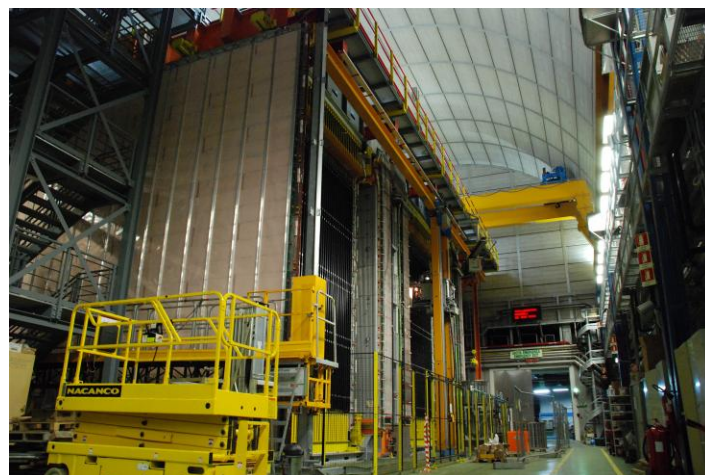




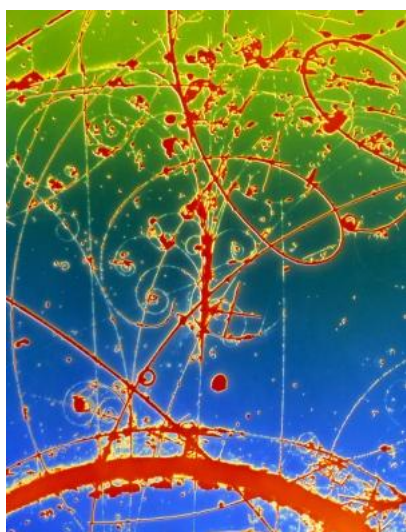
Faster-Than-Light Neutrinos – Again?

Unless you were severely ill or trapped in a cave somewhere, chances are that you heard about the neutrinos that turned up at the Gran Sasso Laboratory in Italy a few nanoseconds earlier than they were supposed to. Back in September, physicists at CERN announced that they had clocked these subatomic particles travelling faster than the speed of light, by about a factor of 10^{-5} . This result was a significant one: it defied Albert Einstein's special theory of relativity, which states that this should be impossible. It inevitably led to a long-winded online discussion on Twitter and across the scientific blogosphere, where most scientists seemed skeptical.



▲ The OPERA detector at the Laboratori Nazionali del Gran Sasso in Gran Sasso, Italy. Image credit: OPERA.

Since then, the collaboration behind the experiment, OPERA (Oscillation Project with Emulsion-tracking Apparatus), has made a few tweaks in an attempt to rule out one possible source of error. On Friday, it was reported that the neutrinos had once again made the 730-kilometre journey from CERN, near Geneva in Switzerland, to the Gran Sasso Laboratory near L'Aquila, Italy, faster than the ultimate cosmic speed limit.



▲ Neutrinos interacting with other particles. Credit: Science Photo Library

In September, most of the team members who wanted more time to check the result refused to sign the original paper; now, in light of the recent discovery, more have come onboard. "It's slightly better than the previous result," reasons Dario Autiero, OPERA's physics coordinator. Still, as Eugenie Samuel Reich of Nature magazine wrote: "the key test will be replication by an independent experiment".

In response to the latest OPERA findings, the Main Injector Neutrino Oscillation Search (MINOS) at Fermilab, Illinois, has issued a statement saying that it will upgrade its timing system to match OPERA's precision. Currently, it is possible that MINOS might be able to complete a preliminary check of the OPERA result as soon as early 2012. Rob Plunkett, spokesman for MINOS, said: "OPERA is to be congratulated for doing some important and sensitive checks, but independent checks are the way to go."

By Sam Hawkins

Reference: [arXiv:1109.4897v2](https://arxiv.org/abs/1109.4897v2)



Articles submitted for inclusion in this Newsletter are welcomed, and should be sent, in **electronic format**, to the editor, who will consider them for publication.
The editor is Sam Hawkins. E-mail: editor@ldas.org.uk

Articles for the next issue must be submitted by Saturday 14th January 2012.

Opinions expressed by the contributors are not necessarily those of the Editor or the Committee.
Copyright © LDAS 2011. This newsletter may not be copied or distributed in whole or part without the prior express written permission of the Editor, and if so permitted, full accreditation must be given to the society.

