



CAMBRIDGE UNIVERSITY
ASTRONOMICAL SOCIETY

NEPTUNE

2016-17 Edition

Cover Photo – The Dumbbell Nebula M27 by Andrew Sellek
See inside for lots more photos from CUAS members!

WELCOME

Another year of CUAS has passed and its been a busy one! We've had a planetary transit, a garden party, a visit from an astronaut and lectures and obsnights aplenty. You can read more about those on the forthcoming pages. I've also included some of the best photos taken by members both from Cambridge and from their homes. There are a few other items of interest such as an amusing archive finding and an observing report about the moons of Uranus and Neptune. All in all, it's been a really successful year with 120 new members at the time of writing and many longer-standing members still active. It's great to see so many people interested in our events and I'd like to thank everyone for making them worth running and also to thank all those who have helped make them happen. So take a read through and see what we've been up to this year!

Andrew Sellek (Neptune Editor and Chairman 2016-17)

Why Neptune?

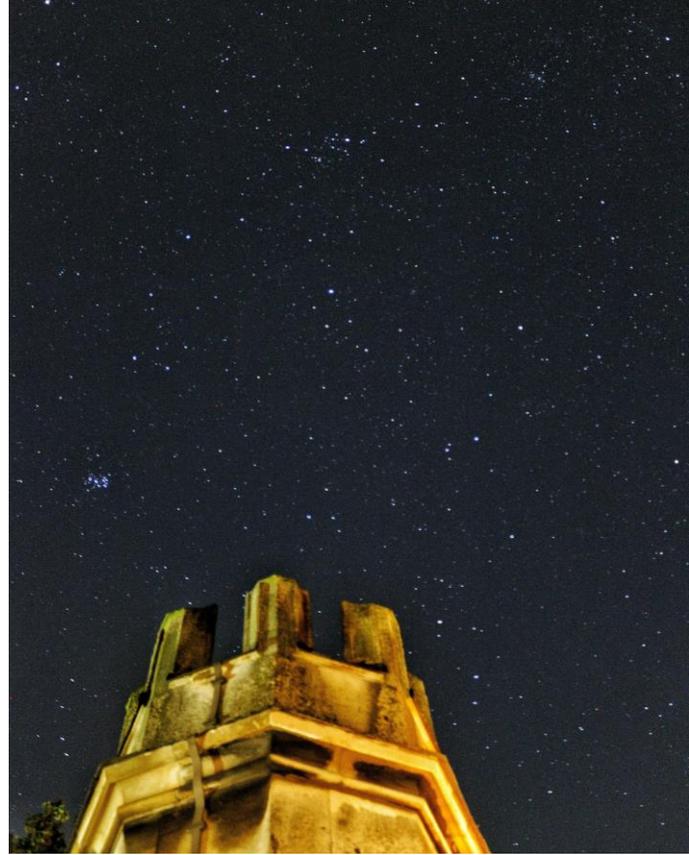
Neptune has a special place in the history of the Northumberland telescope. In 1846, the director of the observatory, James Challis, set out to look for the 8th planet predicted by Adams and LeVerrier—he recorded the planet in his observations but failed to recognise it as such before the German astronomer Galle announced his discovery. Now this magazine bears the planet's name. On his visit in November, Chris Lintott recalled the tongue-in-cheek events held in the early 2000s where members would all observe Neptune, deny seeing it and go to the pub instead!

2016-17 Committee:

Chairman:	Andrew Sellek
Secretary:	Helen Piatkowski
Junior Treasurer:	Xiao Lin
Observation Secretary:	James Xiao
General Member:	Priti Gupta



