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# CAPELLA

CAMBRIDGE ASTRONOMICAL ASSOCIATION

Newsletter 162. May / Jun 2013  
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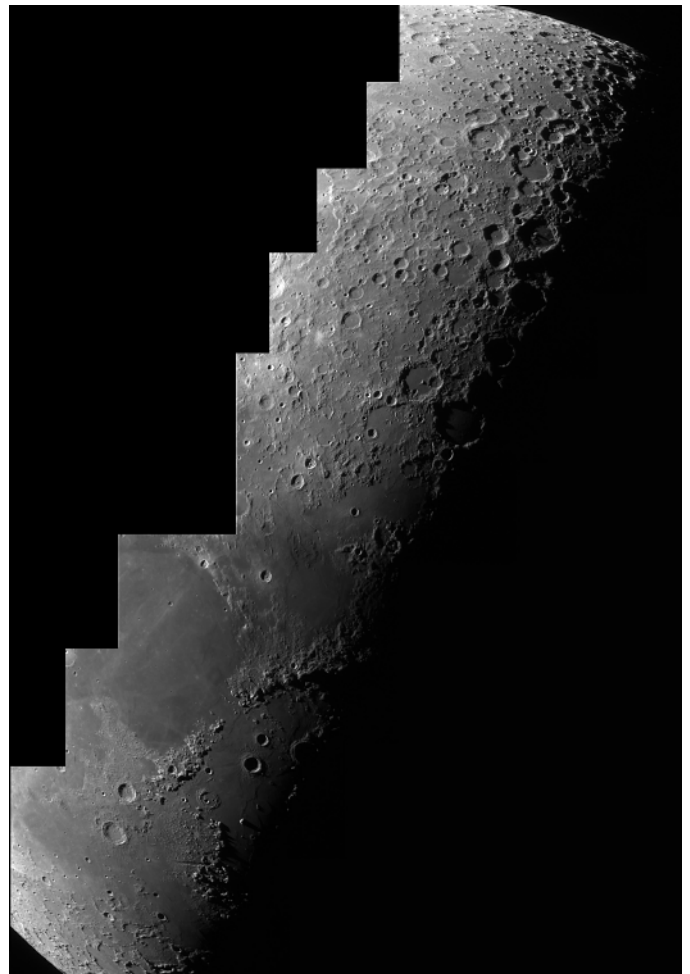
## Special edition featuring courses run by CAA

Moon mosaic image taken with an Altair Astro 8"/200mm RC telescope and an Imaging Source DMK21 mono camera.

8 panes used, each pane consisting of about 1,000 frames processed in Registax 6 and then joined automatically using the Photoshop 'Photomerge' option.

"It was a very bad night for seeing, but this was my first night out with my new scope, and I was amazed how actually good it looked after processing, seeing that I had not really taken much care in the video capture stage".

*To find out how to take Astro Photography, come on the course on page 4*



Taken on 19th March 2013  
at Ely, Cambridgeshire.  
Daniel Coe.

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# Cambridge Astronomical Association & Cambridge Young Astronomers

## Chairman's Comments

As I write these comments we have just finished the public observing season, with a score card of clear nights for the season of only 39% due to the abysmal weather this season. However, we are now planning the next series of activities which include the "Introduction to Astronomy" and "Intro to Astro-Imaging" courses which will be taking over our Wednesday nights for the next couple of months. The speaker meeting program remains a challenge filling all the spaces, especially over the summer vacation period, but we are nearly there with bookings up to Christmas.

There will also be another steam engine trip, back to Didcot, where the GWS did such a good job for us last time. Welcome to all our new members, and I look forward to seeing you all at some of these events in the future.

Paul

## Members Contributions

Photograph of the spectacular M42 and Jupiter  
By Paul Fellows

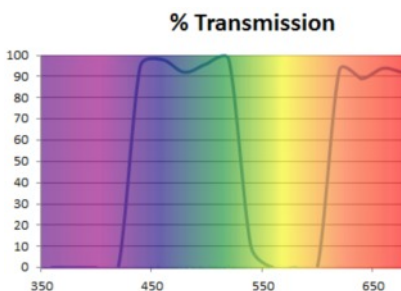


### M42 (Paul Fellows) and Jupiter (Alex Fellows) images

These were taken by Paul Fellows using a Modified DSLR camera and the 10-inch SNT telescope with a "CLS" filter.

