

Talks A-Z



200@75

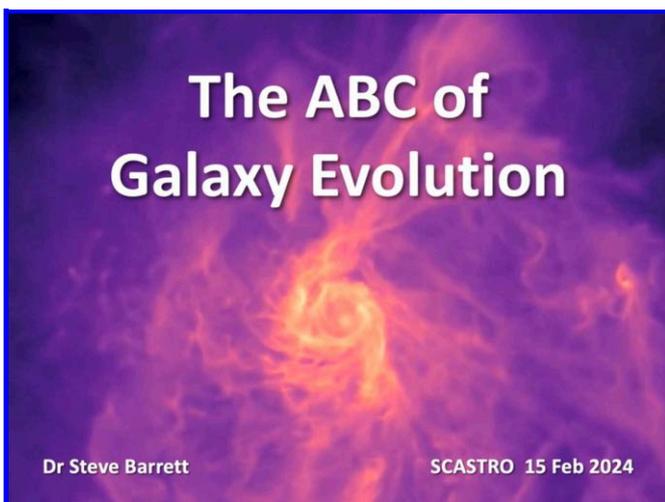
The 200" Hale Telescope on Palomar Mountain has been in operation for 75 years. This is the story of its design and construction.

Recording

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ABC of Galaxy Evolution

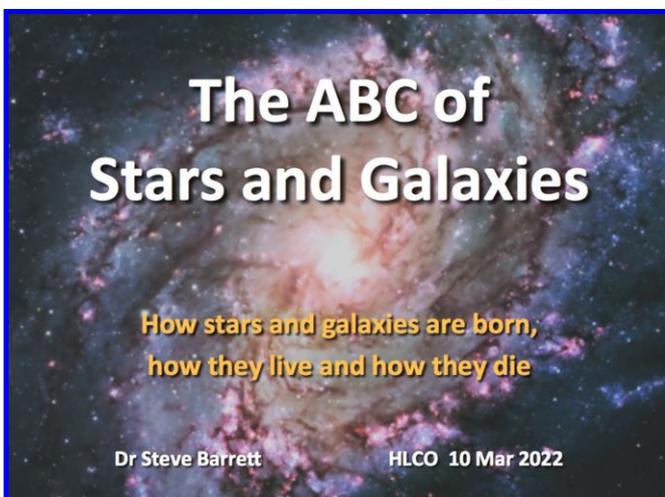
What are the three factors (the ABC) that determine how galaxies form and how they grow?

Recording

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ABC of Stars and Galaxies *

How stars and galaxies are born, how they live and how they die. A star might live for billions of years and during its lifetime it can evolve and change its behaviour. This talk looks at the main factors (the ABC) that determine how galaxies form and grow and how stars evolve.

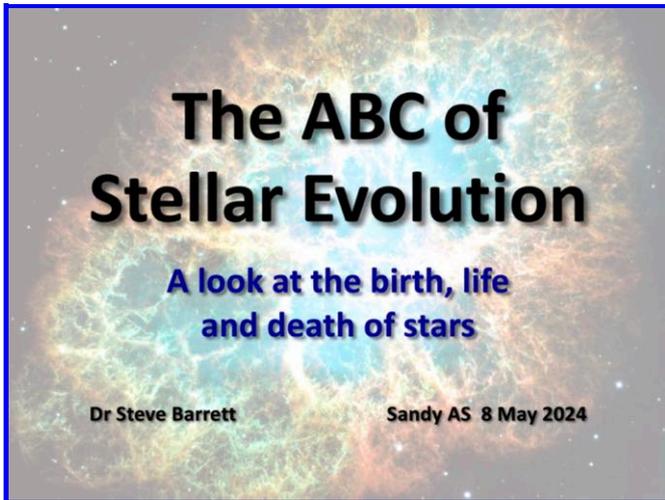
Part of [The Universe: Half an Hour at a Time](#)

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ABC of Stellar Evolution

A look at the birth, life and death of stars. What are the three factors (the ABC) that determine why stars are the way they are and why they evolve the way they do?

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Ancient Light *

The Universe is vast and ancient. Large telescopes have imaged galaxies that are billions of light-years distant. Is it possible to capture an image of one of these very remote objects without a telescope?

Appendix: [How can the light ever reach us?](#)

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Apollo 13 *

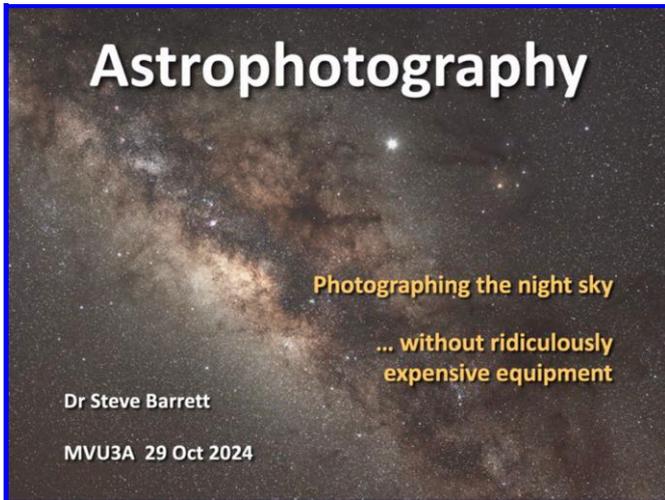
In 1970 the Apollo 13 mission "had a problem". The heroic efforts of mission control to rescue the three astronauts are well documented. This short talk covers some of the perhaps not-so-well-known aspects of the mission.