The University Library from Trinity – Toby Henley Smith

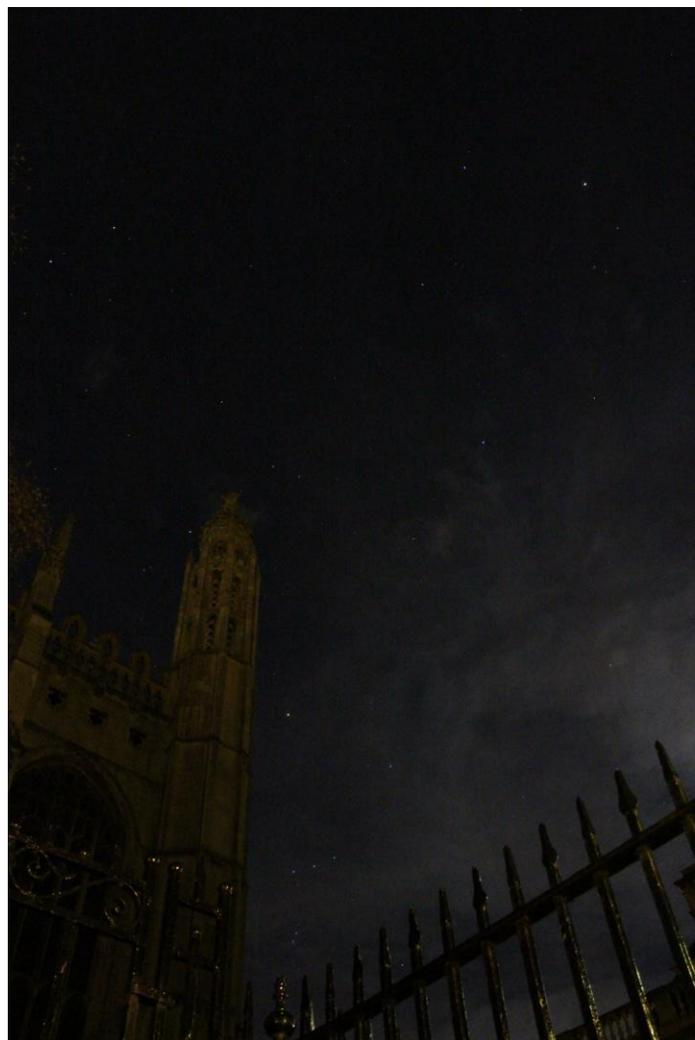


Trinity College – Toby Henley Smith

Garrett Hostel Lane – Yanbo Yin

WIDEFIELD PHOTOS

King's Chapel – Yanbo Yin



TRANSIT OF MERCURY

Mercury transits the Sun about 13-14 times a century as seen from Earth. The 9th May 2016 provided an especially good opportunity to observe this often elusive planet as the whole transit lasting over 7 hours was visible from the UK and more importantly, it was clear—the next entire transit visible from the UK is in 2049, though the next one to be partially visible is in 2019. We set up solar-filtered telescopes at the IoA along with the IoA themselves and the CAA to observe this phenomenon—there were excellent views of the sharp, round planetary disc contrasted with the softer, more irregular, sunspots. Several people took photos using phones and cameras too—below you can see Xiao Lin using his phone to do afocal imaging, an image of mine taken through the telescope and one I took with a zoom lens as the clouds began to come in.