Table of Contents

▪ Front Page : Faster-Than-Light Neutrinos – Again?	1
▪ Editor’s Introduction	2
▪ Society Matters : Announcements / LDAS Meetings and Events	3 - 4
▪ Meeting Review : “The Scientific Exploration of Mars” by Richard Stratford	5 - 6
▪ Additional Meeting Review : Members’ Meeting by Richard Stratford	7 - 8
▪ Astronomical Matters : Observing report by Robert Townsend	8 - 9
▪ The Night Sky in December and January by Robert Townsend.....	10 - 11
▪ LDAS Equipment Hire List and Charges	11
▪ Committee Contacts and Meeting Dates	12

Editor’s Introduction

Hi everyone,

What a busy month we have had. First there was our additional meeting on the 12th, which featured two very different talks: one from our chairman, Jerry Stone, who described the Society’s visit to the Museum for the History of Science in Oxford, and one from Stan Waterman, who spoke in detail about his observations of variable stars in the constellation Auriga.

Then, at our main meeting, Professor Fred Taylor showed us how scientific exploration has changed our understanding of the red planet, Mars. If you missed these meetings, do read Richard Stratford’s reviews on pages 5-8.

On November 16th we had a productive Committee meeting, where one of the main tasks was to discuss our activities for next year. If you have any suggestions for the society then please e-mail us at committee@ldas.org.uk.

In the meantime, we still have a couple of observing sessions before the end of the year; details can be found on pages 3 and 4. Our November meeting is our last standard meeting of the year; it takes place this Wednesday, when Norman Walker will be revealing “Some Recent Work on RR Lyrae stars”.

For new members, our December meeting is not at the end of the month, but will be on the 14th, when we have our AGM and quiz. There is no Newsletter next month, but don’t forget to send us any articles and observations you would like included in the January issue. More information can be found on our website – www.ldas.org.uk – and our new programme for 2012 will go live on the website shortly.

Clear skies,

Sam Hawkins

LDAS is affiliated to :

- The British Astronomical Association
- The Federation of Astronomical Societies
- The Society for Popular Astronomy



SOCIETY MATTERS

★ Main meeting : Wednesday November 30, 7:30pm : Norman Walker

Our guest speaker for the November meeting is Norman Walker, an astronomer at the Royal Observatory Greenwich. His topic is “Some Recent Work on RR Lyrae Stars”, which should be very interesting. RR Lyrae stars are periodic variables commonly found in globular clusters, often used as ‘standard candles’ to measure galactic distances.

★ Observing Sessions : Fri / Sat November 25 / 26 : From 7:30 pm

Our next observing session will be held on Friday November 25, with the Saturday as a backup. If you’d like to come along, then please write to events@ldas.org.uk. If you want to check on the day that we are going ahead with the observing session, call the society mobile on **07751 315447**.

★ AGM and Annual Quiz : Wednesday December 14

December is the one time when we don’t meet on the last Wednesday of the month. Our AGM takes place on December 14, when we will review the year and discuss our plans for 2012.

Following the formal part of the evening, there will be food and drink, a raffle, and of course our annual quiz.

If you would like to stand for a place on the Committee, or if you would like to have something discussed at the AGM, please let us know by the November meeting.

★ The Astronomy Centre : 10% discount for LDAS Members









The Astronomy Centre is a new online supplier of astronomical equipment. They are an official dealer for Vixen, Celestron and Baader Planetarium products and are working to include other brands in the near future.

The Astronomy Centre is run by Chris Smith, who is offering **10% discount** for LDAS members! This is a great offer, not only for existing members, but it may help to attract new ones.

LDAS Meetings and Events

Here is a listing of some forthcoming events. Our full listing is on our website.

★ A star indicates that places at the event must be booked in advance.

Key:	 LDAS meeting	 Committee meeting	 Public event	 Publicity event
	 LDAS additional meeting	 Members' event	 Observing event	 Other science event

Event	Day	Date	Time	Notes
November				
Committee Meeting	Wed	16	19:30	
Perseids Meteor Shower	Fri	17	From 21:00	
Observing Session	Fri/Sat	25/26	From 19:30	At Standalone Farm.
November Meeting	Wed	30	19:30	Norman Walker: Some Recent Work on RR Lyrae Stars
December				
Annual Space Conference	Thu	8		Rutherford Appleton Laboratory
AGM and Annual Quiz	Wed	14	19:30	
Geminids Meteor Shower	Fri	14	From 22:30	
Winter Solstice	Thu	22	05:30	
January 2012				
The LDAS 2012 Programme will go live on the updated website shortly				
LDAS activities with the BBC's Stargazing Live. Watch for details.				

- All members are welcome to attend our observing sessions, but if you would like to come along then please let us know in advance, so we know whether or not it is actually worth holding the session. Please e-mail events@ldas.org.uk or call the society mobile on **07751 315447**.

Note: *If the weather looks uncertain on the day of a session and you want to check that we are going ahead, call the society mobile after 6pm, or check the website. If the session is being cancelled, then a notice will be placed on the home page of the website by 6:30pm.*

- If you'd like to take part in any of the other starred events, then write to events@ldas.org.uk or put your name on the appropriate list at the next meeting.