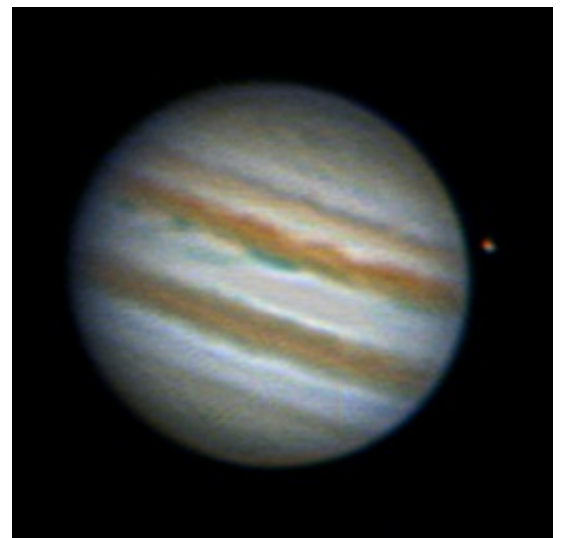
The Modification of the camera was to remove the internal filter that blocks out the Infra-red light. These filters are good for every-day use of the camera, but for astronomy, they block out the light from the emission line of Hydrogen called H-alpha at 656nm - so we need to let this through if we want a good image of a nebula!

These images then had a filter added called a "CLS filter" to cut out the yellow and orange parts of the spectrum this gets rid of most of street-light glow that we all suffer from.



The diagram shows which parts of the spectrum the filter lets through.

Without both of these tricks, the horsehead nebula remains almost impossible to pick out of the background.



**This image of Jupiter** was taken by Alex Fellows using the 10 inch SNT and a Phillips Web Cam. The image shows some great colours in the belts and of course the moon Io just heading into occultation behind the planet.

*See page 4 to learn how these pictures were taken.*

## Speaker Meetings

Friday 17<sup>th</sup> May 2013  
**Dr Robin Catchpole**

### **"Threats to Earth from Asteroids and Comets"**

Robin a recent Senior Astronomer at the Royal Observatory Greenwich, currently works at the Institute of Astronomy in Cambridge. Born in 1943, he took a BSc at University College, London, before being posted to the Royal Observatory at the Cape of Good Hope. He received his doctorate from the University of Cape Town.

In 1991 he returned to the Royal Greenwich Observatory, where he worked until it closed in 1998. He has authored and co-authored over 100 research papers and has used telescopes around the world including the Hubble Space Telescope. His research interests include the composition of stars, exploding stars, the structure of our Galaxy and galaxies with central black holes.

In this talk Robin will examine the threat from asteroids, how stable their orbits are and how we are trying to plot the course of each one's chaotic orbit near Earth to determine if it is on a collision course. If we do find one which could collide with Earth, he will tell us how we might be able to deal with the impending disaster.



Friday 21<sup>st</sup> June 2013  
**Dr Jay Farihi**

### **"Autopsies of dead rock stars"**

Jay was a Postdoctoral Researcher at the Gemini Observatory in Hawaii, which he left in 2007 and became a Research Associate at the University of Leicester. Last year he became the Ernest Rutherford Fellow at the Institute of Astronomy here in Cambridge.

His main research activity is digging up evidence of terrestrial planetary systems at stellar corpses known as white dwarfs. One might not expect to find the surviving planetary systems around dead stars, but the universe is full of surprises. In fact, it is likely we will learn more about extrasolar terrestrial planets using white dwarfs than via any other method. This is because cool white dwarfs have pure hydrogen and helium atmospheres, and those stars with rocky planetary systems can become polluted by small yet detectable amounts of heavy elements, such as metals.

Jay uses the Spitzer Space Telescope to analyze the rocky debris around white dwarfs and detect this metal pollution to measure the composition of the rocky planetary material, and even identify water.



**These speaker meetings will be in the Hoyle building of the Institute of Astronomy, Madingley Road, Cambridge. Doors will open at 7.30 pm. and the talks will begin at 8:00 p.m.** For security reasons, entry will not be possible after 8:10pm As usual, the library will be open before and after the lecture and refreshments will be available after the lecture. These meeting are free to members. Non-members are charged £1

# Capella CAA - CYA Course News

## Introduction to Astronomy

24<sup>th</sup> April to 29<sup>th</sup> May

Institute of Astronomy, Madingley Road starting at 8pm

This course will benefit those people new to astronomy, and give them an insight into this fascinating subject. We will be covering objects in our solar system, our galaxy and the universe beyond. Plus we will cover the use of telescopes, with hands-on opportunity to use various instruments.