Photos by Andrew Sellek





NEBULAE

Top L: **Crab Nebula M1**
– Aditya Ravuri

Top R: **Ring Nebula M57**
– Aditya Ravuri

Right: **Rosette Nebula**
– James Luis



Orion Nebula

Left: Toby Henley Smith

Centre: James Luis

Right: Tian Huang



MIKE FOALE

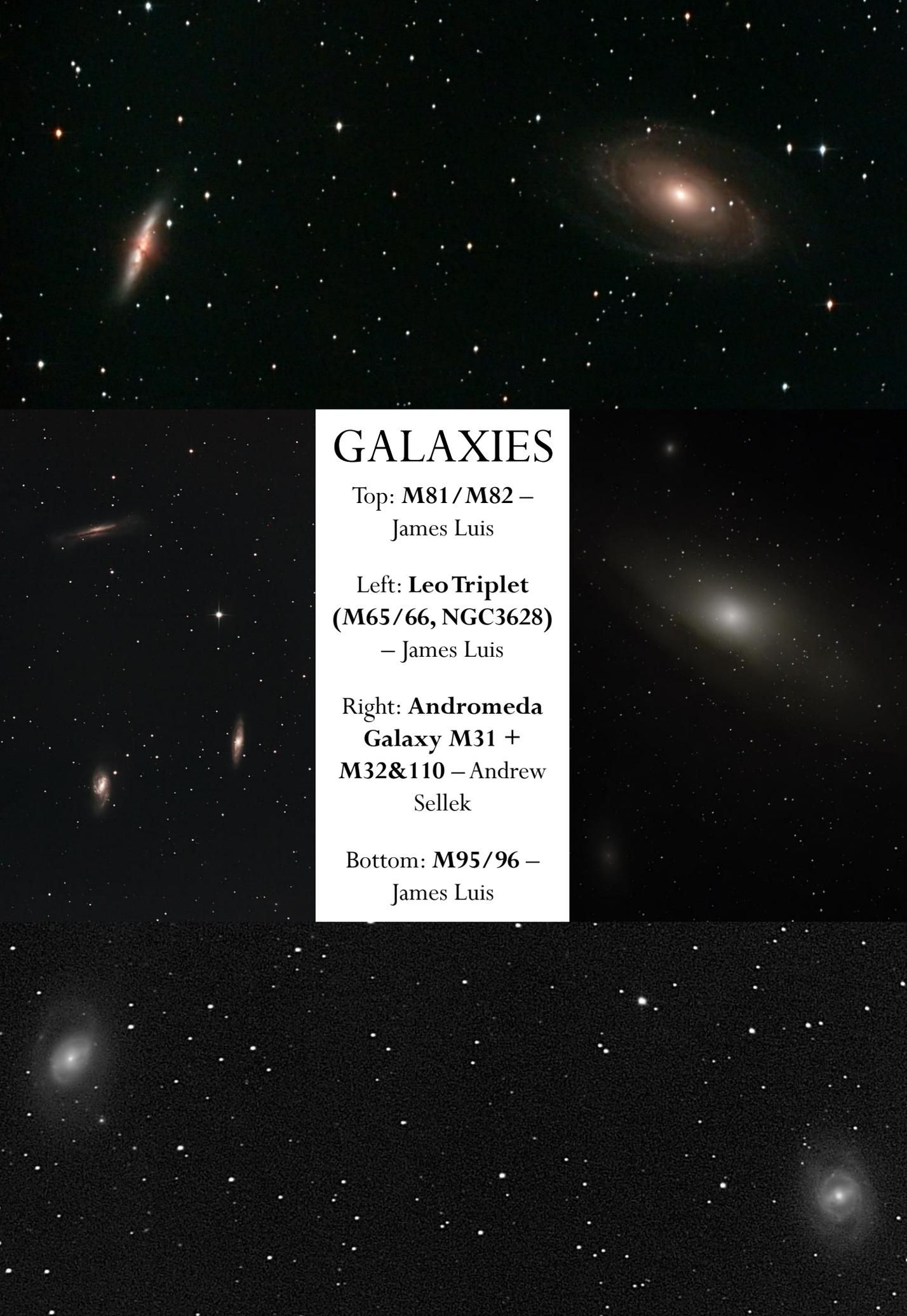
In November, we had an exciting visit from Dr Michael Foale CBE, a British-American NASA Astronaut, who came to speak to us and the “A Pint of Science” group. Mike told us of how he always had an ambition to go to space. A trained pilot, he was turned down from NASA’s astronaut selection programme twice before being accepted and encouraged us to keep pursue our ambitions, however unlikely! He is one of NASA’s most experienced astronauts and, as a fluent Russian speaker, was involved in collaboration projects with Russia in the 1990s. He described these spaceflights, including the importance of maintaining positive relationships with his crewmates, despite differing politics and cultures. The dramatic central feature of his tale was when a supply ship impacted the Mir space station, puncturing its hull. Mike prepared the escape vehicle as per guidelines—there may have only been minutes of oxygen—before realising his crewmates were trying to seal off the leaking module. He helped them do this but the space station was now rapidly spinning so the solar panels could no longer produce power. Mike determined a way to boost the space station so that they could regain power though there were several dynamical challenges to doing this. The evening concluded with questions and answers, many exploring the future of space travel with Mike proposing some exciting ideas about how to preserve the International Space Station for future years such as by dropping some modules in order to boost the laboratory to a higher orbit.