Recording



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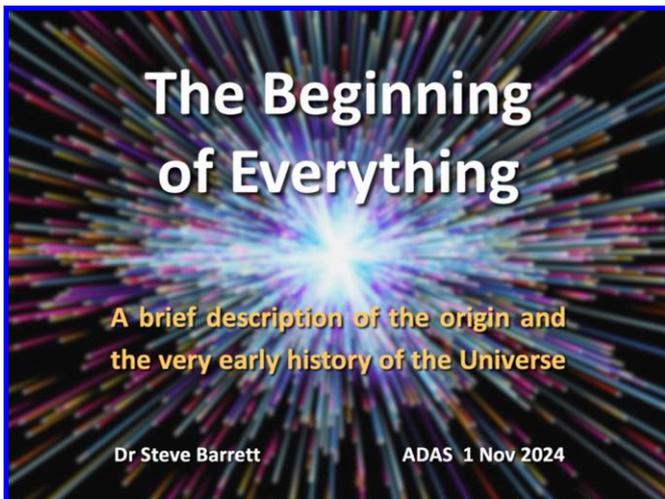
Astrophotography

Photographing the night sky without ridiculously expensive equipment. What can be done with a digital camera, a tripod, a bit of ingenuity and very little else?

Recording



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Beginning of Everything

A brief description of the origin and the very early history of the Universe. After the Big Bang it took about three minutes to make all the constituents of the Universe and give it a kickstart. If this happened 13.8 billion years ago, how can we be so sure?

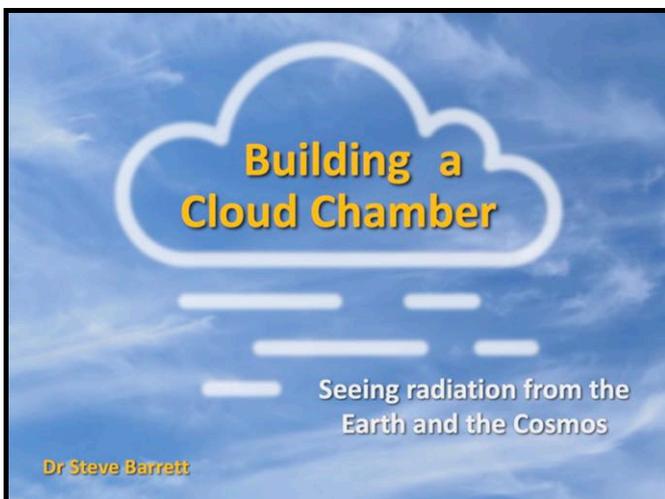
A shorter version of this talk is part of

[The Universe: Half an Hour at a Time](#)

Recording



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Building a Cloud Chamber *

A cloud chamber shows the tracks of charged particles as they pass through and so can be used to see radiation from the Earth and cosmic rays. This short talk describes how I designed and built one.

The design and construction:

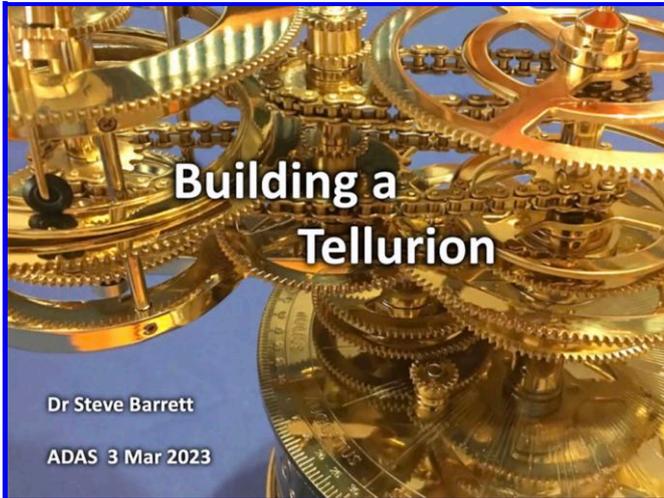
[Building a Cloud Chamber](#)

Recording



Handout





Building a Tellurion *

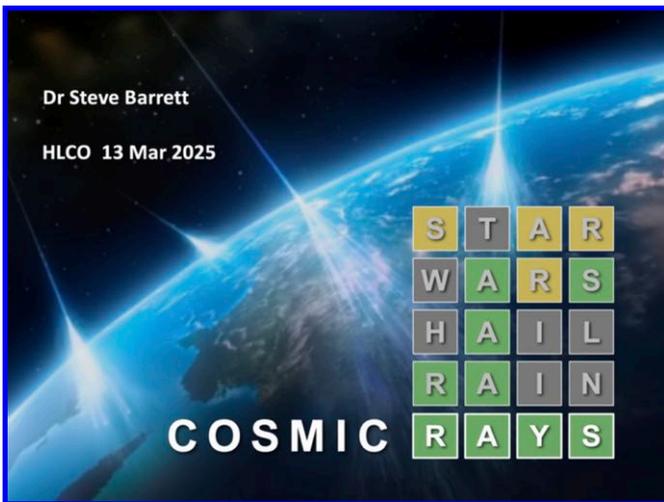
A tellurion is a model of the Earth-Moon-Sun system that demonstrates the changing seasons, the phases of the Moon, and predicts eclipses.

