the Sun and Moon. One Saros after an eclipse, the Sun, Earth, and Moon return to approximately the same relative geometry, and a nearly identical eclipse will occur. Chris was able to demonstrate that the movement of the Moon's shadow across the Earths surface is mainly due to the rotation of the Earth. Secondly, the Moon is moving in an anti-clockwise direction around the Earth at approximately 2288 miles per hour which is in the opposite direction to the moving shadow. What seems to be

at first a simple system is in reality, quite complicated.

It was explained that if you have are going to travel to see an Eclipse, you should maximize your chances by looking at the past weather charts for the areas that the eclipse path will follow. For this trip, Ian chose Egypt in preference to Turkey. The weather for the trip turned out to be unusually quite poor but fortunately the sky cleared just before the eclipse started.

We were then treated to Ian's top class images, illustrating the progress of the eclipse. The Ring effect and Baily's Beads where very evident. Baily's Beads are caused by the Sun's light, shining through the mountains on the Moon's surface. Ian finished with a video film of the equipment set up, and as it was a windy day, we were able to hear the wind in the back-ground.

The next Total Solar Eclipse will be in 2008 in the region of Canada, Greenland, Siberia, Mongolia and China, this will have a Central Duration of 2 minutes 27 seconds. If you can wait until 2009 there will be a Total Eclipse in India, Nepal, China, Central Pacific with a Central Duration of 6 minutes 39 seconds.



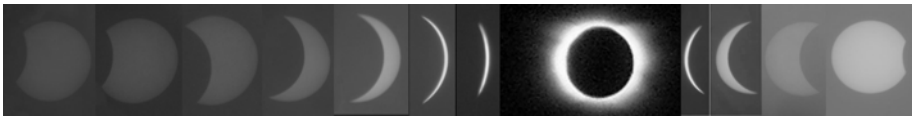
**Totality & Diamond Ring Effect. Ian Bruce**

## Eclipse from Turkey - Tony James

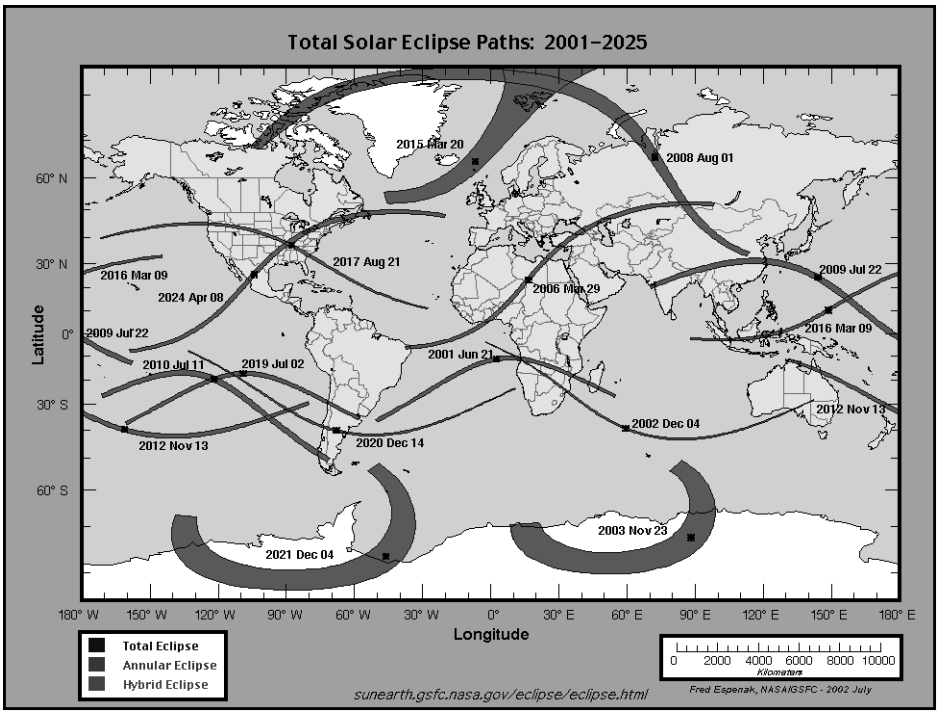
Tony James, a friend of Keiths describes the solar eclipse from Belek, Turkey.