L: Mike answers questions from the audience

R: The committee take their chance to meet an astronaut!

Photos by Andrew Sellek





GALAXIES

Top: **M81/M82** –
James Luis

Left: **Leo Triplet**
(**M65/66, NGC3628**)
– James Luis

Right: **Andromeda**
Galaxy M31 +
M32&110 – Andrew
Sellek

Bottom: **M95/96** –
James Luis

CUAS SONGS?

In an age before the internet had developed increasingly niche meme pages for entertainment, and with no Crushbridge for students to vent their poetic talents, it seems our CUAS predecessors took to rewriting the lyrics to well-known tunes. In some ways not much has changed though one song refers to the “Northcumbersome” when now Northumberland is generally much easier to use the Thorrowgood! Take a look below a one of the more relatable songs—especially since this year we have observed both Neptune and a transit (Pluto is hard to see at the moment sadly, but issues of Neptune from the 1990s do record it being observed!):

Northumberland (Tune: "Jerusalem")

1.

And did those eyes, in ancient times,
Peer upon planetaries green?
And was That Planet, missed by James,
Through our great refractor seen?
And have three hundred solstice suns
Shone forth upon our clouded fens?
And did Northumberland build it here,
Resplendent with a Cauchoix lens?

2.

The music of the spheres plays on,
We spend our nights drinking starlight;
But our excess defies surfeit-
Each transit adds to our delight!
For three half-centuries the sky
Has with our minds and souls eloped:
Still you will find us queuing for more
Beside the Third Duke's mighty 'scope.

3.

Bring me my charts, covered in mould!
Bring me my torch of dimmest red!
Bring me my blanks- O clouds unfold!
Bring me coffee and pizza-bread!
I will not sleep another night,
My lectures I'll put out to grass,
Till I have gazed at Pluto through
Northumberland's thrice-virgin glass.

Martin Clayton, mcmlxxxviii

CLUSTERS

Top Right: **The Pleiades M45** –
Andrew Sellek



Centre Right: **Great Globular in Hercules M13** – Toby Henley Smith



Bottom Right: **M52 (and the Bubble Nebula)** – James Luis

Bottom Left: **Great Globular in Hercules M13** – Aditya Ravuri

Centre Left: **Open Cluster** – Aditya Ravuri



PRIZE* QUIZ

This year we had a quiz on our Freshers' Fair Stall. James set a very tough challenge with only 3 minutes to complete a set of mainly matching questions. The best score was 24/43 scored by William McCorkindale. Try out one of the questions below and see how you would have done:

(James likes telescopes, check out his fleece!)

1) Match the observatories to what they detect (draw lines):

Radio		Chandra
Infrared		LIGO
NIR-Visible-UV		IceCube
X-ray		Arecibo
Gamma ray		Hubble
Neutrinos		Fermi
Gravitational waves		Herschel

**The prize is the kudos of beating James' question!*

NEW EQUIPMENT

We recently bought some new equipment for the society to use for observing. This includes a new widefield eyepiece that gives views of a larger area of the sky at a higher magnification than before, making observing a more immersive experience. There is also a UHC (Ultra High Contrast) filter which lets through specific wavelengths related to Hydrogen and Oxygen – it greatly improves the contrast and detail that can be seen on emission nebulae and cuts down on light pollution. Finally there is an adapter with a T-ring thread that can be used in conjunction with the appropriate T-ring for astrophotography.



