



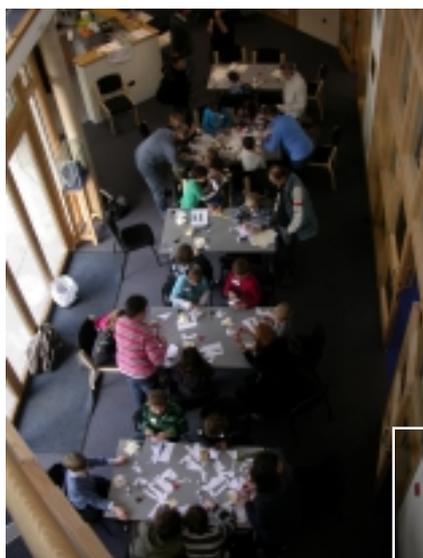
CAPELLA

CAMBRIDGE ASTRONOMICAL ASSOCIATION

Newsletter 148. January/February 2011.

www.caa-cya.org

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Three photos by Paul Fellows of the CYA meeting in November which was held in Kavli Institute for Cosmology. The youngsters made two Universe models, one showing the expansion of the Universe, the other folded in such a way that when you started to unfold the model, it could be continuously unfolded without coming to the end - a bit like the Universe!



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For details of the picture, see page 7

Cambridge Astronomical Association and Cambridge Young Astronomers

President: Dr. David Dewhurst

Chairman: Paul Fellows

Treasurer & Membership Secretary: Mickey Pallett

Secretary: Peter Howell

Committee: Dave Allen, Kevin Black, Paul Drake, Clive Gilchrist, Clive Holt, Barry Warman

Capella: Members should send contributions for Capella to: Ken Day, 28 Waddelow Road, Waterbeach, Cambridge, CB25 9LA. e-mail to Brian Lister (btl21@cam.ac.uk) **Please make sure e-mail contributions are in .TXT format.**

Vice President: Jim Hysom

Vice Chairman: Brian Lister

Cambridge Young Astronomers (both groups): Brian Lister Tel: 01223-420954 (evenings) or e-mail btl21@cam.ac.uk

Telescopes for hire to members: Mickey Pallett Tel: 01480-493045 or book on-line

Loan Telescope maintenance: Dave Allen, e-mail day.vid@hotmail.co.uk

Library: Kevin Black Tel: 01223-473121

Webmaster: Paul Fellows

Website: www.caa-cya.org

Chairman's Comments

Well, its newsletter time again, and a lot is and has been happening. Our program of Friday speaker meetings culminated before the holiday break with us having two Professors for the price of one. Professor David Burgess treated us to an excellent discourse on the Sun as the primary source of space-weather, and how that can affect things down here on Earth, and this was followed by a guest appearance from Professor Colin Pillinger who said a few words about the writing of his new autobiographical history of the Beagle-2 mission. He was kind enough to sign copies for us, and was able to secure my own which I am now enjoying reading. The following morning, in a final act for the association before the break, we held the CYA "panto" "Shrek 3 and a bit" which made for a good few laughs and yet still wove the science of planet hunting into the plot. Looking forward, we have the BBC "Stargazing Live" event on Saturday 8th Jan (6:30, IoA), and we have been contacted by both BBC Radio Cambridgeshire and the Look-East TV people about this as they want to put some coverage together as part of this country-wide initiative. Good to see the media taking a real interest in astronomy, so I hope we live up to their expectations. Anyway, it's a great way to start 2011, and I look forward to this, and all the other events we have planned for the association. Happy New Year to all!

Paul

Speaker Meetings

Friday 21st January 2011 Professor Alan Aylward.

"From Daedalus to Dan Dare to Daedalus: Is Interplanetary Travel feasible?"



Man has long wondered if he could travel to other planets. Once we showed we could reach the planets of our solar system in the 1960s, this question turned to other star systems. A British Interplanetary Society study in the 1970s concluded that even with the technology of the time (with minor extrapolations into the future) it would be possible to conceive scientific missions to nearby stars. If that study was right it raises once again the Fermi Paradox: if it's that easy why have we no evidence of ever having been visited ourselves? Since the BIS study more work has been done on this and a number of interesting ideas have arisen.