MEETING REVIEW

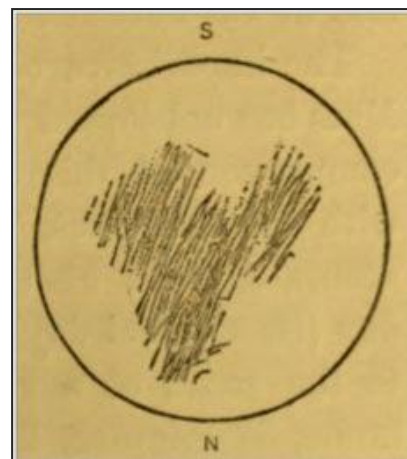
October Meeting Review

“The Scientific Exploration of Mars”

by Professor Fred Taylor

This is the first time that Professor Taylor has been a speaker at one of our meetings. He is the Halley Professor of Physics at Oxford University; his research interests include the physics of planetary atmospheres, including the Earth; experimental methods for studying atmospheres from satellites, space probes, and ground-based observatories; and the theory of atmospheric radiation and atmospheric molecular spectroscopy. He has been an investigator on space missions, including Mars Surveyor, since 1976, and has written a large number of books.

Professor Taylor presented his talk historically, describing the exploration of Mars from the earliest times to the present day. Observations of Mars go back to before the beginning of recorded history. However, the first useful telescopic observations were those of Huygens in 1659, 1672 and 1683; Huygens recorded the polar caps and the most prominent dark areas, such as the Syrtis Major. In 1784 William Herschel stated that Mars is ‘not without a considerable atmosphere’ and that its inhabitants ‘probably enjoy a situation in many respects similar to ours’. In 1845 the American astronomer Ormsby M. Mitchel (1805-62) discovered a residual bright patch left by the receding south polar cap, which he interpreted as snowfields on a mountain range, called the Mountains of Mitchel. In fact, the area is not mountainous, and is no higher than other snow-free zones at the same latitude.



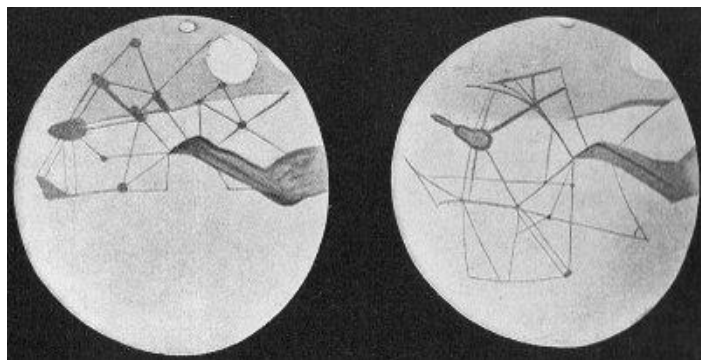
The oldest existing map of Mars, produced by Huygens in 1659

Percival Lowell founded Flagstaff Observatory to study the supposed linear markings on Mars, which he believed to be artificial canals. However, he also drew linear features on Venus and Mercury. Since Lowell suffered from severe hypertension, and eventually died of a stroke in his early 60s, he may have been drawing the blood vessels in his own retina.

Water vapour was detected on Mars by Donald M. Hunten (1925-2010) on 27 March 1969, using observations of Doppler-shifted spectral lines. These observations showed that there is very little water in the Martian atmosphere.

Wernher von Braun (1912-77) wanted to go on to Mars after the Moon. He worked on a mission to Mars from the 1950s, and was already prepared to go to Mars in 1969.

Three reasons for continuing with exploration of Mars are to understand the planets (particularly the Earth) and their origins, to study the supposed ‘face on Mars’, and to search for Martian life. Mars was once more like the Earth, with a dense atmosphere, rainfall, rivers and oceans. Professor Taylor asked whether life arose on Mars, and whether life inevitably arises where conditions are suitable or whether its appearance even in suitable conditions is a rare and improbable accident.



Martian channels depicted by Percival Lowell in the late nineteenth century.

Although Mars is now cold, dry and barren, there is strong evidence that early Mars was warmer and wetter. The presence of sinuous channels, dendritic networks and deep fluvial channels, for example Nanedi Valles, provides evidence for rainfall and runoff. The topography of Mars shows that there is a well-defined coastline, implying that an ocean once covered the low-lying northern hemisphere. Gullies on crater walls imply that there have been recent flows of water. Subsurface liquid water may exist at depths of less than 500 metres, and brines can survive on the surface for a short time.

Not only was early Mars warmer and wetter than it is now; it also had a stronger magnetic field than the Earth. This magnetic field would have shielded the atmosphere from the eroding effects of the solar wind. The Martian climate turned colder and drier as volcanic activity and impact bombardment stopped and as the magnetic field decayed. In addition, Milanković cycles cause climatic changes. In particular, there are large changes in the orbit and the axial obliquity of Mars owing to its proximity to Jupiter; the large orbital eccentricity also enhances the effects of Milanković cycles.