ANSWERS: Radio: Arecibo; Infrared: Herschel; NIR-Visible-UV: Hubble; X-ray: Chandra; Gamma-ray: Fermi; Neutrinos: IceCube; Gravitational waves: LIGO

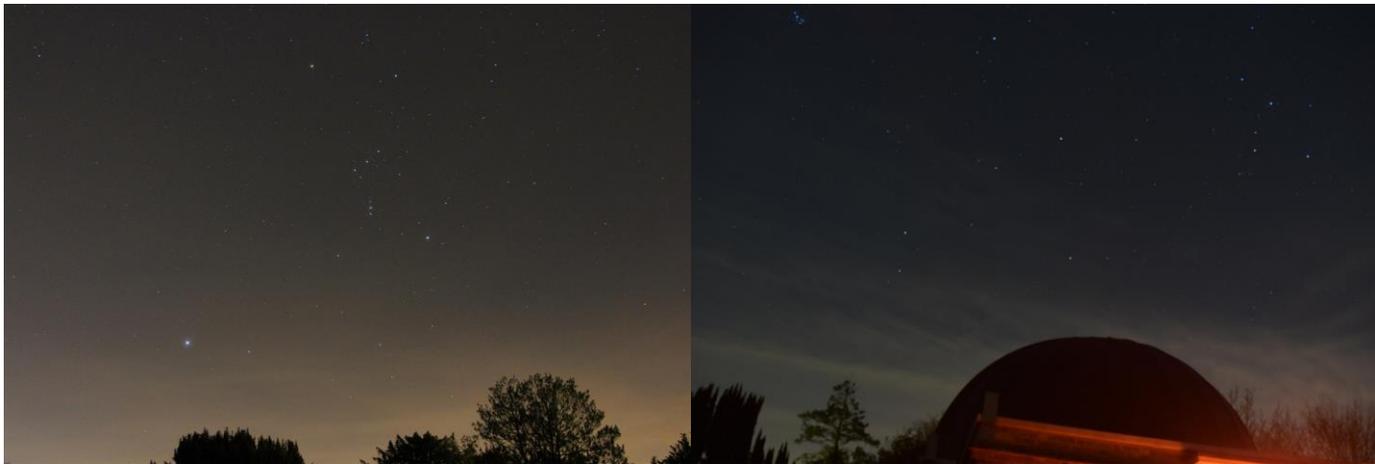
ASTROPHOTOGRAPHY WORKSHOP

In February, James held an astrophotography workshop to show members some of the different methods used to image the skies (Photos by Andrew Sellek):



Here are some examples of widefield images we took:

L: Orion - James Xiao / Yanbo Yin R: Perseus and Cassiopeia above Northumberland - Andrew Sellek



The Observatory Building - James Luis



One interesting trick was to defocus the camera a little to exaggerate different colours of the stars as James demonstrated here:



OBSERVING THE MOONS OF URANUS AND NEPTUNE

For the last few years the autumn sky has been devoid of bright planets, so the Solar System spotlight has fallen on the ice giants, Uranus and Neptune, which will remain autumn objects for years to come. Although they only appear as featureless dots through most telescopes, many people are excited just to see these planets at all: at the Freshers' ObsNight in October 2016, there was a queue of around 60 people waiting to observe Uranus through the Northumberland scope! But there is more to observing Uranus and Neptune than just their bland bluish disks. Uranus's two largest moons, Titania and Oberon, are around magnitude 14 at their brightest – 2000 times fainter than Uranus – and they are always within an arcminute of the planet. But under the right conditions, they can be seen with the Northumberland; I observed them several times in October.

To see these faint moons, high magnification is necessary: I used around 300x (the 20mm Meade eyepiece in the Northumberland). Averted vision is essential, and tapping the telescope tube slightly helps too. None of this will work if the Moon is up. The quality of the sky is very important, and this can be hard to judge with the naked eye. On one night I spotted both Titania and Oberon very quickly. On another night, when the sky seemed just as clear, I only managed to see one of the moons, even after half an hour. I expect that observing Titania and Oberon would be very difficult in any scope of 8 inches or below.

Uranus has three more moons that are visible in larger telescopes, but are almost certainly impossible with the Northumberland.

Neptune's largest moon, Triton, reaches magnitude 13.5 at its brightest. This is brighter than Uranus's moons, but Triton always remains within 20 arcseconds of Neptune, so it can get caught in the glare. Nevertheless, I managed to spot Triton with the Northumberland on two nights in October.