Alan is the Professor of Atmospheric Physics and Head of the Atmospheric Physics Laboratory in the Department of Physics and Astronomy at University College, London. He studied here at St John's College for his MA in Natural Sciences, then a Diploma in Space Science at UCL. A PhD in Space Science followed at UCL in 1984 and has been Head of Atmospheric Physics Laboratory since 1995.

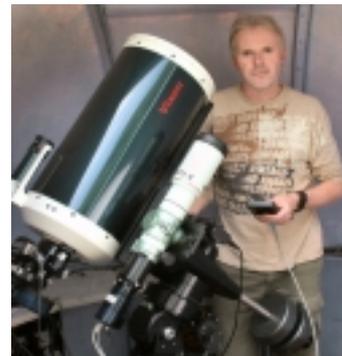
He has worked on rocket launches of electric and magnetic field probes at UCL for a PhD, then after a short career in Aerospace (zero-g satellite fuel tanks) and computing, moved to Kiruna in Sweden to become a programmer, then Head programmer, on the EISCAT (European Incoherent Scatter Radar association) research radar. Alan came back to the UK to support EISCAT science in the UK. He wrote his PhD mainly on radar studies of the aurora, thermosphere and ionosphere.

After joining UCL Alan has continued with ionosphere-thermosphere measurements plus modelling of first the terrestrial atmosphere and then planetary atmospheres, and lately even exoplanet atmospheres. Current main fields of interest are Space Weather and exoplanets.

Friday 18th February 2011 Nik Szymanek
“Photographing the Night Sky”.

The main part of Nik’s talk will focus on images taken using modern CCD cameras but he will also cover wide field imaging with film and DSLRs. The talk will be suitable for all levels and at the end he’ll show the short film taken during his visits to observatories abroad.

The talk has grown over the years with plenty of new images, in some cases taken with review equipment which he evaluates for Astronomy Now magazine. Nik has a well-equipped back garden observatory in Essex that he uses to take long-exposure colour images of deep sky objects such as galaxies and nebulae. By day he’s a train driver on the London Underground but also has a part-time position at the University of Hertfordshire’s astronomy department.



This meeting will be in the Hoyle building of the Institute of Astronomy, Madingley Road, Cambridge. Doors will open at 7.30 pm. and the talk will begin at 8 p.m. For security reasons, entry will not be possible after 8.10.

As usual, the library will be open before and after the lecture and refreshments will be available after the lecture.

Members’ Contributions

An Imaging Beginner’s Journey to Stephan’s Quintet by Peter Whalley

In the early 1970s I acquired a basic 3” refractor. It seemed that I used most of my available ‘astronomy time’ finding and then chasing an object across the sky. Frequent manual tracking adjustments and image tremble on a flimsy tripod made actual observations fleeting but tantalising. Locating any faint object like a galaxy or nebula seemed close to science fiction apart from the Andromeda Galaxy and even that was not much more than a smudge in the eyepiece. Eventually the telescope was abandoned in a cupboard.

My interest in observing was replaced by reading about and seeing extraordinary images from space telescopes and planetary exploration craft. It seemed to me, for a while at least, that all such things were only for the professional astronomer to experience. However, my original desire to see beyond our own galaxy gradually awoke from hibernation.

In September 2006, I invested in a 10” reflector telescope (Schmidt-Cassegrain optical design) with GPS. As it was portable I could try different locations around the garden for best results. Once the alignment and guidance techniques became familiar, I found observing time was the big winner.

Alt.Az. tracking was fine whilst I stuck to visual observation. However, to locate fainter objects I started using a CCD camera. It quickly showed sensitivity to the tracking accuracy as exposure time was limited to a few seconds and was vulnerable to image tremor through the tripod including wobbles from the occasional lorry passing on a nearby road. A permanent location for the scope, on a pier with a wedge to allow polar alignment, seemed essential (and would relieve me of lugging the scope back

into the house in the early hours of the morning).

Finding a suitable spot took about a year of experimentation and negotiation. It concluded in a compromise between avoidance of street light intrusion affecting seeing quality, neighbouring trees limiting the useable horizon and various domestic constraints on where would be acceptable.