The first Martian mission after the Vikings of 1976 was Mars Observer in 1993; this carried ten instruments, including temperature, water vapour, cloud and dust sounding experiments. Unfortunately it never produced data; shortly before it entered orbit, the radio transmitter was turned off so that the fuel tanks could be pressurised, and contact was never regained. The spacecraft may have been destroyed by an explosion. Another unsuccessful mission was Mars Climate Orbiter in 1999; this crashed on Mars owing to confusion between metric and imperial units.



The Mars Reconnaissance Orbiter is using onboard scientific equipment to study the Martian climate.

The Mars Reconnaissance Orbiter, which entered orbit in 2006, was the largest spacecraft ever sent to Mars; its objectives include studies of the Martian atmosphere, climate and geology, and preparation for human exploration. Professor Taylor showed atmospheric temperature profiles over the polar caps and at lower latitudes derived from infrared soundings. The polar temperatures at a height of 50 km (160-190 K) are higher than the surface temperatures (138-155 K), because of the circulation of the Martian atmosphere; air rises at the equator and moves towards the poles, and the resulting compression heats the atmosphere.

The Mars Science Laboratory is expected to be launched on 23 November this year and to arrive at Mars in spring 2012. Its rover is much bigger than Spirit and Opportunity, and its powerful motors mean that it can travel farther. It uses a nuclear

generator as a power source, rather than solar panels. Another mission, the first European rover, is ExoMars 2018, which will use a 2-metre long drill to search for subsurface water; this intended mission has been hampered by problems with funding. There are also proposals for a deep-drilling mission that will search for ice at depths down to 100 metres, and for a cliffbot to explore the geology of Martian cliffs.

There have been proposals for a sample-return mission since the Viking missions in the 1970s. Such a mission would require a large lander and an intelligent rover for collecting and analysing samples. Manned flights to Mars were on the agenda until recently. The European Space Agency established Aurora Programme, including a Mars sample return mission and ExoMars, followed by a human mission. NASA had planned to build a lunar base as the first step towards a Martian mission, but this programme has been cancelled. China and India are also interested in space exploration.

Finally, Professor Taylor spoke about the possibility of Martian colonies and explorers. These would require a new generation of spacecraft, with nuclear-powered rockets carrying humans. Orbital considerations mean that explorers would be able to stay for either three weeks or two years on the Martian surface, but not for any intermediate duration. One impediment to such expeditions is the danger to human life from high-energy radiation emitted by solar flares and other solar activity.

Review by **Richard Stratford**

ADDITIONAL MEETING REVIEW

12th October Meeting Review Additional Meeting

This was one of our additional meetings, at which Jerry Stone described the Society's visit to the Museum for the History of Science in Oxford and Stan Waterman talked about his observations of variable stars in Auriga.

Several members of the Society visited Oxford on Saturday 23 July. The Museum is in Broad Street, next to the Sheldonian Theatre. It has three floors, with the entrance on the middle floor; the same kinds of items are exhibited on all the floors. Jerry showed pictures of many interesting scientific instruments, including a Chinese jade instrument (600-900 AD) for locating the celestial pole, and a unique Islamic spherical astrolabe of about 1480. British scientific instruments included a 4¼" Gregorian telescope manufactured by James Short and used for observations of the transit of Venus in 1761, a spectroscope with six prisms made by John Browning in 1880, a 12' zenith sector for observations of stellar aberration, and a 32" mural quadrant made by John Bird and installed in Corpus Christi College. The museum also has a memorial window to Christopher Wren (1632-1723) and a pastel drawing of the Moon by John Russell, the official painter to King George III.

There are several telescopes at the museum, including a 7' Newtonian reflector by William Herschel, an achromatic reflector by Peter Dollond, and, in the basement, a large Gregorian telescope with an 18" primary mirror by James Short. This is the only survivor of three telescopes supplied to the Duke of Marlborough. There are also armillary spheres, orreries (including one made of wood and paper in 1820), and terrestrial and celestial globes. There is a silver microscope with eight objective lenses, made in 1770 for King George III by George Adams.

A particularly interesting exhibit is an Indian brass 'Earth ball', which forms a representation of Hindu cosmology. The land and the sea are arranged in bands, with the gods in the mountains, and men and animals in the lowlands.

We also visited the Museum of Natural History, where we saw fluorescent minerals and meteorites; among them were specimens of the Gibeon (Namibia) iron meteorite, with its Widmanstätten structure, and the Nantan meteorite (China), a fall of iron meteorites with a total mass of 9.5 tons in May 1516. There are also mineral specimens, including iron pyrites (10 Myr old), quartz (1100 Myr), and orbicular granite (2700 Myr), and skeletons of dinosaurs, including *Tyrannosaurus rex* and *Velociraptor*. Other places of interest in Oxford included Tom Tower, Alice's Shop, the Radcliffe Camera, and Stone's Court.

