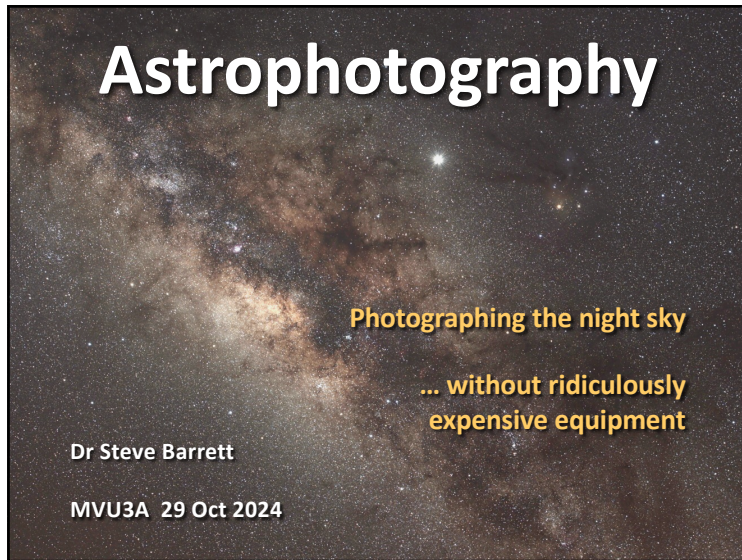


# Astrophotography

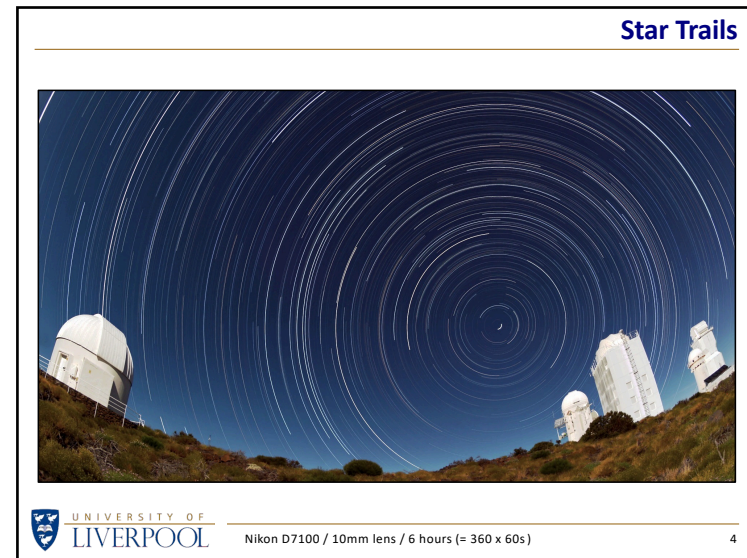


### What Do You Need?

<b>Start Simple</b>	Just a camera and tripod
<b>Equipment</b>	Telescopes and mounts
<b>Equipment</b>	Cameras and star trackers
<b>Photo Gallery</b>	Some of my images
<b>Astro Africa</b>	Under the darkest skies

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2



# Astrophotography

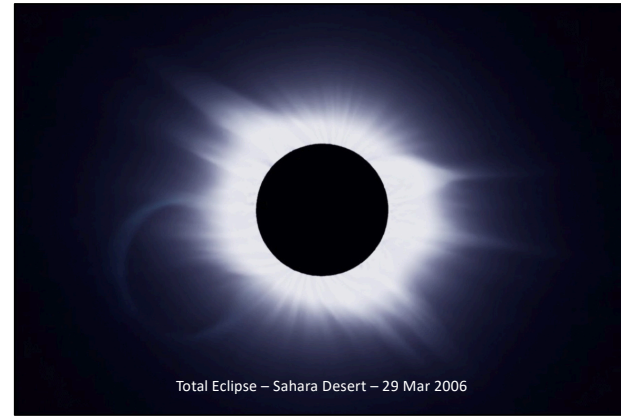
## Right Place ... Right Time



Nikon FM2 / Fujichrome slide film / 24mm lens / 300s

5

## Right Place ... Right Time



Total Eclipse – Sahara Desert – 29 Mar 2006



Nikon D200 / 300mm lens / Various exposures

6

## What Do You Need?

- Start Simple**      Just a camera and tripod
- Equipment**      Telescopes and mounts
- Equipment**      Cameras and star trackers
- Photo Gallery**    Some of my images
- Astro Africa**      Under the darkest skies