The course is open to anyone over 18 years old.

The talks are on the following Wednesdays:-

- |                   |   |
|-------------------|---|
| <b>24th April</b> | "Things that go bump in the night." <b>Brian Lister</b> |
| <b>1st May</b>    | "Journey through the solar system" <b>Paul Fellows</b>  |
| <b>8th May</b>    | "The Sun and other Stars." <b>Peter Howell</b>          |
| <b>15th May</b>   | "Space" <b>Chris Crowe</b>                              |
| <b>22th May</b>   | "The Milky Way." <b>Carolyn Crawford</b>                |
| <b>29nd May</b>   | "An introduction to cosmology" <b>Will Handley</b>      |



The course is run jointly by the Institute of Astronomy and the CAA.

The Cost of the course is just £6 for the six weeks, or should you wish to attend only some of the evenings please pay £2 at the door for each meeting.

If you have any queries please contact Brian on 01223 420954 (evenings) or email [btl@cam.ac.uk](mailto:btl@cam.ac.uk) here (weekdays!)

## Introduction to imaging

12th June to 26th June 2013

Institute of Astronomy, Madingley Road starting at 8pm

This course attempts to clear away the fog and help people who would like to have a go and doing some imaging of their own for the first time, or to improve their techniques and learn more about the subject

The course is open to anyone over 18 years old.

The sessions are on the following Wednesdays:-

- |                  |   |
|------------------|---|
| <b>12th June</b> | "Capturing the Sky with a digital camera" <b>Paul Fellows</b> |
| <b>19th June</b> | "Imaging with a webcam" <b>Paul Fellows and Daniel Coe</b>    |
| <b>26th June</b> | "Deep Sky Photography" <b>Daniel Coe and Paul Beskeen</b>     |



The course is run jointly by the CAA and presented by some of our members who have learned to do imaging over the years. Often the hard way!

The Cost of the course is £6 for members, and £9 for non-members for the three sessions, or should you wish to attend only some of the evenings please pay £3 at the door for each session.

## More news

### Experience Steam Engine Driving at Didcot

Thursday 16th May at 06:00

We have been searching out new venues, but this time have decided to return to Didcot.

- Two Engines in steam - 3738 and 3650 with 5322 as reserve loco
- Driving and Firing a GWR Engine, and assisting the Guard
- Buffet lunch included
- Guided Tour of the site including repair shop, engine and carriage sheds
- Visit the signal box
- Museum and shop

Programme of the day will be

09:00 , with optional early start available for photography, aroma-therapy etc while the engines are prepared  
 10:30 On the footplate : First batch of drivers, in pairs  
 13:00 Lunch Break and group photo  
 14:00 On the footplate : Remaining driving pairs  
 16:30 Finish

The cost is just £102 for CAA members and £107 for non-members. As we'll have two engines in steam, which gives better value than our last visit in 2010 with considerably longer on the footplate. We also know from our last visit, it'll be a brilliant day out and we'll be very well looked after!

Here are some images from last time!



Peter shows a little touch of finesse with his driving technique!



GWR 5322 built 1917, weight 102 tons

To book a place: e-mail [bt121@cam.ac.uk](mailto:bt121@cam.ac.uk)  
 or call him on 01223 420954 (evenings)

## Members Contributions

### Steam powered Astronomy Part 2

By Brian Lister

*In the Capella 158 Sept/Oct 2012 issue, I wrote an article about steam powered astronomy.*

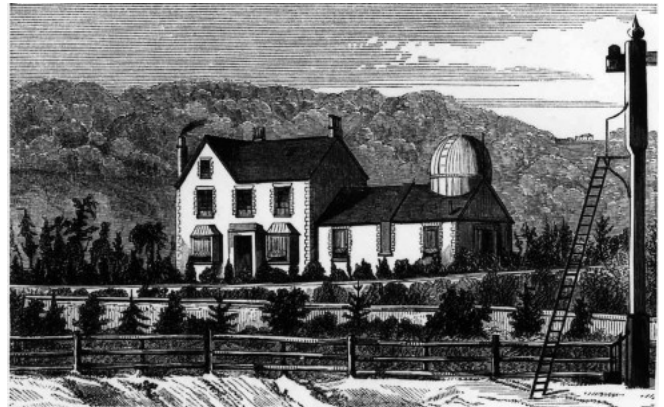
However I finished with the sad (for me!) thought that “Although I searched, I couldn’t find a steam powered telescope”. Clearly, I hadn’t looked hard enough! So, where does one start a search for a steam powered telescope? Putting ‘steam powered telescope’ in Google reveals nothing. Better start with a really clever chap – a really clever Cambridge chap – good ol’ Isaac.