Stan Waterman spoke about 'Catching up in Auriga: new variable stars and how to find them', a talk that he was to present at the BAA Variable Star Section meeting in Manchester. Stan has observed stars in a field at $\alpha = 05^{\text{h}}18^{\text{m}}$, $\delta = +41^{\circ}50'$, south-west of ρ Aurigae, on 76 nights from 25 October 2003 to 30 March 2008; on 6-7 February 2007 he observed for $11^{\text{h}}26^{\text{m}}$, beginning when the field was at an elevation of 68.4° and ending at an elevation of 9.1° . He has obtained 25,000 images, 21,000 of which pass quality tests.

Stan started his observations in October 2000, and spent the first two years gaining experience. He has obtained 66,400 quality filtered images since August 2003 in a field in Cygnus (area 'a'), with another 10,000 images in eight contiguous areas in Cygnus and 25,000 images in the Auriga field. The area 'a' has >220,000 measurable stars, of which 17,000 have 5-year light curves; 1022 variable stars have been found in this area so far. In the Auriga field Stan has found 178 variables, comprising 63 eclipsing binaries, 64 slow variables, 37 fast variables, one Cepheid, and 13 miscellaneous variables. Six of the variable stars are in the GCVS.

Stan explained how he obtains and reduces the data. For the Auriga data there are $20,086 \times 14$ magnitude values from 76 observing dates. This comes to 8.08×10^9 data values from a nominal 28738 stars. Stan finds variable stars by analysing fast noise (unusually large magnitude dispersions on small time scales), slow noise, scatterly noise, and spiky noise. In fact, fast noise is not very useful for finding variable stars, although it is good for detecting proximity effects due to nearby stars. Star p00380 showed a very large scatter in magnitude even before an automatic scan; it turned out to be a W UMa eclipsing binary with $P = 0.54648$ d.

Letchworth & District Astronomical Society Newsletter – November 2011

The GCVS stars in the Auriga field include SX Aur (p00041), an 8th-magnitude β Lyrae eclipsing binary with $P = 1.21009$ d, SY Aur (p00061), a 9th-magnitude Cepheid with $P = 10.14452$ d, and ER Aur (p00742), a 10th-magnitude Cepheid with $P = 15.7$ d.

Slow noise is characteristic of red giant variables, namely the long-period and semi-regular variables. The star with the largest amplitude in the field is p02541, with an amplitude of 1.34 magnitudes; this star and p15268 are the only two with $\Delta m > 1.0$ mag. By contrast there are 15 slow red variables in area 'a', in Cygnus, with amplitudes of >1.0 magnitudes. The faintest slow red variable in Auriga is p22947, which varies between magnitudes 13.9 and 14.8.

Stars with spiky noise are generally eclipsing binaries; these include p00057, p00303, p2147, p2883, p3046 and p20117. Fourier searching is good for short-period variable stars; these variables need only one long night of observation, although observing for three nights gives better results. Stan has used observations on 10 December 2005 (11.8 hours) and on 11 and 20 January 2006 (12.5 and 11.6 hours). Stan first tried looking at stars where the sixth or higher harmonic dominated the Fourier spectrum, and has so far found 37 variables by this method, including p01864 ($P = 0.090145$ d), and the δ Sct star p09911 ($P = 0.10091$ d).

Finally Stan discussed a new pulsating variable star, p01171, with $P = 1.82807$ d and $\Delta m \sim 0.35$ mag. (11.05 to 11.40 mag.). This is either a classical Cepheid or a W Virginis star, but we do not know which type it is.

Review by **Richard Stratford**

ASTRONOMICAL MATTERS

Observing Report for Friday 4th November 2011

As I drove through parts of Hitchin to pick up Richard Stratford to take him to the LDAS observatory, there were so many fireworks going off that you could be forgiven for thinking that it was Guy Fawkes night! Some people obviously hadn't bothered to check their calendars that evening. Initially, there had been much doubt among us as to whether or not we should go ahead with this observing session. The weather all afternoon had been very cloudy and wet, with rain storms coming and going. But the BBC/Met Office online forecast for that evening said that the rain would die out with clear periods developing by about 9:00p.m. Some mist and fog was also on the cards, but this was not expected until after midnight, so I thought we'd be okay up until then.

When Richard and I arrived at the observatory our Chairman, Jerry Stone, was already there with several young boy scouts, some parents, and scoutmasters in attendance. He had already opened the observatory roof and set up the six inch reflector outside on the concrete hardstand. He was attempting to show the visitors the Moon, which was just past first quarter phase and in the western evening sky. But everyone was having great difficulty in seeing the Moon because of the rapidly thickening cloud. I was sure that the cloud wouldn't inconvenience us for too long. It was just a question of how long everyone was prepared to wait for it to clear away again. The observatory mobile phone went off inside my coat pocket, so I quickly took it out. It was Ian and Emma, two new members who had joined the society at our Public Star Party two weeks earlier, asking if there was any observing to be had that evening. I told them that several people were already up here, and they came up to join us about twenty minutes later.