All the tips I gave for observing Titania and Oberon also apply to Triton: a moonless night, high magnification, averted vision and good sky quality are all important. Again, a scope larger than 8 inches is probably necessary, at least from Britain.

Faint stars can masquerade as moons, but luckily Sky and Telescope have tools that show the positions of the major moons of Uranus and Neptune:

http://www.skyandtelescope.com/wp-content/observing-tools/uranus_moons/uranian.html

http://www.skyandtelescope.com/wp-content/observing-tools/neptune_moons/neptune.html

This year there will again be no bright planets in the autumn sky, so if you find yourself observing Uranus or Neptune, don't forget to look out for moons.

Harry Metrebian



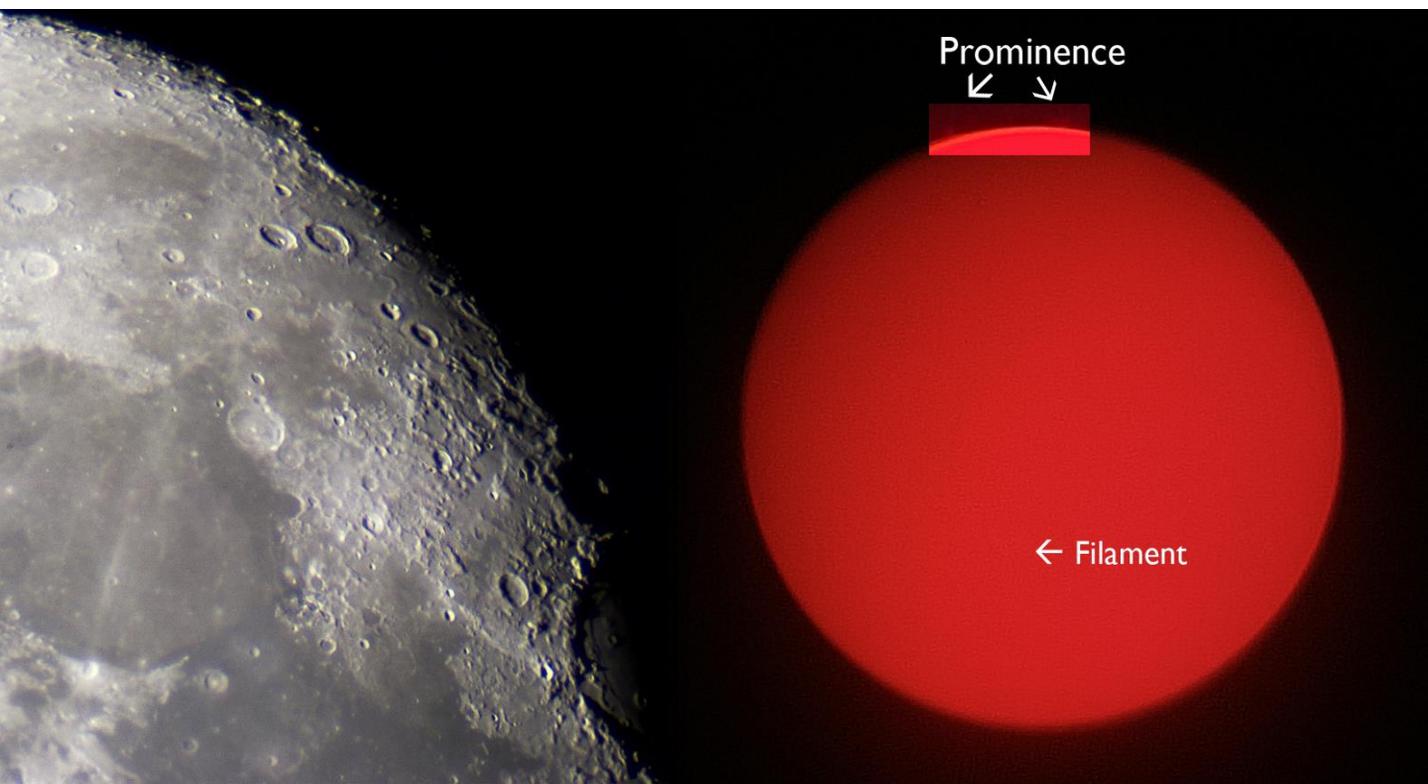
OUR SOLAR SYSTEM

Top: **Solar system composite**
(Venus, Uranus, Jupiter and moons
photographed with Northumberland)
– Aditya Ravuri