7

## What Do You Need?



Keep an eye on eBay

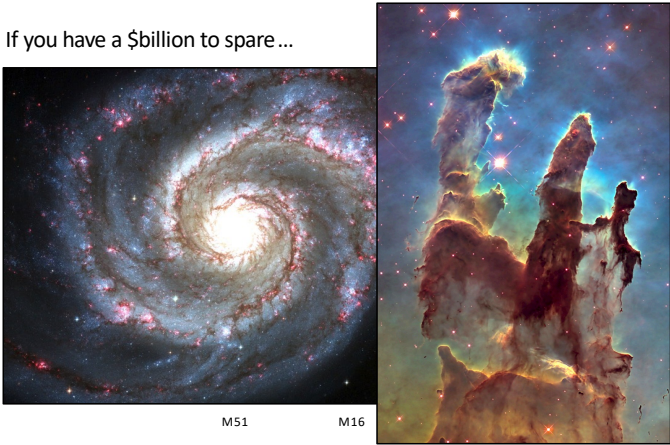


8

# Astrophotography

**What Do You Need?**

If you have a \$billion to spare ...



M51 M16

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9

**What Do You Need?**

If you have a \$100 million to spare ...



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10

**What Do You Need?**

If you have ~ £million to spare ...



Liverpool Telescope, La Palma

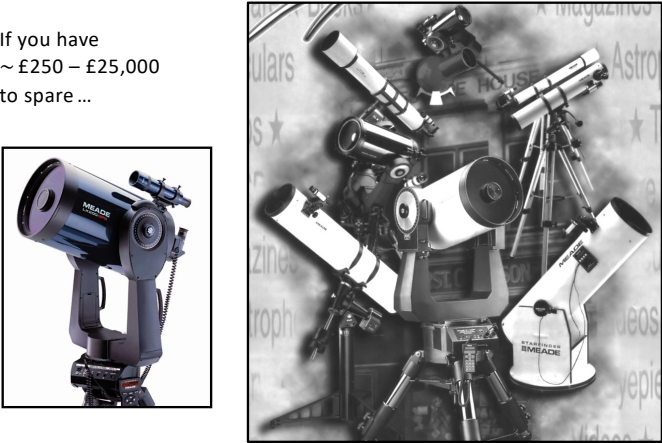
M51 M16

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11

**What Do You Need?**

If you have ~ £250 – £25,000 to spare ...



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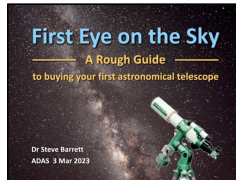
12



# Astrophotography

## What Do You Need?

If you have  
~£250 – £25,000  
to spare ...



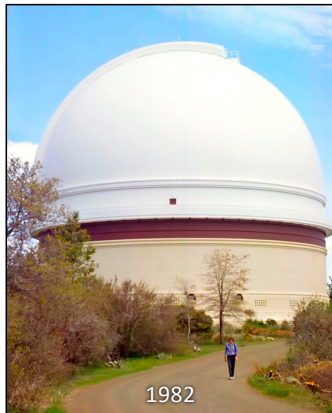
Many astronomers would advocate the use of a telescope mount that is the most sturdy and most precise that you can afford. Is this mount worth \$10,000?