I quickly got the 14-inch LX200 into operation by putting it straight onto the brightly-lit Moon. We managed to get brief glimpses of it now and again in small gaps and thin patches in the fast moving cloud, but this isn't really a satisfactory way to observe anything in the night sky. After about half an hour or so of waiting, a large clearing appeared to the north and west and gradually expanded. 'Great', I thought. 'Now at last we can all get a good clear look at the Moon'. But towards the south the cloud stubbornly refused to budge and let us see the Moon at all. I began to wonder if it would be more profitable to point the telescope to the North West and show the visitors some bright double stars instead. I didn't get the chance as the clear gap began to shrink away and disappear again. Then, without warning, large raindrops started coming down everywhere, and in less than a minute it began to pour down. Jerry came running into the observatory and there followed a desperate mad panic as we hurriedly parked the telescope, took the eyepiece and erecting prism out, put the lens caps back on,

Letchworth & District Astronomical Society Newsletter – November 2011

and heaved the roof up, all at breakneck speed. With the rain still pattering down on the roof, I disconnected the battery and put everything away in the boxes and cupboards. We decided to temporarily suspend the observing and go up to the Two Chimneys pub and wait inside in the dry for the rain to stop and the clouds to break up. As I came outside and locked the observatory door, the rain had ceased completely; the passing rainstorm had lasted all of two minutes! But it was still 100 per cent cloudy.

Five of us spent about an hour and a half chatting and drinking at the pub while we waited for the conditions to improve. Upon leaving the pub to try observing again, Jerry decided to go home, and that left Richard and I returning to the observatory with Ian and Emma. It was 10:30p.m. when we got the telescope back onto the Moon again. Although the sky was now totally free of cloud, I noticed that some slight mist was beginning to form in the air. Our efforts paid off, and we all got to study the Moon closely using my 24.5mm Meade Super Wide Angle eyepiece, giving a magnification of x145 on the big telescope. After that I decided to do something I had wanted to do for some time but hadn't been able to: I inserted the big 8.8mm Meade Ultra Wide Angle eyepiece into the erecting prism on the telescope and explored the fine lunar features with a whopping magnification of x404! It was like flying over the lunar surface in a spacecraft. The Moon began to sink lower towards the west, and the tree branches began to interfere with the view, so I manoeuvred the 'scope eastwards and onto the planet Uranus. Under fairly sharp clear conditions, we all got to see its tiny blue disk. Perhaps one night we'll get to see some tiny surface features, or even glimpse one or two of its faint moons. (Theoretically, they are within the reach of a 14 inch 'scope.)

The next targets were two bright and easy double stars in the constellation of Aries, Gamma Arietis and 1 Arietis. They are well worth a look with any size telescope. By now the brilliant gas giant Jupiter was high up on the meridian. It was well seen with its colourful belts and four bright Galilean moons. Unfortunately we had missed a transit of Europa earlier that evening because of the cloud. Richard mentioned that M1, the famous Crab Nebula supernova remnant, was also high up towards the south, so I thought I'd try for that. Because of the steadily increasing misty conditions, it was barely visible. I managed to glimpse a faint fuzzy blob of light, but everyone else said they couldn't see anything there at all.



Messier 45, the Pleiades star cluster, is well-placed for observation in the winter months.

So I decided to go for some brighter and easier deep sky objects. These were, M45, the Pleiades star cluster in Taurus, and then the Double Cluster in Perseus. In order to fit as much as possible into the field of view, I used the big two-inch barrel 56mm Meade Super Plössl on them to get the lowest magnification (x63.5) obtainable. Upon close inspection, I noticed that these star clusters seemed a bit blurry and lacklustre from their usual sparkling appearance through a telescope. The reason for this soon became apparent: when we ceased observing and were about to put the big lens cap on the 'scope, at about 01:15a.m., the corrector plate at the front was dewed over. By the time we had locked up and were leaving the observatory, the sky above and the surrounding landscape was shrouded in thick mist and fog everywhere.