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Cosmic Rays

High-energy charged particles are continually raining down on the Earth. Where do they come from and how do they gain so much energy? This talk includes a demonstration of a [cloud chamber](#) that allows cosmic rays to be seen.

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Dark Matter

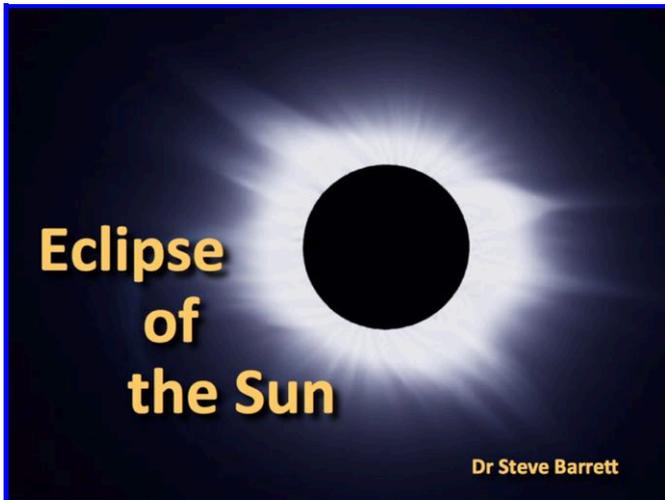
More than 80% of all the matter in the Universe is dark matter. What is the evidence that makes us think that dark matter exists? Why is it dark? What is it made of? Does it matter? What are the consequences if dark matter does not exist?

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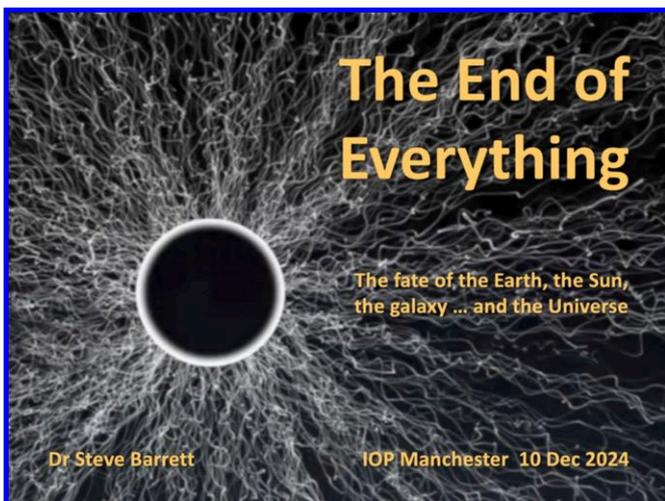
Eclipse of the Sun

Why do solar eclipses happen and what determines how often they occur? An explanation of the theory and an account of a trip to the Sahara Desert in 2006 to observe and photograph a total eclipse.

Recording



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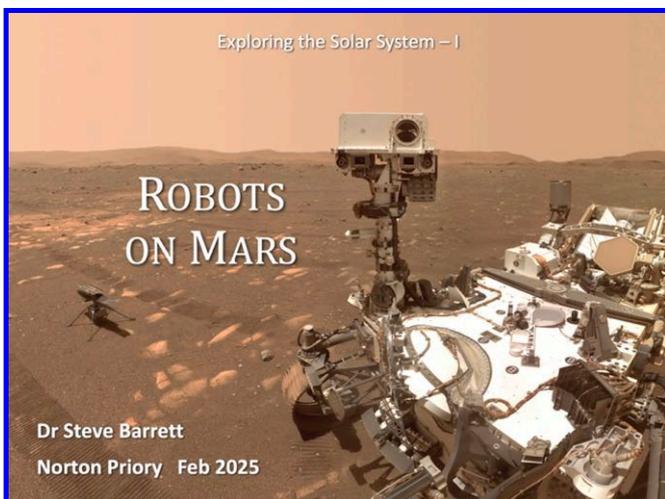
End of Everything

Although it took only three minutes to make our Universe (see 'Beginning of Everything') it will take more than a trillion trillion years for it to come to an end. This talk looks at what will happen to the Earth, the Sun and the galaxy on timescales ranging from thousands of years to eternity.