#### **Newton’s bucket.**

In this experiment you suspend a bucket of water by a rope, then wind the bucket round and round so that the rope twists up, release the bucket which will spin as it unwinds, and once the water has caught up with the spinning bucket the surface of the water will assume a parabola. Newton probably didn’t do this demonstration, he already knew what would happen. He also knew that a parabolic mirror would produce a better telescope than the refractors that were then available. To figure a spherical mirror is comparatively easy, but to grind a parabolic mirror is a different question – it’s a real pig of a task! Although he made reflecting telescopes, producing the perfect parabolic curve was beyond him and he had to stop down the outer parts of the mirrors of his telescopes. By using the central portion of the mirror the difference between a spherical curve and a parabola is small enough not to affect the image too badly.

#### **Mercury telescope mirrors.**

It’s not surprising that astronomers thought about producing a mirror using a rotating container of mercury, the main problem would be that the telescope could only point to the zenith. The first published reference to the use as an astronomical telescope of a parabolic mirror formed from rotating liquid mercury appears to be a letter from Italian astronomer Ernesto Capocci of the Naples Observatory read before the Royal Academy of Belgium in 1850. Although he did not follow up his idea and build a working telescope – that would be left to Richard Carrington. Carrington lived in Redhill in Surrey, where, aged 26, he built his observatory in 1852 beside the railway line to Dover.



The observatory contained a 4.5 inch refractor, and a 5 inch transit telescope, and when Carrington wanted to measure his observatory’s precise latitude, he hit on the idea of using a mercury mirror telescope in conjunction with his other telescopes. How to power the rotating vessel of mercury? Steam of course! At last I’m a happy bunny, I’ve found my steam powered telescope, although there’s a slight tinge of sadness, as no diagrams or detailed description of this experiment exists. But at least the concept worked albeit with problems that would dog many liquid mirror telescopes, how to rotate the vessel at constant speed and avoid vibrations that would cause ripples in the surface of the mercury.

#### **Professor Robert Wood.**

Woods was not an astronomer but an experimental physicist and by 1901 a professor at Johns Hopkins University in Baltimore. He had a ability for finding simple solutions to problems that defeated others and in 1908, as a diversion during a holiday, he set himself the challenge of making a practical telescope. He would build the first successful liquid mirror telescope. It was built in his old well house, with a 20 inch spinning mercury mirror driven by fine rubber bands to eliminate vibrations, was placed more than 12 feet down the well and a hole cut in the roof of the well house.

*Continued over page -*

After dark just as the Milky Way was passing overhead Woods tried his telescope, “its appearance when I observed it from the roof of the house the first time the motor was started amply rewarded me for all my trouble”, he wrote, “No eyepiece was used, the star images appearing in space about 3 feet above the mouth of the pit...rising and falling rhythmically, dancing up and down like will-o “-the-wisps.” (Caused by the variations of the electric motor).

The photo shows Robert Wood with his 13 inch reflector in those far off halcyon days before health and safety was even dreamed of!

By the end of the summer he'd abandoned the project despite having rid the system of most vibrations, although he could detect someone walking on the lawn or a horse and carriage 200 yards away and even waves breaking after a storm on the nearby beach.



Liquid mirror telescopes (LMT) idea would remain dormant for more than 70 years. Then several LMTs were built, the largest is 6 meter diameter LMT at the University of British Columbia, completed in 2003. The mirror rotates at 8.5 revolutions a minute. Although these telescopes can only look straight up, the main advantage is they're very cheap to build compared to conventional telescopes of comparable size. Some things you don't need a steerable telescope for, such as, searching for supernovae and plotting orbits of space debris.

Mentioning steerable telescopes, I just wonder if there has ever been a steam driven telescope – the quest continues.....

## Useful Sites

<http://www.fourmilab.ch/earthview/pacalc.html> - Moon Perigee and Apogee Calculator. Members please contribute other sites that would be of interest to the members.