Robert Townsend

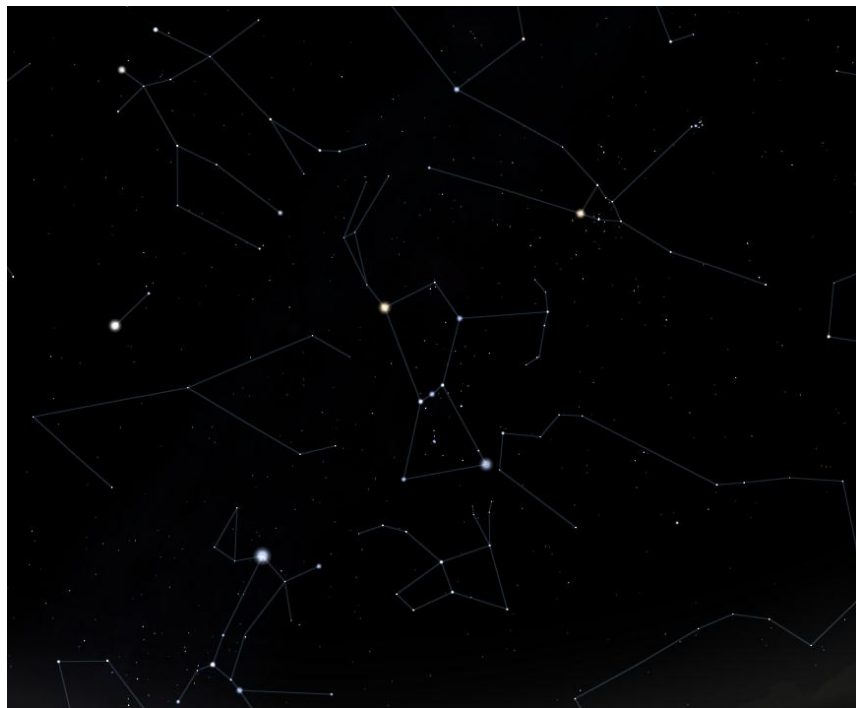
LDAS Observing Co-ordinator

The Night Sky in December 2011 and January 2012

By Robert Townsend

With winter now well and truly upon us, the longest and darkest nights of the year can often be cold and frosty, and therefore produce some of the clearest and steadiest skies for some spectacular sharp and crisp viewing of stars, planets and deep sky objects. Just do remember to wrap up well with many layers of warm clothing.

Immediately after sunset at this time of year the great galaxy in Andromeda, Messier 31, can still be seen very high up towards the south and west. The Andromeda Galaxy is a giant spiral believed to be about 30 per cent larger than our own home galaxy, the Milky Way. It lies at an oblique angle to us, i.e. in between face on and edge on, so that through a telescope it presents a highly elliptical shape. The bright nucleus is about half a degree in length, and this is surrounded by a much fainter outer disk of stars and gas that measures some two and a half degrees. It is only with larger amateur telescopes and on very clear moonless nights with little or no light pollution can the full extent of M31's galactic disk be fully appreciated visually. Images taken with the latest digital technology can reveal the full extent of it clearly of course; even with quite small telescopes from severely light polluted locations. If you are lucky enough to be able to travel to very dark skies, completely free of the scourge of sky glow, M31 can be glimpsed with the naked eye as a small fuzzy patch of light lying just north and west of the star Nu Andromedae. It was the great American astronomer Edwin Powell Hubble who, in the 1920's, used Cepheid variable stars within the Andromeda Galaxy to calculate its' distance and hence prove what many in the international astronomical community had long suspected; i.e. that spirals such as Andromeda are separate galaxies that lie far beyond our own Milky Way Galaxy. Hubble gave the distance to M31 as 750,000 light years, which he then later revised up to 900,000 light years. We now know that both of these measurements were in error; they were a gross *under* estimate. The latest Hubble Space Telescope measurements, made just a few years ago, now indicate a distance of 2.9 *million* light years. The big spiral has two smaller and fainter dwarf companion galaxies. About half a degree to the south of M31's nucleus lies the little M32, and about three quarters of a degree to the north and west lies the larger but fainter M110. They were discovered by Caroline Herschel in the late eighteenth century, and can be seen even with small telescopes if you know exactly where to look for them.



The prominent winter constellations Gemini (top left), Taurus (top right), Orion (center) and Canis Major (bottom left) – located in the south after midnight.

Further to the south and east of Andromeda the magnificent constellation of Orion the hunter is now visible for most of the night. Straddling the celestial equator, the hunter is high on the meridian during January evenings. The seven brilliant stars that make up his famous outline are easy to identify for newbie astronomers. His shoulders are marked by the red giant star Betelgeuse (left) and white star Bellatrix (right). Alnitak, Alnitam and Mintaka are the three bright stars which make up his distinctive belt. Bottom left is Saiph, which means 'knee', and bottom right is brilliant white Rigel, which means 'foot'. Rigel is a fine double star and although the faint companion is fairly wide, because of the overpowering brilliance of Rigel itself, it requires a medium to large amateur telescope with a high magnification to see it clearly. Immediately below Orion's Belt lies Orion's Sword. This is a

distinctive line of bright and faint stars, double stars, star clusters, and bright and dark nebulae running directly north-south, some of which can be discerned with the naked eye or in 10 x 50 binoculars. Slap bang in the centre of this north-south line of objects lies the most famous nebula in the sky; 'The Great Nebula in Orion', or M42/M43. In classic photographs the nebula looks a bit like a giant red and pink flower with the smaller offshoot nebula of M43 sitting on its' northern edge. There is also a finger like intrusion of dark nebulosity sticking into it known as 'The Fishes Mouth'. Inside the tip of this lies a famous multiple star known as 'The Trapezium' because its' four brightest stars make up a distinctive trapezoid shape that can be seen in any small telescope. Catalogued also as Theta-1 Orionis, this multiple contains several much fainter members and some spectroscopic binaries making up a stellar family containing a total of ten members. Lying at a distance of 1,385 light years and about 30-35 light years in diameter, 'The Great Nebula in Orion' is a giant stellar nursery where new stars are being born out of this vast cloud of hydrogen gas and dust.