Around 11.50, the first part of the Eclipse started with a notch becoming increasingly apparent as the Moon began its transit. The slow ingress over the next hour allowed time for some quick lunch, and the chance to get refreshments ready for later. By the time coverage was substantial, it was becoming obvious that the sunlight was not as strong as usual, with shadows deepening and the light becoming dimmer, and brassy. Pin-hole spots of light caused by leaves and fencing began to display the obvious crescent shape of the remaining Sun's disc, a fascinating effect. In the final seconds to Totality, the projected crescent became tiny indeed, and all

our attention turned skywards. There, to shouts of amazement from those around us, the Diamond Ring was displayed in all its glory and the amazing sight of the Corona was then apparent. As the coverage became complete, stars and some of the planets became visible and things occurred more rapidly. I was rather surprised that the sky did not seem as dark as I had expected, but the strange light created a most eerie effect, and, although I had planned to look for lots of effects in the 4 minute Eclipse, I abandoned all these intentions to just look at the fabulous sight it made in our sky. I briefly heard my wife comment about the snow-capped mountains around us glowing pink, but I was reluctant to look away from the all too short wonder happening above us. All too soon, the Diamond Ring again appeared and event slowed again. Strangely, the increasing disc caused by the Moon's egress did not seem so important and inevitably all the talk was about the main part of the show. It was a short, but wonderful experience, which was well worth travelling to see.



**Eclipse Phases: A composite of some of the projected images combined with a Totality picture taken Chris & Hilary Newbegin.**



**13th October 2006**
**Sci Fi to Sci Fact - Peter Sell**

**Time Travel**

Imagine a time machine, if we can go back to say the Roman times with say an Uzi machine gun. Even the puniest of us would be worshiped as a God for our magic. This leads onto the saying from Arthur C. Clark - "Any sufficiently advanced technology is indistinguishable from magic".

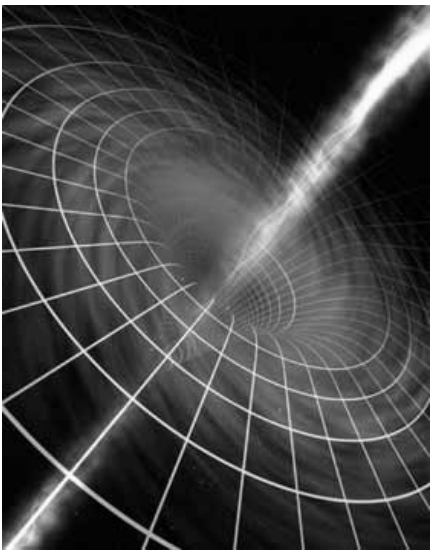
Where do we start with sci-fi? Gulliver's travels, Alice in Wonderland and The Wizard of Oz could be classed as sci-fi because when they were all written they were wondrous stories and it was around the end of the 19th-century. Now most people think that Jules Verne was the start of it, but in my opinion he was grossly overrated. He wrote some good stories such as 20,000 Leagues Under the Sea and the first nuclear submarine made by the Americans was named the Nautilus after the story. It's now probably glowing in the dark in some backwater scrap yard, but his only contribution to the stories of future science / sci-fi is concerned, was a fantastically powerful source of energy powering the submarine (nuclear-power).

He wrote from Earth to the Moon in which he used a giant gun to get them there. All the acceleration must be made within the length of a barrel, therefore to get to the 18,000 mph plus required for the journey, the astronauts would end up as strawberry jam at the bottom of the bullet. The only bit for the future was to have the launch site within 50 miles or so of Cape Canaveral in Florida.

To my mind, the first true original thinker was H G Wells, as most of the things he wrote about in his novels had not been invented or even thought of. The Time Machine was very futuristic and written in 1895. In 1908 Einstein wrote his theory of relativity, which gave a tantalising possibility of travelling into the future by going very fast (You must approach the speed of light to do it). Currently the fastest man-made object is possibly one of the Voyager spacecraft. After several slingshots from the giant planets, Voyager is travelling in excess of 100,000 mph, or about .00014% the speed of light. The difference in the clocks on the Voyager and on earth would be a matter of seconds or minutes at the most and they have been travelling for decades.
In 1926, Einstein published his modified relatively theory called special relativity. This gave another possibility of cheating time, because time slows down in the presence of a gravitational field. This means that if you could travel at or near the event horizon of a black hole, you could stop time and travel into the future. The use of a black hole is more feasible than destroying the entire universe to obtain the power to travel near to the speed of light. We know both these theories are correct because our GPS systems have built-in calculations, accounting for the difference between

the clocks on the satellites and the cars below. Satellites are in a lower gravitational field than our cars, but are travelling faster, so these changes almost cancel each other out, leaving a very slight error.