Recording



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Exploring the Solar System – Robots on Mars *

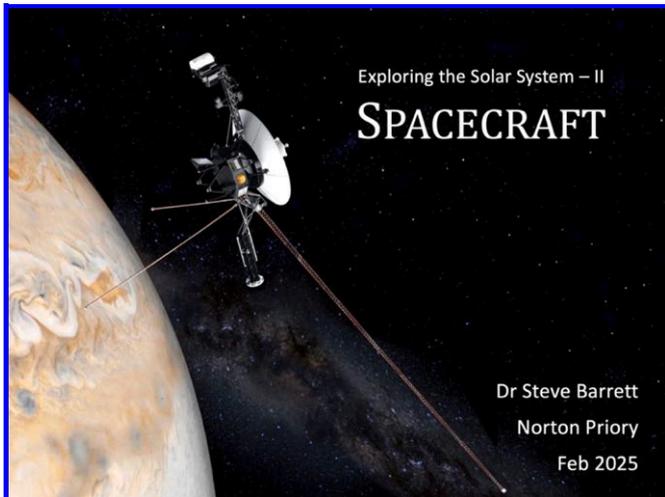
Rovers have been exploring the surface of Mars for over 25 years. The latest generation of rovers is looking for signs of past life and is collecting rock, soil and atmosphere samples for return to Earth.

Recording



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Exploring the Solar System – II
SPACECRAFT

Dr Steve Barrett
Norton Priory
Feb 2025

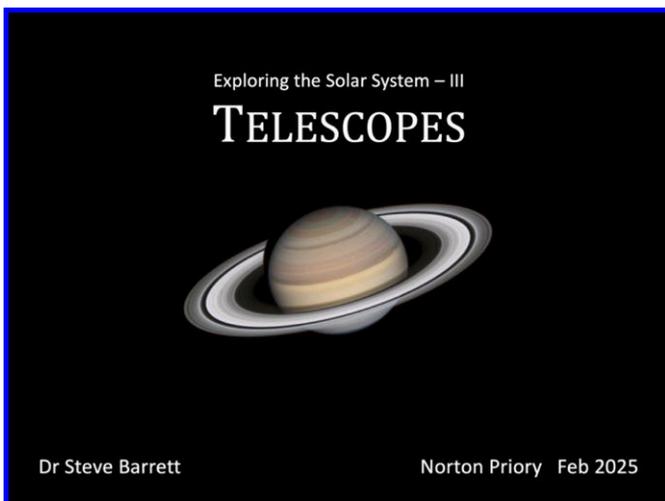
Exploring the Solar System II – Spacecraft *

We have visited every major body in the solar system by sending spacecraft across billions of miles. These unmanned probes have mapped dozens of planets and moons and sent back incredible images.

Recording



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Exploring the Solar System – III
TELESCOPES

Dr Steve Barrett

Norton Priory Feb 2025

Exploring the Solar System III – Telescopes *

Since Galileo first turned his telescope on the night sky, we have been using telescopes with ever larger apertures to observe and study all types of object in the solar system.

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Exploring the Solar System – IV
EXOPLANETS

Dr Steve Barrett
DU3A 4 Apr 2025

Exploring the Solar System IV – Exoplanets *

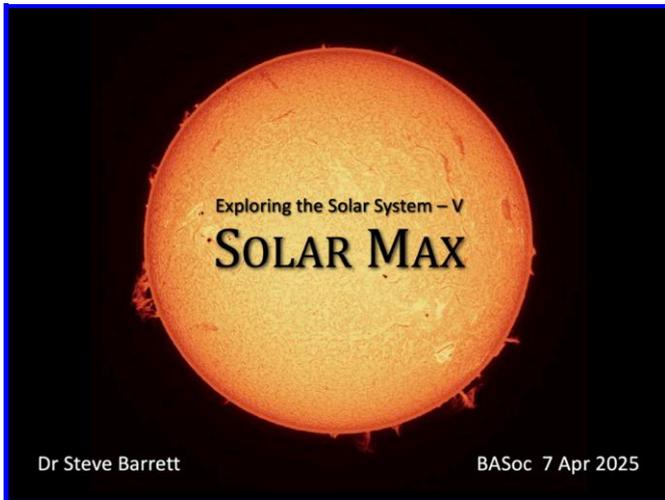
The first discovery of a planet orbiting another star was made 30 years ago. Since then, many thousands more have been found. The number of habitable planets in the galaxy may number in the billions, but are they inhabited?

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Exploring the Solar System V – Solar Max *

The activity of the Sun goes through an 11-year cycle and is at a maximum in 2025. Specialist instruments, both professional and amateur, have been able to capture detailed images of its surface features.

Recording



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Fiat Lux

A talk on the nature of light with measurements of the speed of light and the wavelength of light, and demonstrations of splitting light into its component colours and different types of polarisation of light.

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Fiat Lux II

A sequel to 'Fiat Lux', this talk looks at how the nature of light has influenced the design and construction of optical telescopes.

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Fiat Lux III (aka **LSST**)

The Large Synoptic Survey Telescope will survey many billions of galaxies, stars and planets and will address the most profound questions concerning our solar system, our Milky Way galaxy, and enigmatic dark matter and dark energy.