Right: **September 2015 Lunar
Eclipse** – Toby Henley Smith

Bottom L: **The Moon** – Aditya
Ravuri

Bottom R: **The Sun** – Aditya Ravuri



TALK POSTERS

Thanks to Joanna Piotrowska for making these amazing posters each week!



UAS Cambridge University Astronomical Society

Jupiter and Juno

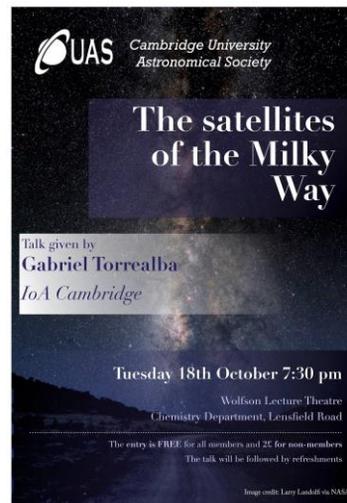
Talk given by
Dr Carolin Crawford
IoA Cambridge

Tuesday 11th October 7:30 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: NASA/JPL-Casch



UAS Cambridge University Astronomical Society

The satellites of the Milky Way

Talk given by
Gabriel Torrealba
IoA Cambridge

Tuesday 18th October 7:30 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: Larry Landolt on NASA



UAS Cambridge University Astronomical Society

Cosmology after the first 5 minutes

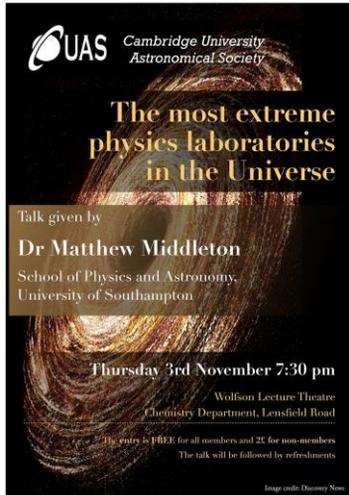
Talk given by
Sarah Bosman
IoA Cambridge

Tuesday 25th October 7:30 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: cosmicweb.banuchuk.com



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The most extreme physics laboratories in the Universe

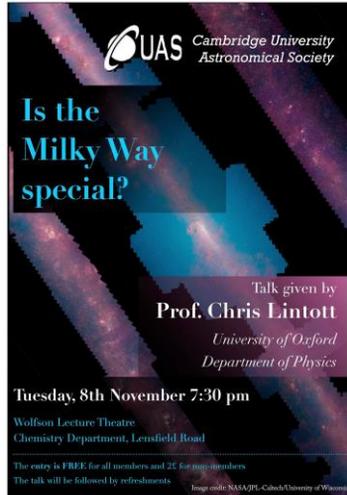
Talk given by
Dr Matthew Middleton
School of Physics and Astronomy,
University of Southampton

Thursday 3rd November 7:30 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: Discovery News



UAS Cambridge University Astronomical Society

Is the Milky Way special?

Talk given by
Prof. Chris Lintott
University of Oxford
Department of Physics

Tuesday, 8th November 7:30 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: NASA/JPL-Casch/University of Wisconsin



UAS Cambridge University Astronomical Society

Characterising Exoplanets with a Twinkle satellite, researchers and school students.