How would a time machine work? We required two things to make it be possible. 1 - create a wormhole and 2 - line it with exotic material (both these are theoretically possible but not yet invented). You then have to catch a couple of asteroids or build two space ships. Now link the asteroids or spaceships with a wormhole, and then stop it collapsing with the exotic material. Next accelerate one of the space ships to a significant proportion of the speed of light and bring it back to the same point (or placing one Asteroid near a black hole would work and then bring it back), you now have two asteroids / space ships with different clock times. Let's say they are 10 years apart, the one that had been near the speed of light would be a time machine into the future by 10 years. So you could step into a wormhole on one and walk out of the other end 10 years in the future.



You couldn't do this in a never ending loop and end up going further into the future because the time machine that you are stepped out at the other one wouldn't exist yet. You could however walk backwards and forwards in time between the two asteroids. The Black hole would work the other way around and be a path into the past.

In theory therefore, a time machine will one day be possible but very difficult to build and maintain.

**Matter Transmission (beam me up Scotty)**

Believe it or not they are working on this. They are trying to beam a single sub-atomic particle in a laboratory. I have no details on how it worked, but let's examine the problems. The atomic bomb converts a few pounds of matter in to pure energy (heat) energy that could level a city. Now if we beam a person, a man of say 200 lbs (14 St 4 lb). You would have enough energy to level say 50 -100 cities. You then have to send this beam through whatever (the atmosphere), and then convert all that

energy back into matter (at 100% efficiency). So you have a beam that will ionise the atmosphere with lightning you would not believe. A beam that would disintegrate anything in its path. You then have to put every atom back in exactly the same place, but it doesn't stop there, because you have to put every subatomic particle back in exactly the same place at the same speed, charge, velocity, direction, etc.

There is something called the Heisenberg uncertainty principle, which roughly states that if you observe, you change whatever you are observing and that if you know the spin you can't know the mass or if you know the charge then you can't know the velocity. In other words, you can't know all the parameters of a system. In the first series of Star Trek they didn't worry about this but in second and subsequent series, they came up with a fictional solution – the Heisenburg Compensators.

It was pointed out that the atoms may be in the correct position, but the person would be dead (not all the parameters would be correct). Sci-Fi writers (good ones certainly) revise their stories to bring in the current known facts.

If you don't beam the energy but just beam the information they get over the ionisation of the atmosphere problem, but we then have another problem. On board the ship we have enough energy to probably power the ship or if we were beaming between say Miami and London then we would have enough energy to level the cities. And that's just with one individual. If we were moving people like say British Airways do. They will probably have enough energy to destroy the planet.

Obviously the trips would be roughly equal and that the energy created in one place could be used to recreate the person at the other end. If however we do get out of sync then we would make Chernobyl look like a damp squid.

But just imagine the information required. You would need to know the mass, charge, velocity, direction, charm, colour, strangeness etc (there are properties that have no known physical equivalency hence the names given) of every single subatomic particle. For a single atom of carbon it would amount to some tens of thousands of bits of information for what we now know and that's just for one atom. Try multiplying that by the number of atoms in a person.

**13th October 2006**
**Digital Photography - Chris Hall**

Showing the progression of Sunset, Chris gave four reasons why he prefers digital over film photography:

1) More sensitive
2) Enables under-exposure
3) Effect is higher speed photography
4) Not limited to reel capacity

Chris started with stunning images of Sunset, showing the Sun Pillar, caused by Steel Dust Grains in the sky.

Reel capacity
By following the ever-changing sky patterns, at Sunset and after, Chris uses a Digital Camera because he is not restricted to how many exposures he can take.
A normal camera is limited to each reel capacity, having either 24 or 36 exposures per reel.