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Fiat Lux IV (aka **Colour in the Cosmos**)

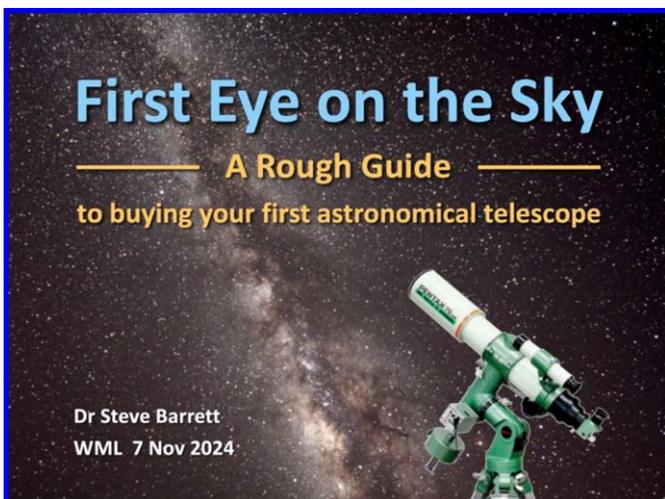
Part four of the 'Fiat Lux' trilogy.

How we perceive colour is a complex mix of physics and physiology. We can see in colour because starlight (and hence sunlight) covers a spectrum of wavelengths. What can colours tell us about how the Universe works?

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First Eye on the Sky *

A rough guide to buying your first astronomical telescope. The pros and cons of the different telescope types and a guide to the prices you can expect to pay.

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Great Moon Hoax

As we all know, the Apollo moon landings of the late 1960s and early 1970s were faked by NASA. What is the 'evidence' that supports this claim and does it stand up to scientific scrutiny?

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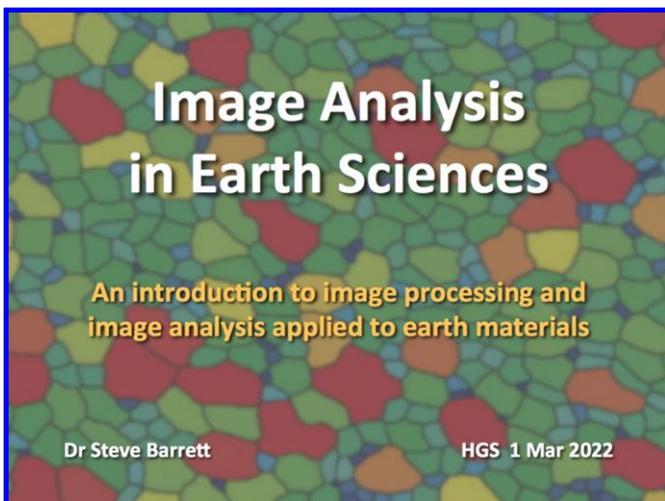


Image Analysis in Earth Sciences

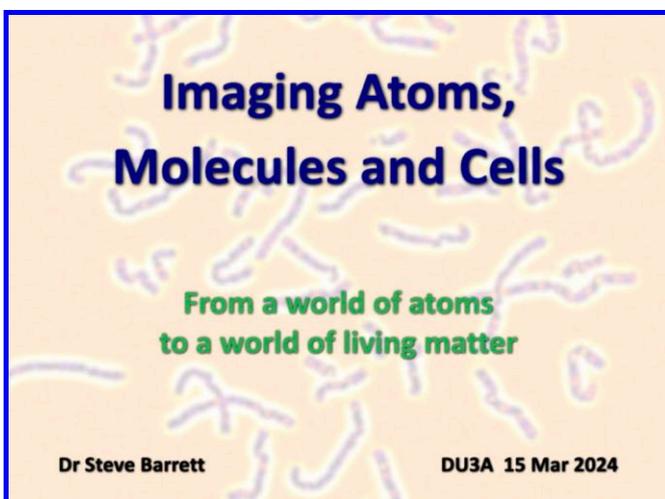
An overview of how images can be analysed to provide information about a wide range of materials, including geomaterials, and a short introduction to the nature of light shows how specialist microscopes can be used to reveal the crystalline structure of rocks.

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Imaging Atoms, Molecules and Cells

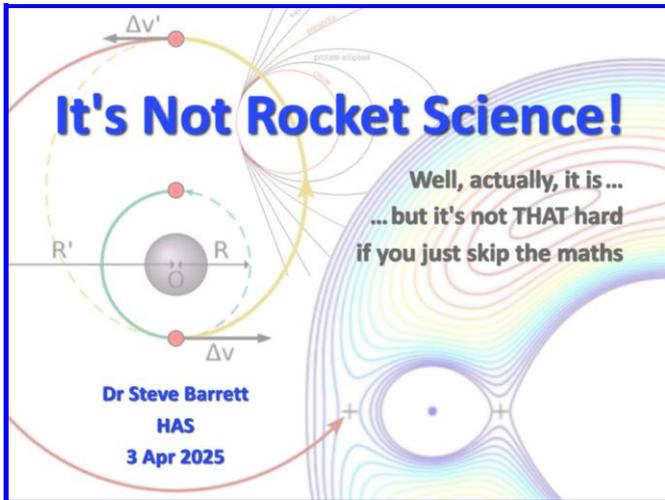
From a world of atoms to a world of living matter. This talk describes how microscopes, that can resolve features from microns down to less than a nanometre, can be used to image atoms and molecules, and can be applied in the earth sciences and medical sciences.

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It's Not Rocket Science!