## Where To Put the Telescope?



Palomar Mountain, California

## Back Garden Observatory

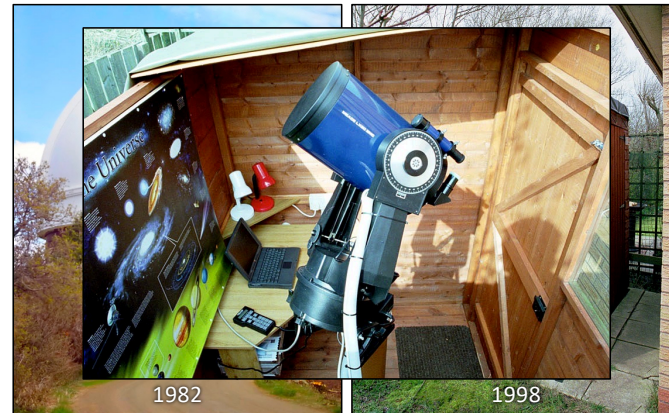


1982



1998

## Back Garden Observatory

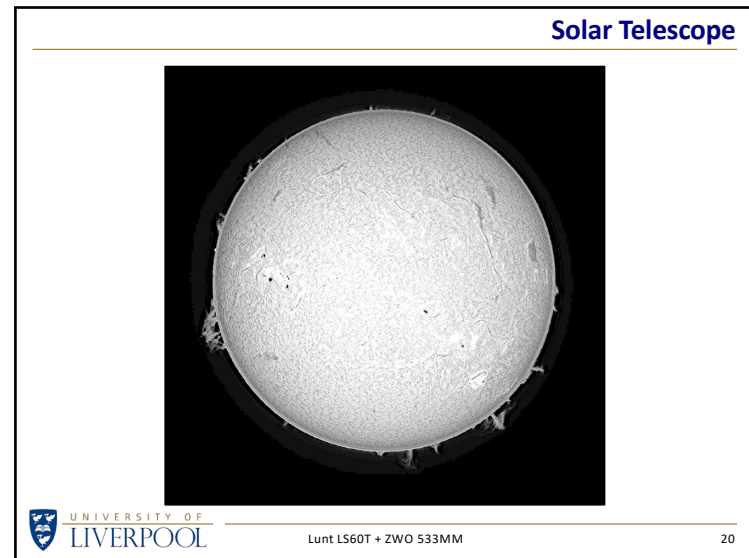
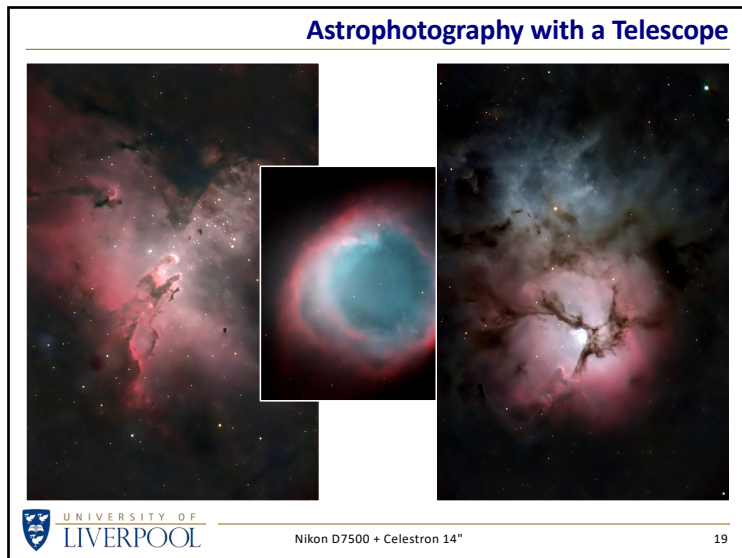
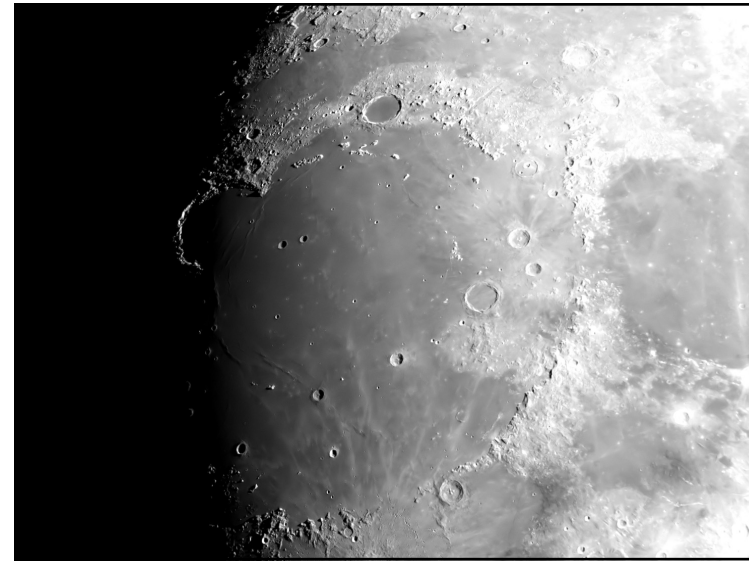