More sensitive
As the Sunset progresses, it is possible to photograph the Sun Pillars, using Digital techniques. This is because a Digital camera is 90% sensitive to light, but film is only 10-15% sensitive. An interesting side-effect of Steel Dust Grains occurs once every 25-35 years: It is possible to see a perfect 'mirror image' of the Sun, mirrored in the clouds, on the opposite side of the sky. In effect, we see two Sun's in the sky at the same time.

Chris also explained how it is possible to obtain further information from old photographic slides by converting them to digital using a specially made camera attachment.

Allows under- exposure
Never over-expose, as the detail is lost. By under-exposing Digital images, they can be processed on the computer, to show finer detail.

Higher effective speed
For very faint object, high speed and long exposure time are required.
Digital techniques cut down the exposure time needed for faint objects, due to the higher sensitivity.

Speed - quality
There is a relation between quality and camera/ film speed.

High speed, high ISO number, high ASA number, produces a lower quality and higher grain effect. Low speed, low ISO number, low ASA number, produces a high and low grain effect.

To conclude
One disadvantage is that all but high end digital cameras do not have a 'B' setting yet. The 'B' setting allows you to keep the camera shutter open for as long as you keep the shutter button depressed.
The main advantages of digital cameras are that the picture can be viewed instantly and the pictures need less time to expose.

## 10th November 2006
## William Herschel - Brian and Ian

William Herschel was born in Hanover 1738, the fourth son to a professor of music. He joined the Hanoverian Guard as a member of the band, playing the Oboe and the Viol.

**Sir William Herschel (1738-1822)**

In 1759, after experiencing the 1757 battle at Hastenbeck, he deserted to England where he started to teach music. In 1763, he was officially discharged and was able to return to Germany for a holiday in 1764. After teaching music for some time, he became the organist at Halifax in 1765, then the organist and conductor at Bath in 1766.

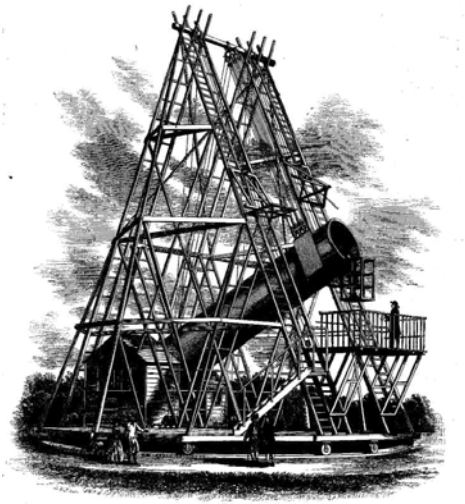
William took home in Bath, and in 1773 was joined by his sister Caroline. On May 10, 1773, at age 35, William Herschel purchased a copy of Ferguson's book, *Astronomy*, and found interest in astronomy. Consequently, he started to become a skilled maker of the most powerful telescopes of his time: After 1774, he had acquired skills to make specula mirrors superior to any which had been made before.

Caroline served as his assistant, taking notes while he observed at the telescope and was a very skilled astronomer in her own right. She began to make her own discoveries, particularly comets.

On March 13, 1781 William Herschel discovered what he first thought to be a comet, but was later found to be planet Uranus. Herschel named his discovery *Georgium Sidus*, Latin for "George's Star", in honour of King George III, this brought him favour but the name did not stick. Until the name 'Uranus' was adopted the planet was known in France - where reference to the English King was to be avoided if possible - as 'Herschel'.

**Caroline Herschel**

In recognition of this discovery, he was elected to the Royal Society on December 7, 1781, and awarded an annual grant by King George III of England, which enabled him to give up his career in music and concentrate on astronomy as the Court Astronomer of the King. For his new position, he moved to Datchet in 1782, with a move to Clay Hall near Old Windsor in 1785. In 1786, Herschel finally settled in Windsor Road, Slough, which came to be known as Observatory House. It is no longer standing, having been demolished in 1963 to make way for a high-rise office building.