A Merry Christmas and a Happy New Year with lots of clear skies to you all!

EQUIPMENT HIRE NOTICE

LDAS Equipment Hire List and Charges

The society has five scopes and one pair of binoculars (as listed below) for hire, on a monthly basis, all with eyepieces, finders and mounts. We hire these scopes out to fully-paid members of the society only. Telescopes 2, 3 and 5 are ideal for beginners and newcomers to astronomy, whilst scopes 1 and 4 are for slightly more advanced observers and those wishing to maybe have a go at astrophotography.

All five scopes will give you the chance to see for yourselves the wonders of the night sky, and many fun hours can be had by hunting down the elusive objects that you have seen many times in books, and wondered about what they would look like through a scope. There is no greater feeling in astronomy than when you find that object for the first time and see it with your own eyes.

Item	Description	Monthly charge
Scope 1	120mm f8.3 Skywatcher refractor complete with equatorial mount, motor drive	£5
Scope 2	150mm Dobsonian reflector complete with mount	£4
Scope 3	150mm f4 Newtonian reflector complete with altazimuth mount (shares with scope 5)	£4
Scope 4	100mm Newtonian reflector complete with equatorial mount, motor drive	£4
Scope 5	70mm f13 Vixen Porta refractor complete with altazimuth mount	£2
Binoculars 6	15 x 50 Konus binoculars, with tripod attachment	£1

Please note: Telescopes 1 and 4 come on a German equatorial mount with motor drive to the right ascension. The 'scope and mount are fairly heavy items and therefore we can only hire to persons who are capable of handling the equipment and have had some experience of using such equipment.

Training on the mount and telescope must be obtained prior to use (see Bob). Please do not let this put you off as these 'scopes have a lot of advantages over the others, as they track the night sky giving you freedom to enjoy the view for longer and maybe try your hand at drawing or astrophotography.

If you would like to hire any of the equipment please contact Bob Baldwin on 07766 536640 or 01462 339438 or write to mandyandbob@googlemail.com.

Letchworth & District Astronomical Society Newsletter – November 2011

CONTACT INFORMATION AND OFFICIAL MEETING DATES

If you have any questions, comments or suggestions regarding any aspect of Society activities, do please contact us using any of the details below.

Next Committee meeting date: AGM on December 14

If you would like to stand for a place on the Committee, or if you would like to have something discussed at the AGM, please let us know by the November meeting.

General LDAS Contacts

Position	E-mail
Committee	committee@ldas.org.uk
Chairman	chair@ldas.org.uk
Secretary	sec@ldas.org.uk
Treasurer	finance@ldas.org.uk
Membership	membership@ldas.org.uk
Newsletter editor	editor@ldas.org.uk
Webmaster	web@ldas.org.uk
Other contacts	E-mail
Society activities	events@ldas.org.uk
Questions on astronomy	questions@ldas.org.uk
Society information	
Website	www.ldas.org.uk
Twitter	www.twitter.com/LetchworthAstro
Society Mobile	07751 315447

LDAS Committee Contacts

Position	Name	Obs key holder?	Telephone	E-mail
Honorary President	Carolyn Crawford		01223 337510	csc@ast.cam.ac.uk
Chairman	Jerry Stone	Yes	01438 712000	jstone@spaceflight-uk.com
Secretary	Nick Ellis		01707 321013	ellis.nick@virgin.net
Treasurer	Brian Hendy		01462 812123	brianhendy@henlow1.plus.com
Membership Secretary	Jim Haughey		01462 812035	jacob.haughey@btopenworld.com
Meetings Organiser	Stan Waterman		01462 433912	stanwaterman@aol.com
Observatory Manager	Mike Atkins	Yes	01992 460044	mike-atkins@hotmail.co.uk
Observing Co-ordinator	Robert Townsend	Yes	01438 238338	meteorwatcher@hotmail.com
Telescope Hire Co-ordinator	Bob Baldwin		07766 536640 01462 851975	mandyandbob@googlemail.com
Catering Co-ordinators	Bob Baldwin & Barbara Thompson		01462 851975 01462 637603	mandyandbob@googlemail.com barbara.thompson890@ntlworld.com
Newsletter Editor	Sam Hawkins		07543 663009	samuel.f.hawkins@gmail.com
Librarian	John Flook		07796 884848	jsflook@yahoo.com
Dark Skies Officer	Jim Haughey		01462 812035	jacob.haughey@btopenworld.com
Webmaster	Jerry Stone		01438 712000	jstone@spaceflight-uk.com
General committee member	Rosemary Anthony		01438 869807	erosemaryanthony@gmail.com
General committee member	Colin Navin		01462 442762	colin@navigator.net
General committee member	Richard Stratford		01462 649257	richard.stratford1@ntlworld.com