1998

1998




# Astrophotography



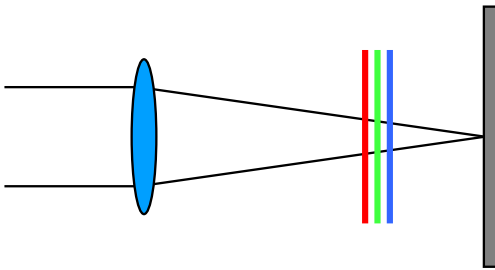
# Astrophotography

### What Do You Need?


<p><b>Start Simple</b></p> <p><b>Equipment</b></p> <p><b>Equipment</b></p> <p><b>Photo Gallery</b></p> <p><b>Astro Africa</b></p>	<p>Just a camera and tripod</p> <p>Telescopes and mounts</p> <p>Cameras and star trackers</p> <p>Some of my images</p> <p>Under the darkest skies</p>
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21

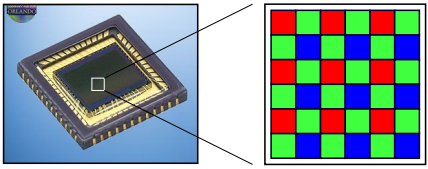
### Colour Imaging



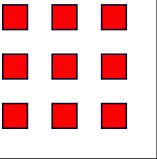
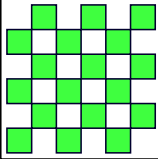
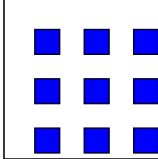
Monochromatic film or CCD chip



22

### Colour Imaging



Bayer grid


23

### Astronomical Cameras



2 Mpixel colour  
£250



7 Mpixel colour  
£2000



7 Mpixel mono  
£2000



Filter wheel £250  
+ filters £100 x n



Already got a DSLR?  
Try a star tracker ...


24



# Astrophotography

### Star Trackers



DIY star tracker 'K2' that I designed and built  
Used 2007–2013


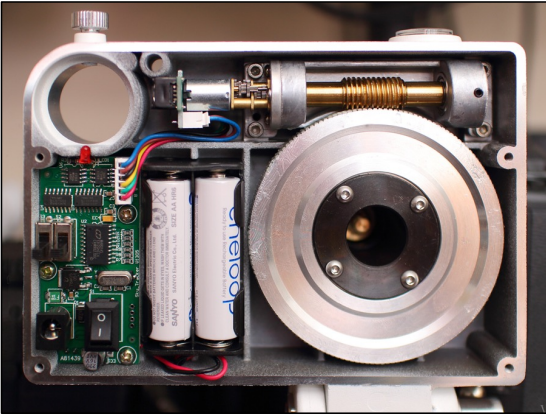


iOptron SkyTracker™  
Used since 2015



25

### Inside a Star Tracker




26

### Star Trackers





27

### Camera and Lens



Nikon D7500  
300 mm f/4 lens



28

# Astrophotography

## What Do You Need?

- Start Simple** Just a camera and tripod
- Equipment** Telescopes and mounts
- Equipment** Cameras and star trackers
- Photo Gallery** Some of my images
- Astro Africa** Under the darkest skies

## Some Of My Images

I like to take astrophotographs without using a telescope, just using a camera on a star tracker:



Astrophotography using a telescope can be very rewarding, but to get the most out of it will take quite a bit of time, effort and cash.