Talk given by
Dr Laura McKemmish
UCL, Twinkle project

Tuesday 15th November 7:30 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: huffingtonpost.com



UAS Cambridge University Astronomical Society

Neutron stars: beyond-ordinary stellar objects

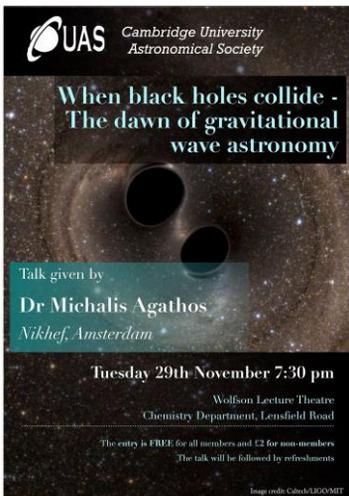
Talk given by
Dr Arnau Rios
University of Surrey

Tuesday, 22nd November 7:30 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: usmag



UAS Cambridge University Astronomical Society

When black holes collide - The dawn of gravitational wave astronomy

Talk given by
Dr Michalis Agathos
Nikhef, Amsterdam

Tuesday 29th November 7:30 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: Caltech/LIGO/MIT



UAS Cambridge University Astronomical Society

A Comet's tale

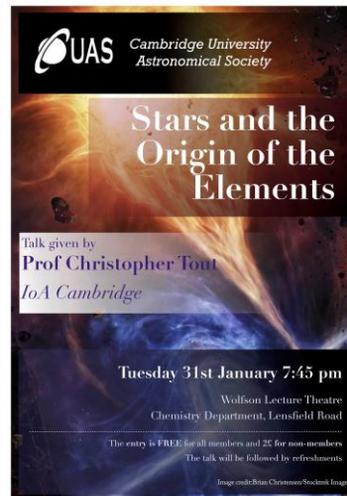
Talk given by
Jonathan Shanklin
British Antarctic Survey

Tuesday 24th January 7:45 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: Michel Jäger / Royal Museum Greenwich



UAS Cambridge University Astronomical Society

Stars and the Origin of the Elements

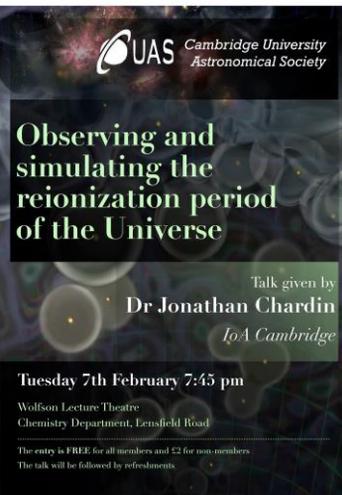
Talk given by
Prof Christopher Tout
IoA Cambridge

Tuesday 31st January 7:45 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: Brian Choumou/Socimedia Images



UAS Cambridge University Astronomical Society

Observing and simulating the reionization period of the Universe

Talk given by
Dr Jonathan Chardin
IoA Cambridge

Tuesday 7th February 7:45 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.



UAS Cambridge University Astronomical Society

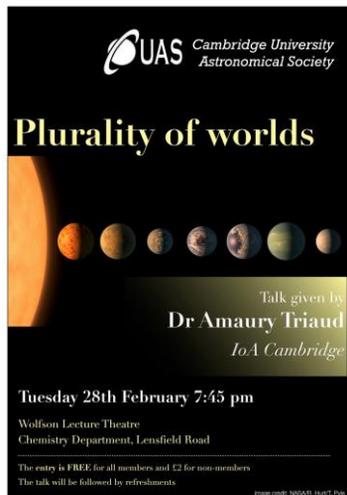
Planets, comets, dust ... or aliens... around KIC8462852

Talk given by
Prof. Mark Wyatt
IoA Cambridge

Tuesday 21st February 7:45 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.



UAS Cambridge University Astronomical Society

Plurality of worlds

Talk given by
Dr Amaury Triaud
IoA Cambridge

Tuesday 28th February 7:45 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: NASA's Hubble Space Telescope



UAS Cambridge University Astronomical Society

Our Dynamic Sun

Talk given by
Dr Helen Mason
DAMTP, Cambridge

Tuesday, 14th March 7:45 pm

Wolfson Lecture Theatre
Chemistry Department, Lensfield Road

The entry is FREE for all members and £2 for non-members
The talk will be followed by refreshments.

Image credit: space.com