On the chosen location I put in a cubic metre of concrete as foundation for the steel pier and used a laser level to set it true on vertical and horizontal planes. I suspect I went overboard on getting celestial North alignment of the pier before fixing it to the foundation. The polar axis wedge, once bolted to the pier top plate, had more tolerance adjustment than I had expected to correct minor pier alignment errors. Fortunately it seems that the rigid pier, coupled with the mass of the pier foundation and a loose shingle packing between the foundation and the surrounding access area, seems to have dealt with any noticeable tremor transmission to the scope.

I subsequently acquired a second-hand fibreglass dome that now provides a reliable cover for the scope albeit condensation remains a constant hazard. I continue to find ways to manage its appearance around the scope with heater tapes but wonder if I am missing some simple answer for dew appearing on the collecting plate around the metal baffle at its centre!

With no more excuses about equipment performance, I have had to get to grips with the basics of imaging. A presentation by Nik Szymanek at a CAA evening provided helpful encouragement. He makes it look so easy.....several books later I know much more about what I am not doing and should do. Initially the diverse issues

that needed to be addressed seemed overwhelming but by practice some appear more important than others depending on the seeing conditions and the target. I am a long way from mastering any part, but I am continuing to learn and hopefully will improve on my imaging results.

As an example of my antics, in the late autumn of 2009 I had a look around the constellation of Pegasus and located Stephan's Quintet. I imaged it in monochrome obtaining some 40 frames at 30 seconds each. After alignment processing with 'darks' deducted but with no other quality corrections, I selected 30 frames for combination using a statistical average combine process. I have since starting using a statistical mean combination process which can remove rogue hot pixel trails such as the one evident in my image of the Quintet. With the free programme Fits Liberator (courtesy ESO/ESA/ NASA professional astro imagers) I applied some of the tried and tested formulas from the available menus to bring out the faint detail to arrive at an image of the five galaxies which I then tidied up in Photoshop.

After the frustrations of trying to find (no less see) the Andromeda galaxy all those years ago I was awed to capture photons from Stephan's Quintet.

The large galaxy at 7 o'clock in the image is apparently only some 40 million light years away in line of sight of the other four that are nearly 300 million light years distant. The travel time for photons currently arriving from the cluster represents 2% of the estimated age of our known universe. They apparently started their journey when mammals had yet to emerge in the evolutionary process here on earth.

At around magnitude 14, the four distant galaxies in the image are some 1500 times fainter than the unaided human eye can detect.

The reason for my image of the cluster being superimposed on an image of the moon (taken earlier in the year) was to try and answer a question about how big the cluster would appear to be in the night sky if it could be seen unaided.

Stephan's Quintet has frequently been studied by professional astronomers since its discovery in the 19th century. ESA, NASA and Spitzer web sites have provided me with plenty of history, current observation and theory about the cluster and insights it can provide on events in the early universe. For reference, I have included a 2006 Spitzer space telescope composite image which clearly identifies a vast galactic shock wave not previously recognised from earth based observation.

If there are members of the CAA who are beginners in the imaging arena and would like to share their imaging experiences, find solutions and/or help crack a problem or two for others please let me know.



Imaging Kit: - Meade GLX 10" polar aligned; DSI II monochrome imager.

Software: - Autostar & Envisage; Registax; Fits Liberator; Photoshop CS4.

Observatory Location: Latitude 52° North; Longitude 0° East

Contact: voyager101@btinternet.com

Hi,

I managed to get a break in the clouds this morning [January 4th 2011] and took a couple of images of the Solar Eclipse using my Canon DSLR and 300mm lens.

Daniel Coe



Exploring the Moon with a Webcam by Mick Jenkins

One area of astronomy I enjoy is exploring the moon. The view through the telescope eyepiece of the Moon to me has a great deal of wow factor. The Moon being our closest neighbour is easy to explore with any size telescope and there are a lot of interesting features to keep your interest.

I like to photograph the Moon with a webcam, process the results, and with the finished image compare it with maps and books to find out about the features: labelling the photos helps to identify them. The following images were taken on the 15th November 2010.



Fig 1 Shows the Archimedes area, with the mountain range Montes Apenninus clearly shown being close to the terminator. Apenninus contains one of the highest peaks Mons Huygens at 5400 metres. The large crater is Archimedes at 85 km in diameter and walls 1400 metres above the sunken floor. Eratosthenes is 60 km in diameter with very steep sloping sides at 3570 metres high, three peaks can be clearly seen in the floor of the crater.