## Image Processing

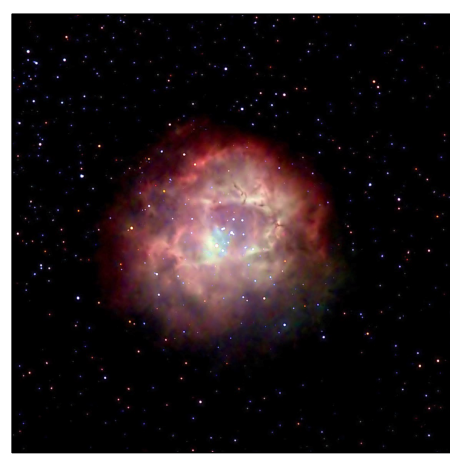


Raw image showing sky glow from light pollution



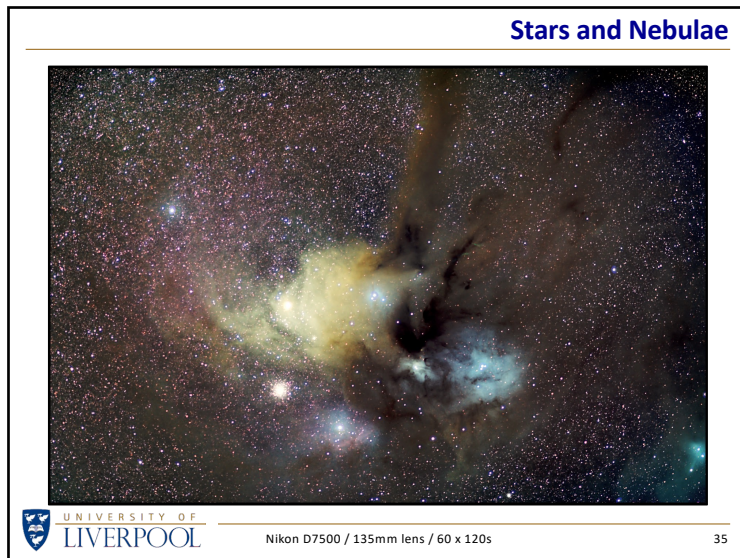
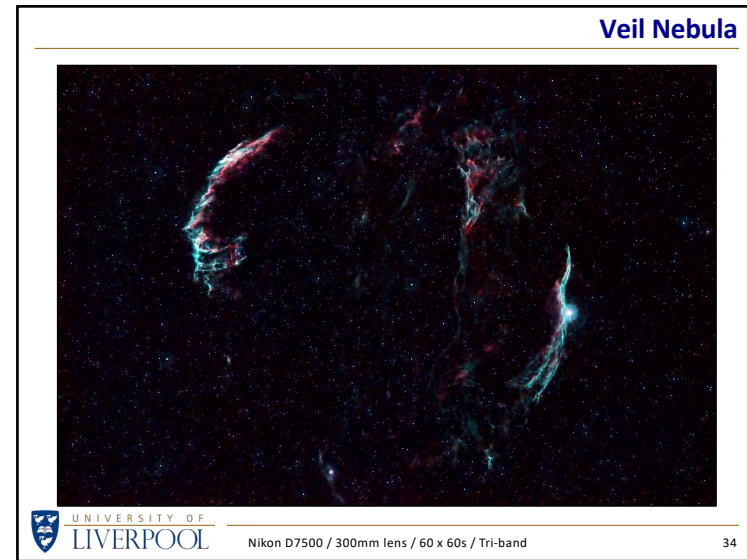
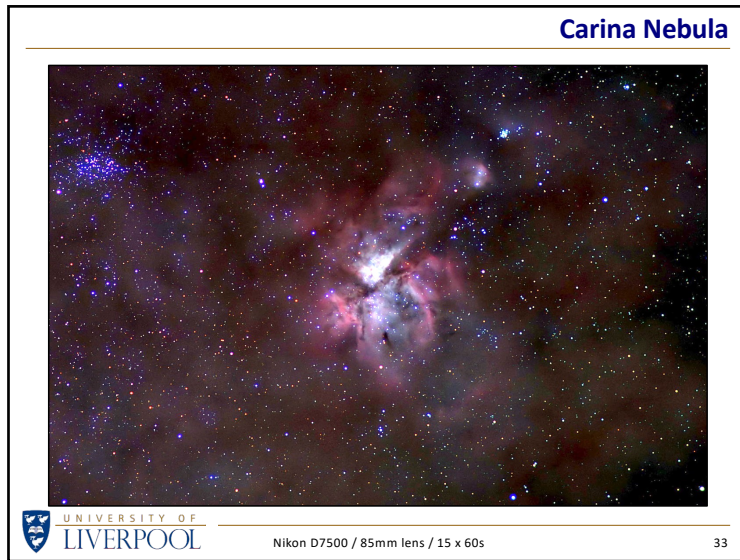
Software can mitigate the impact of moderate LP