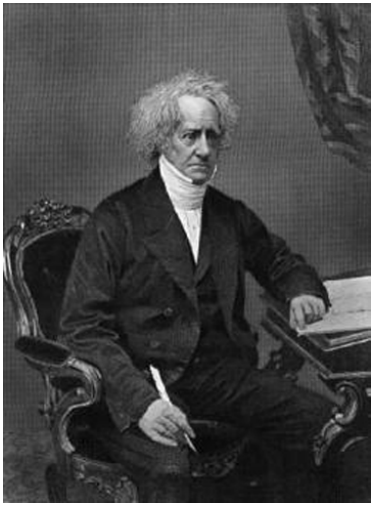
**Herschel's 40ft telescope**

On May 7, 1788, he married the widow Mary Pitt(née Baldwin) at St Laurence's Church, Upton in Slough. Caroline took this quite hard and moved to separate lodgings, but continued to work as his assistant.

During the course of his career, he constructed more than four hundred telescopes. The largest and most famous of these was a reflecting telescope with a 40 ft (12 m) focal length and an aperture 49½ inches (126 cm) in diameter. On August 28, 1789, his first night of observation using this instrument, he discovered a new moon of Saturn. A second moon followed within the first month of observation. The 40 ft telescope proved very cumbersome, however, and most of his observations were made using

a smaller telescope of 20 ft (6.1 m) focal length.

Herschel worked on creating an extensive catalogue of nebulae and he continued to work on double stars. He was the first to discover that most double stars are not mere optical doubles as had been supposed previously, but are true binary stars, thus providing the first proof that Newton's laws of gravitation apply outside the solar system. He also discovered infrared radiation. Herschel used a prism to refract light from the sun and detected the infrared, beyond the red part of the spectrum, through an increase in the temperature recorded on a thermometer. He was surprised at the result and called them "Calorific Rays". The term 'Infrared' did not appear until late in the 19th century.



**John Herschel (1792-1871)**

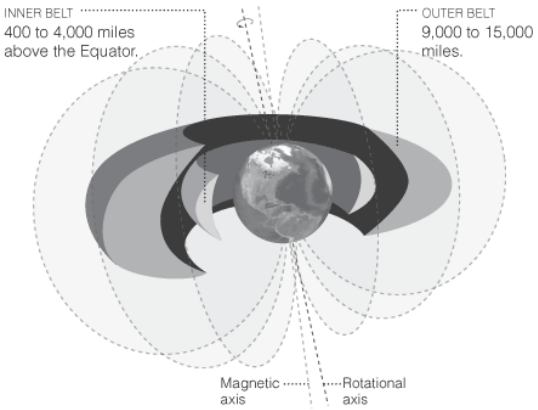
William Herschel died on August 25, 1822. His sister Caroline left England and returned to Hanover. His wife Mary continued to live in Slough until her death in 1832. Their son John continued the astronomical observations of his father in Slough from 1822 to 1833.

## Request for hand-held electric hairdryers

If any member has a hand-held electric hairdryer surplus to needs, we would be very grateful if it could be donated to the Society for demisting the telescopes during observing evenings.

**13th October 2006**
**Van Allen Belts - Chris Law**

The Van Allen Radiation Belt consists of two torus shaped belts of energetic charged particles (plasma) which are held in place around the Earth by the Earth's magnetic field. The presence of a radiation belt had been theorized by Nicholas Christofilos prior to the Space Age and was confirmed by Explorer I on January 31, 1958, and Explorer III missions, under Doctor James Van Allen.




The Van Allen belts are closely related to the polar aurora where particles strike the upper atmosphere and fluoresce. In northern latitudes, the charged particles hitting the atmosphere are known as the Aurora Borealis, which is named after the Roman goddess of the dawn, Aurora, and the Greek name for north wind, Boreas. In the Southern hemisphere, the Aurora is known as Aurora Australis. Chris demonstrated how an electric current being passed through different gases created light of different colours, illustrating how the Aurorae are caused.

The radiation belts protect the Earth from the Solar Wind and harmful radiation from the Sun. The radiation and magnetic storms can damage electronic equipment and requires that electronic components on satellites are hardened in order to operate reliably. The Hubble Space Telescope, among other satellites, often has its sensors turned off when passing through regions of intense radiation.

Proponents of the Apollo Moon Landing Hoax allegations have argued that space travel to the moon is impossible because the Van Allen radiation would kill or incapacitate an astronaut who made the trip. James Van Allen himself, now deceased (August 9, 2006), dismissed these ideas. In practice, Apollo astronauts who travelled to the moon spent very little time in the belts and would have received a harmless dose. Nevertheless NASA said that they deliberately timed Apollo launches, and used lunar transfer orbits that only skirted the edge of the belt over the equator to minimize the radiation. Astronauts who visited the moon would probably have a slightly higher risk of cancer during their lifetimes.