Fig 2. Shows a central area of the Moon with interesting features such as the fault line called the Straight Wall. It is not a sheer cliff, it only looks that way when the Sun casts a long shadow. The slope of the wall is between 30 and 40 degrees and has a height of 240 metres for a length of 114 km.

The Ptolemaeus chain of craters contains the 121 km diameter crater Alphonsus,. The crater walls are 2730 metres high and has steep slopes with many craterlets. There have been many strange sightings of gaseous emissions within the crater, the most famous was in 1958 when Kozyrey reported seeing a red colour within the crater.

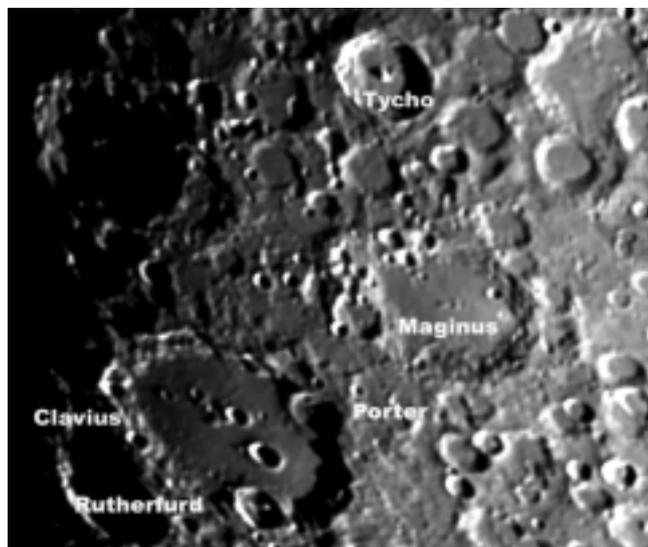


Fig 3. This photo shows the area around Clavis and Tycho. Clavius is the largest walled plain on the Earth-facing side at 231 km in diameter. It contains an arc of small craters with Porter and Rutherford sitting astride the very high walls which rise to 4000 metres.

Tycho is one of the easiest craters to see at full Moon because its very extensive ray system is the largest on the Moon. In this photograph Tycho looks like any other crater with a diameter of 88 km and the crater walls are 4800 metres high, the central mountain is 1500 metres high with three peaks, one is clearly visible in the photo.

Technical stuff

The above three images were taken using a LX200R 200 mm using a NexImage Webcam with a UV/IR filter, 1500 frames were processed in RegiStax 5, the final images contain a stack of 500 frames, the lettering and processing were completed in PhotoShop.

Alberio – The premier colour contrast double by Paul Fellows

Alberio or β -Cygni is actually the fifth brightest star in the constellation of Cygnus the swan, appearing at only magnitude 3 it marks the head of the giant bird in the sky. To the naked eye then it is rather unremarkable, but even the smallest telescope reveals it to be a real gem because it is actually a widely spaced double star. The main star is a bright yellow colour while its fainter companion is a beautiful blue. The two contrast each other very nicely and this makes Alberio one of my favourite targets for a summer or autumn observing session.



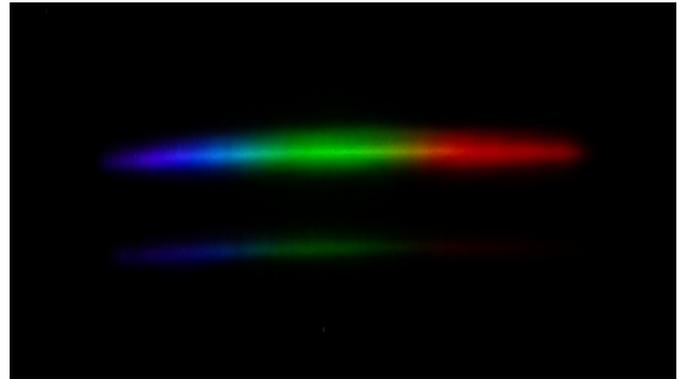
Here is an image taken with the 10-inch and my Nikon Coolpix camera – 8 seconds of exposure time. Even in this image you can see the colour contrast – but the view through the eyepiece is so much better than what a photo can do justice to.

These colours are because the stars are at different temperatures and as a result giving off light of different energies and therefore different wavelengths which equates to different colours. So I decided this would make an interesting target to try out the “star analyser” that I bought recently. What is a “star analyser?” I hear you ask! It is a diffraction grating that splits the light up and makes the spectrum of the light visible by spreading out the different wavelengths.