## Rosette Nebula

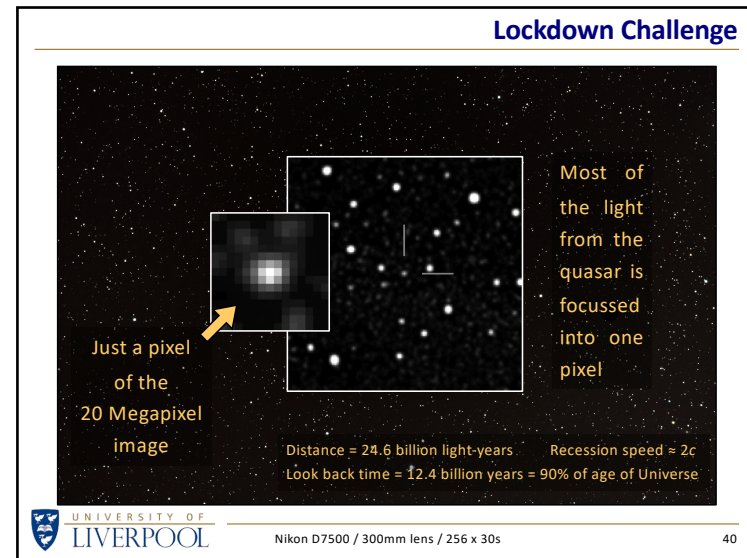
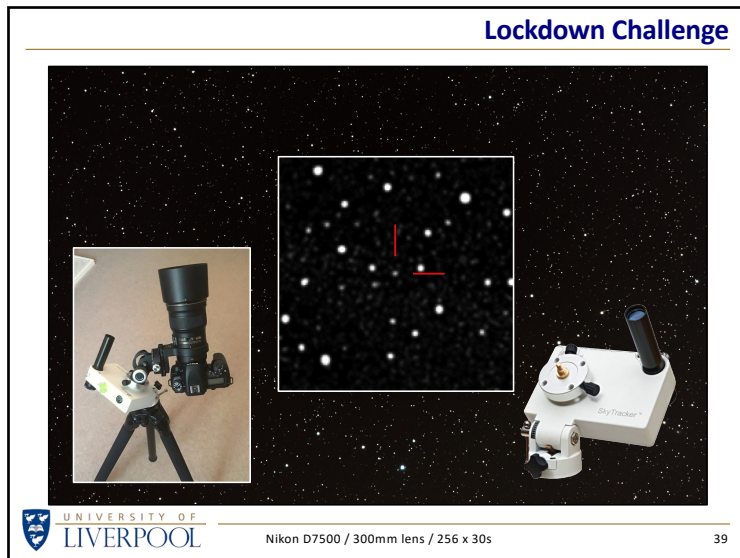
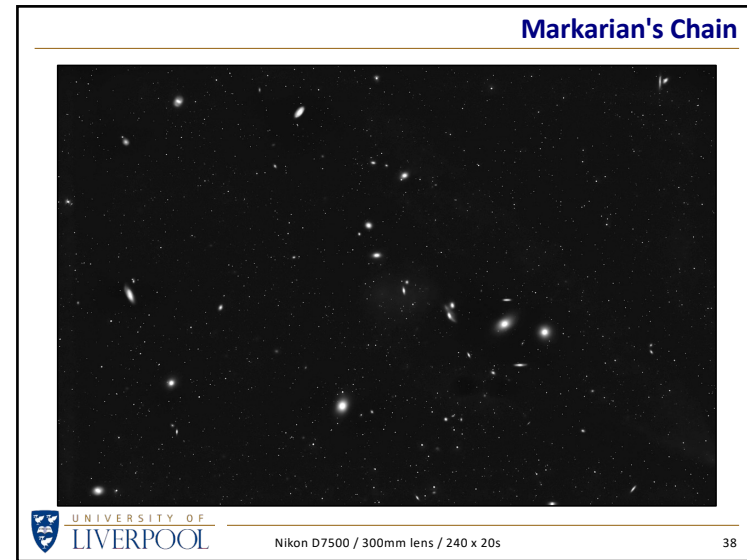
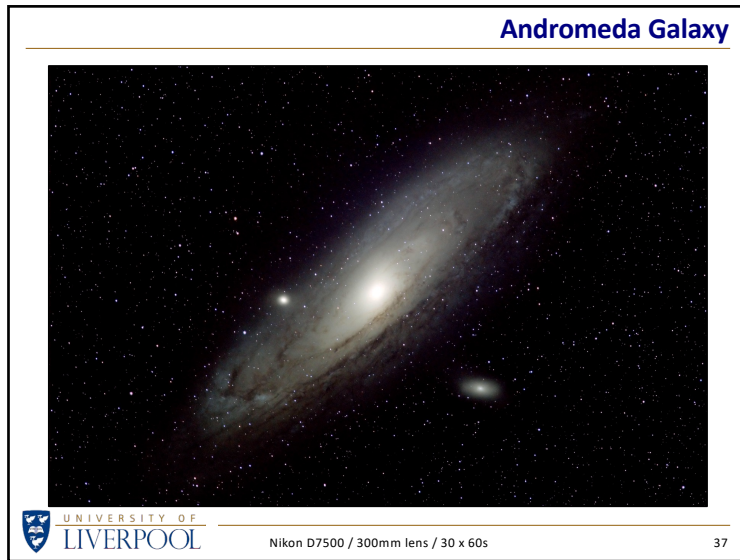