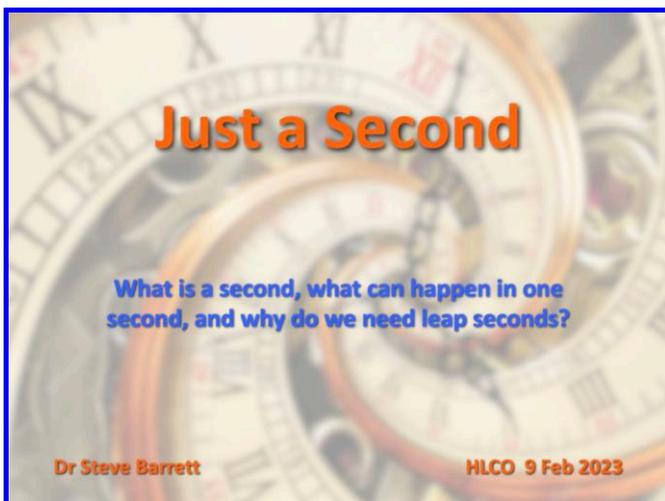
Rocket science is thought to be hard because the maths of orbital mechanics gets in the way. This talk skips over the maths and looks at orbits, how spacecraft travel between planets and how they can park at Lagrange points.

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Just a Second *

What is a second, what can happen in one second, and why do we need leap seconds?

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JWST+3 *

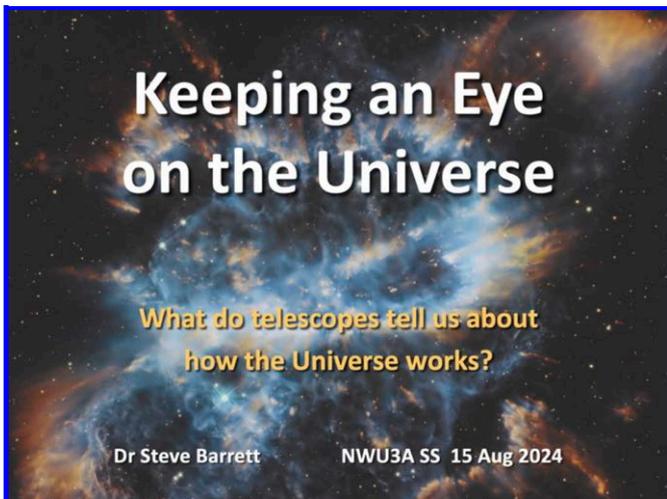
Three years after the launch of the James Webb Space Telescope on Christmas Day 2021, this short talk reviews some of the images and spectra released to date.

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Keeping an Eye on the Universe

What do telescopes tell us about how the Universe works? A look at some of the images taken by the world's largest telescopes and how they have contributed to our understanding of the origin, the evolution and the ultimate fate of the Universe.

A shorter version of this talk is part of [The Universe: Half an Hour at a Time](#)

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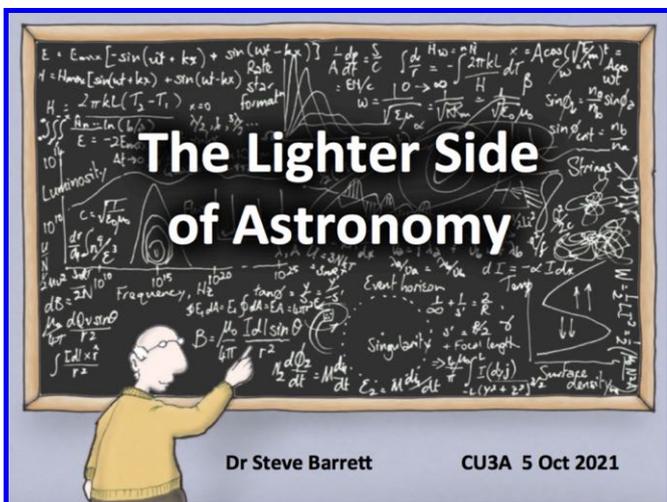
Legacy of the Hubble Space Telescope

A brief history of the Hubble Space Telescope and a description of its legacy in terms of its scientific contributions to our understanding and the way that it touched the public consciousness.

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Lighter Side of Astronomy *

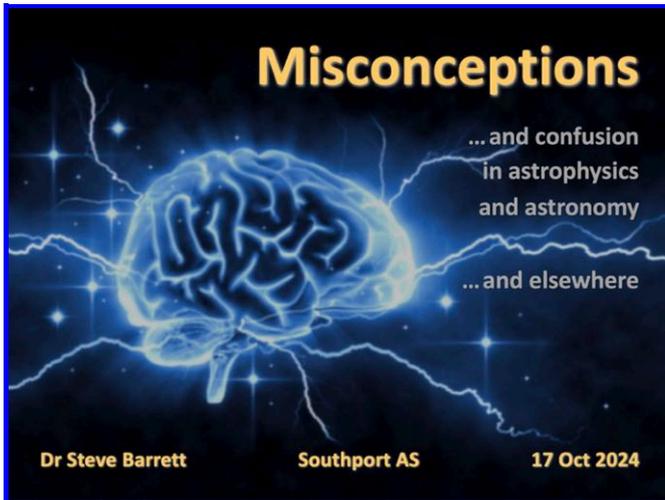
A light-hearted look at astronomy and astronomers, plus some of the weird and wonderful telescopes that they use.