It looks like, and fits like, a filter, screwing into the front of the eyepiece with the same standard thread. When you then look through at the image, you see the normal image of the star, with its spectrum laid out to the side next to it. In fact you see several copies of the spectrum laid out to each side of the main star image.



In fact you see several copies of the spectrum laid out to each side of the main star image.



I tried this and was able to photograph the result using Alberio as my test subject and the resulting spectra are below

The top trace is the spectrum of the primary – and you can see that it is giving light almost right across the range, but that it is brightest in the middle, green, part. You should also be able to see that the red end is brighter than the blue end – and this is consistent with the overall yellow-white colour.

By comparison, the lower trace of the secondary star, which is fainter overall, shows that it is putting out most of its energy at the shorter-wavelength, higher-energy blue end – there is not a lot of red by comparison at all.

What you can just about make out as well is that there are some darker absorption bands in the spectra. I suspect if I had managed to get things in focus better and had been operating the camera with the remote cable release, that I had lost, these might have stood out better – but sorting that out can be a project for next time.

CAA News

Wednesday evening public observing sessions.

These started just after the new year on Wednesday evenings. The doors open at 6.50pm with a talk at 7.15pm by a researcher from the Institute followed by observing just before 8pm using the historic telescopes and our telescope/big screen set up, where we give guided tours of the night sky.

See the IoA website (www.ast.cam.ac.uk/public/public_observing) for the list of speakers. As usual we looking for volunteers to help set up if you interested in help contact Brian or Paul or just turn up at 6.30 by the Northumberland Dome

Capella.

As usual we would welcome contributions from members; photos, letters, articles etc. As you can see, we have very few items in this issue. So, just send your efforts to Paul via our website or Brian by email bt121@cam.ac.uk who will pass them onto Ken - our editor. Do not send us articles from other publications or the web. All your own work please!

Loan telescopes

There are usually no long waiting periods for the loan telescopes. Visit our web site (www.caa-cya.org) and click on to book an instrument, or ring Mickey Pallett on 01480-493045

CYA Meetings

7-11 Year Group

Saturday 29th January 2011

"The World of Astronomy in 3D."

Enjoy astronomy in 3D from the Apollo Moon landings forty years ago to recent images from the Mars rovers and the Cassini mission still orbiting Saturn.

Saturday 26th February 2011

"Our Place in Space."

Throughout history the question has been asked, "Where are we?" and many have tried to answer it. Not unnaturally, some said the Earth was at the centre of the Universe, others like Galileo questioned this (not a good idea with the Inquisition about). A certain Giordano Bruno managed to upset the authorities so much about his views of the Universe, that he ended up being burned at the stake. At least today if you have controversial views or theories, you don't find yourself coming to such a grizzly end!

These meetings will be held in the Hoyle Building at the Institute of Astronomy, Madingley Road from 10 a.m. till noon. Free to CYA members; for non-members there is a £1.00 fee.

11-plus age Group

Monday 10th January 2011

"The World of Astronomy in 3D."

Please remember: This is not the usual first Monday of the month.

A visual feast of astro-images, and yes, we'll be wearing those 3D glasses for some of the pictures. The Mars rovers are fitted with spectroscopic cameras and have taken many brilliant 3D images, but other images have a depth of field of thousands or millions of light years, or in the case of the Hubble Ultra Deep Field thousands of millions of light years.

Monday 7th February 2011

"The Search for Extrasolar Planets."

We'll be looking at the various methods of detecting planets orbiting other stars. So far (December 2010) 515 new planets have been discovered, since the first one (51 Peg) was discovered in 1995. We shall also be looking at new methods using space telescopes to find these elusive stellar companions.

These meetings will be held in the Hoyle Building at the Institute of Astronomy, Madingley Road from 7.15 p.m. till 8.45 p.m. Free to CYA members; for non-members there is a £1.00 fee.



At our Christmas speaker meeting Anita Joysey receives the Mystery Objects trophy from last years winner John Hall. The Trophy is one of the original stars from the Mead Building of 1824 that used to be at the base of the dome, which can be seen on the print behind them. Anita, who has won twice before will have to provide the objects for the next quiz!