# Astrophotography



# Astrophotography







# Astrophotography

### What Do You Need?

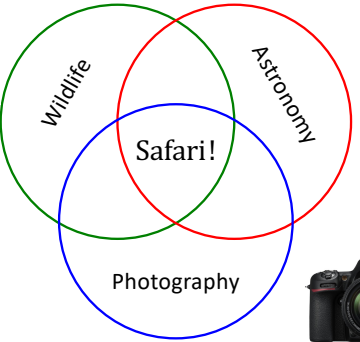
<b>Start Simple</b>	Just a camera and tripod
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41

### Wild Astronomy




Animals  
by day ...






... stars  
by night



( Sleep when you get home )


42

### Aligning Using Polaris

With Polaris visible, aligning a star tracker is easy in the UK.



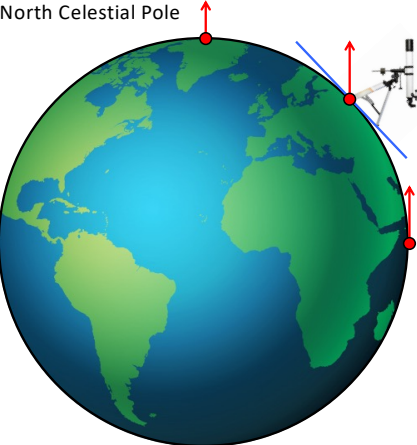


But ...



43

### Aligning a Star Tracker

North Celestial Pole



In East Africa the NCP and Polaris are very close to the horizon, and hence are hidden behind elephants or distant hills.


44

# Astrophotography