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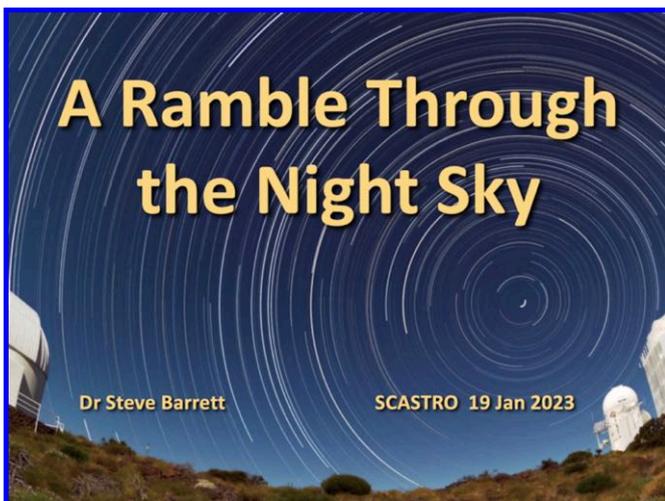
Misconceptions

A random walk through a few concepts in science that are rather tricky to get your head around and hence are likely to suffer from misconceptions and confusion.

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Ramble Through the Night Sky

A general interest talk on astronomy and astrophotography. A description of what's up there, how you can find your way around, how you can see more and how you can photograph the night sky.

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Science of Santa *

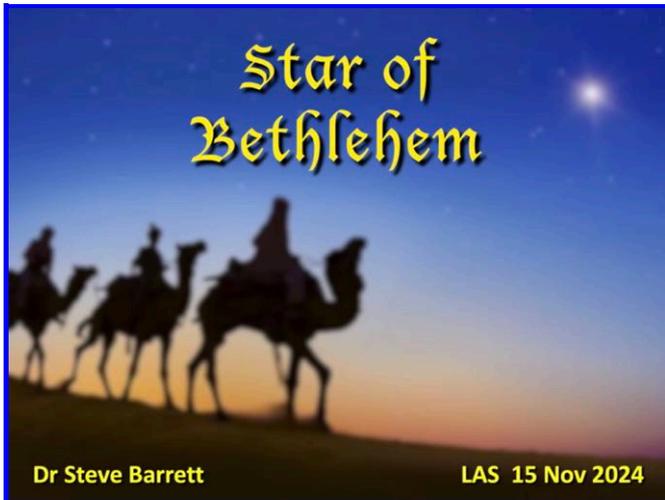
A short tongue-in-cheek 'stocking-filler' talk for the festive season. Is Santa Claus real? How many laws of physics does he break? Can his (alleged) feats be reconciled with scientific reasoning?

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Star of Bethlehem *

A light-hearted look at the Gospel of St Matthew. What are the astronomical candidates for the Star of Bethlehem? How well do they fit the account? Do known events fit the timeline of the nativity?

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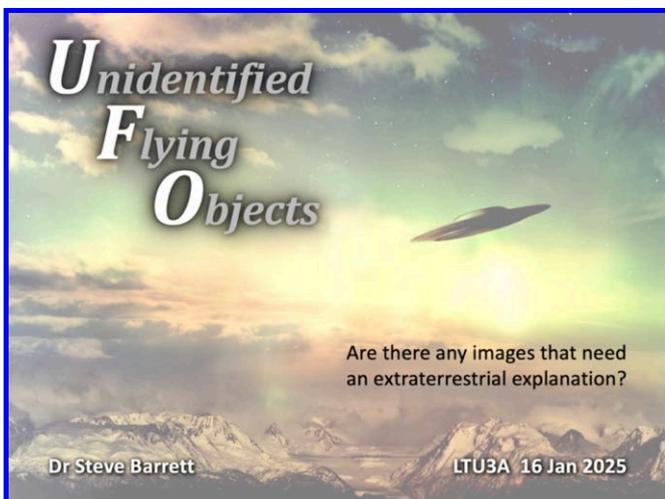
Tri-band Tribulations *

Filters that transmit multiple wavelengths simultaneously allow colour cameras (such as DSLRs) to image astronomical objects despite the sky glow produced by street lights. This short talk shows some examples of how effective [these filters](#) can be.

Recording



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Unidentified Flying Objects

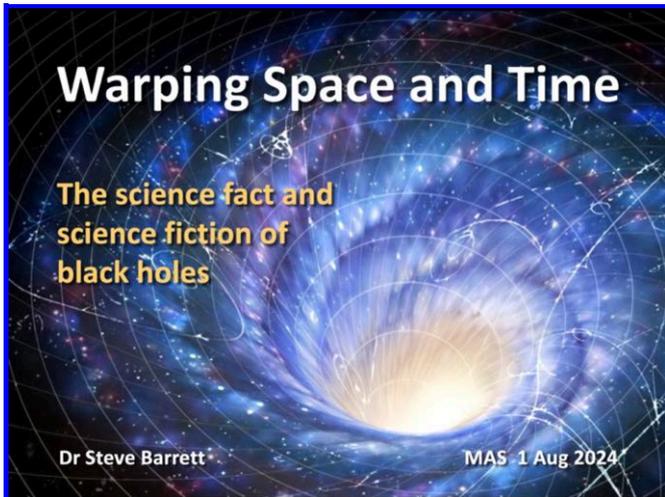
Are there any images of UFOs that need an extraterrestrial explanation? This talk looks at some images that may have more down-to-earth origins.