**9th December 2006**
**Christmas Party**

The HAS Christmas Party was held at Ian and Wanda's house on Saturday 9th December.

It has become some what of a tradition to have a quiz at the Christmas Party, this year the quiz was organised by Ian and consisted of three sections – astronomical dates, famous astronomers and common astronomical terms. Each section had a list of 15 questions and a list of 15 possible answers – all that was required was to match each question with the correct answer! After much umming, ahhhing and deliberation, the answer sheets were given out, putting most of us to shame as the quiz had been based on the talks over the year. Congratulations to Keith and Chris Hall who managed to get a joint top score of thirty one points.

Throughout the night, people went out to Ian's observatories and managed to see a number of sights, including M33 (Spiral Galaxy), M1 (Crab nebula) and Saturn which was quite low in the sky. Chris Hall was busy taking photos of the Moon and managed to get some good pictures of a Rille on the surface of the Moon. Rilles are commonly thought to be the remains of collapsed lava tubes, extinct lava flows or the result of tectonic activity/stresses.

Thanks to Ian and Wanda for their hospitality and to Ian for organising the quiz.

## Public Open Nights

On Saturday 25th and Sunday 26th November 2006 the society hosted public observation nights at the observatory in Eton.

The sky was fairly clear on the Saturday and we managed to split a few double stars and Ian found us a few nebulae to look at. The Moon on its fifth lunar day had already gone below the horizon by the time visitors started coming. Orion was rising late and was somewhat obstructed by trees but we did manage to see the Orion nebula before going home.

For Sunday, it was decided to open the observatory earlier so that the Moon could be observed. The weather was a little more unpredictable, with large clouds frequently coming over. One visitor brought along a small planetarium which worked very well when it was projected onto the inside of the dome.

We used the telescope in the dome, the new telescope on the outside mount and a

telescope was also set up in the car park. In total there must have been approximately 10 people that visited the observatory over the two nights.

## Tribute to Tony Fanning

It is now over a year since we were told the sad news of Tony's passing and he has been dearly missed at the Society meetings. Tony came to the fore in the Society by organising much of the 1981 bicentennial celebrations of the discovery of Uranus. The show was held at the Planetarium Theatre in Slough and was compared by Tony. Key speakers included John Ebdon and Patrick Moore, there was recital of Herschel's music and the trailer program for a BBC series – 'British men of Science' was shown. The latter was never aired and this was probably its only ever public viewing, the subject was, of course William Herschel. It was only through Tony's contacts at the Planetarium that we were able to get access to the material. Tony was also one of the original lecturers at the Planetarium, and in fact only finally stopped when the old projector was replaced. The Society went to the final show as his guests.

Tony will also be remembered as a nautical historian and a distinguished Naval Officer who led many attacks on enemy ships during the Second World War. He was instrumental in the success of the D-Day Landings. By the end of the War, Tony had been decorated with eight medals including the Distinguished Service Cross.

After leaving the Navy, he worked as a lecturer at the London Planetarium, and later became deputy director of the Admiralty Compass Observatory in Slough, taking responsibility for many important maritime projects. After his retirement in 1978, Tony wrote two books, one on naval history, another on astronomy. He was a fellow of many societies and organizations, including the Royal Institute of Navigation and was awarded the MBE for services to naval training in 1958.

Our thoughts continue to be with Tony's family and we wish them the best for the coming year.

**An appreciation from the Journal Editor**
In the eleven years of my membership of the HAS, I have seen Tony in a number of different situations, in connection with astronomy. This has included formal talks, secretarial duties and serving tea/coffee at Society meetings. Tony also helped to supervise observing at public open nights and organised special observing sessions for the Scouts. Tony had a very easy to listen voice, with an attitude of service to others. A very hard act to follow, and a first class example. I called Tony the Society Gentleman.

Keith Stevenson

**Solar Eclipse 29th March 2006 — Ian in Sallum, Egypt.**

**Comet McNaught as seen from above Fitzroy Beach, New Plymouth, Newzealand.**
**Terence Stevenson**