## CAA/CYA News

### **Public Observing Sessions.**

Observing sessions

These have now finished until Wednesday 4th September, when we have practice sessions without an audience. If you want to come along or find out what happens please contact Paul or Brian.

### **Display table**

At our speaker meetings we're putting out a table for members to display their photographs, bring along laptops to present their work or even show objects of interest.

#### **Capella editors notes.**

I would ask that any information you wish to include in Capella must be in a standard text or word format document. Any embedded pictures you have used in your story should be also sent as separate JPG's and smaller than 10mb. You can contact me by email on any content or publication issue at [richard@rwhitestudios.co.uk](mailto:richard@rwhitestudios.co.uk)

#### **Loan Telescopes.**

Our four existing loan telescopes are easy to use and easy to transport, and usually with no long waiting periods so why not give it a try. **See news above on two additions.** Visit our website ([www.caa-cya.org](http://www.caa-cya.org)) and click to book an instrument, or alternatively please ring Mickey Pallett on 01480 493045.

## CYA Meetings

### 7-11 Year Group

**Saturday 25<sup>th</sup> May 2013 at 10:00am**

**“Eclipses that changed history”.**

Today (25th May) there's penumbral lunar eclipse, but don't get too excited. The Moon will be right on the horizon, and it will barely touch the Earth's shadow. If you can see the moon you almost certainly won't notice the eclipse as the Moon is going nowhere near the darker part of the Earth's shadow (the umbra). Even if you were in South America with the full moon high over head, you would still be unlikely to see any difference at all. This eclipse is going to be one of the biggest non-events ever! But there have been eclipses that have a major effect on people who observed them - and of course, that's our topic.

**Saturday 29<sup>th</sup> June 2013 at 10am**

**“Ancient Greek Astronomy”.**

The ancient Greeks were really clever chaps, despite living more than two thousand years ago and having limited astronomical equipment. They managed to work out the exact length of the year, and were the first to calculate the size of the Moon and Sun, predict eclipses, measure the tilt of the Earth axis and even produced the first star catalogue. The period we're covering is from Pythagoras to Hipparchus, when the Greeks seemed to be light years ahead us 'thickies' here in Britain.

**Meetings for the 7 -11 year Group will be held in the Hoyle Building at the Institute of Astronomy, Madingley Road from 10.00am to 12.00 noon. Free to CYA members; for non-members there is a £1.00 fee.**

## 11+ group meetings

**Monday 6<sup>th</sup> May 2013 at 7:15pm**

**"Meteorites and Meteors"**

We'll be looking at the smaller members of the Solar System that come into contact with Earth's atmosphere (or the Earth!), from dust particles to something the size of Harrod's store. Nothing too big, just large enough to demolish your house or the odd Russian zinc factory roof, but certainly not big enough to cause a mass extinction - they're asteroids! We will have examples of the different types of meteorite from all over the World for you to look at.

**Monday 3<sup>rd</sup> June 2013 at 7:15pm**

**"Space Missions update"**

We'll be looking at the various satellites and space missions currently visiting or observing the Sun, planets, comets and asteroids and we'll have the latest results from them. There'll be information on forthcoming launches as well, including those which will be looking at our galaxy and beyond.

**Meetings for the 11+ Group will be held in the Hoyle Building at the Institute of Astronomy, Madingley Road from 7.15pm to 8.45pm. Free to CYA members; for non-members there is a £1.00 fee.**

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 Editor and DTP Setter: Richard White

Members should send stories for inclusion where possible by email to Richard at [richard@rwhitestudios.co.uk](mailto:richard@rwhitestudios.co.uk). Alternatively send them to Brian Lister Tel: 01223 420954 (evenings) or email [btl@cam.ac.uk](mailto:btl@cam.ac.uk)

**Please make sure that article text contributions are sent as standard Word files and images as .jpg's wherever possible.**

Vice President: Jim Hysom

Vice Chairman: Brian Lister

Cambridge Young Astronomers (both groups): Brian Lister Tel: (evenings) 01223 420954 or email [btl21@cam.ac.uk](mailto:btl21@cam.ac.uk)

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

Loan Telescope maintenance: Dave Allen, email [day.vid@hotmail.co.uk](mailto:day.vid@hotmail.co.uk)

Library: Kevin Black Tel: 01223 473121

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