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Warping Space and Time

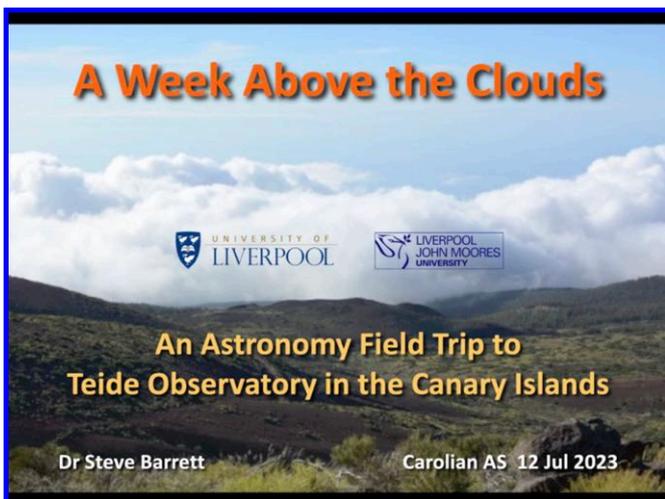
The science fact and science fiction of black holes. How are they formed, what are their properties and how can we 'observe' them? What about TV and the movies? Does Hollywood ever get it right?

A shorter version of this talk is part of [The Universe: Half an Hour at a Time](#)

Recording



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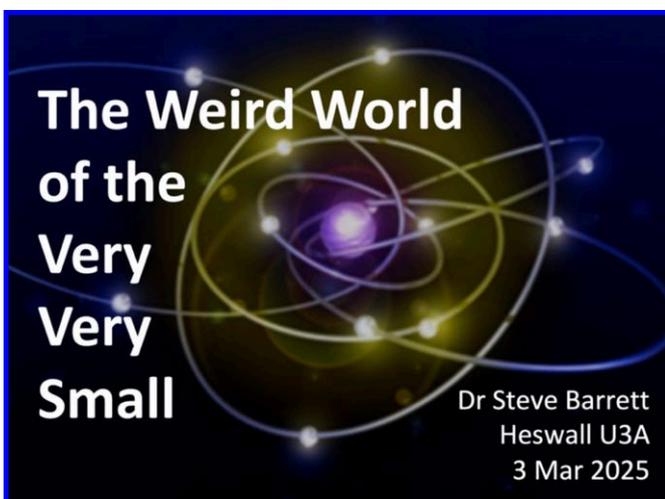
Week Above the Clouds *

Every year astrophysics students from Liverpool John Moores University and the University of Liverpool are taken on an astronomy field trip to Teide Observatory on Tenerife.

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Weird World of the Very Very Small

How do we describe the world on a scale of atoms and molecules? The concepts underlying quantum mechanics seem to be at odds with common sense, but quantum theory describes reality on the atomic scale.

Recording



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Wild Astronomy

What is it like to go on safari in Africa? For anyone interested in wildlife, photography and astronomy it is a wonderful experience.

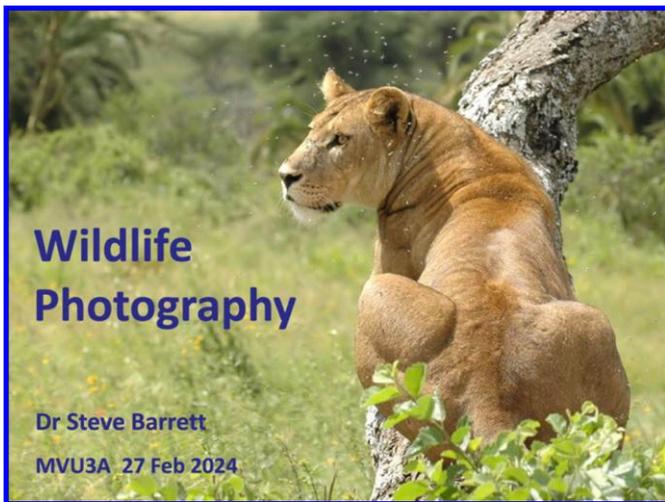
Wildlife by day ... stars by night.

(Sleep when you get home)

Recording



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Wildlife Photography

Illustrated with images taken over many years of African safaris, this talk describes how wildlife photographs can be improved by considering composition, focus, lighting, shutter speed and lens aperture.

Recording



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[Steve Barrett](#) April 2025

Talks are nominally 60-70 minutes in length except for those marked with a * which are about half that.

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The latest A-Z list of talks can be found at: <https://www.liverpool.ac.uk/~sdb/Talks/A-Z.html>