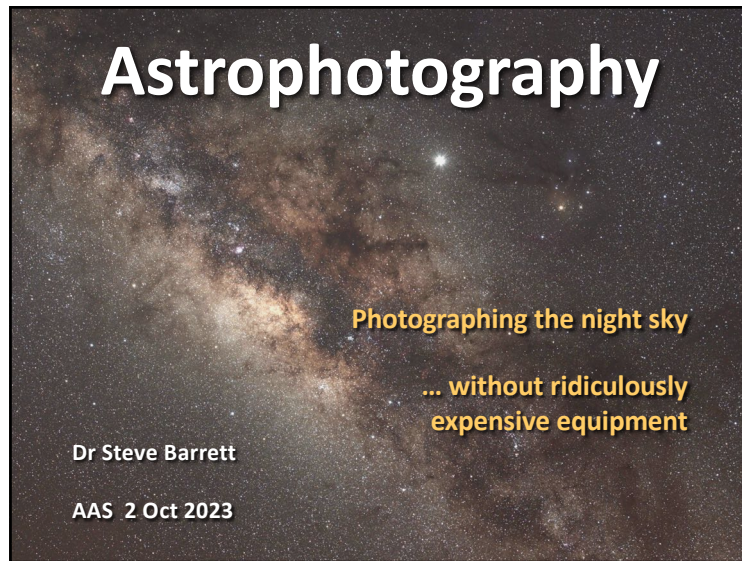


Astrophotography



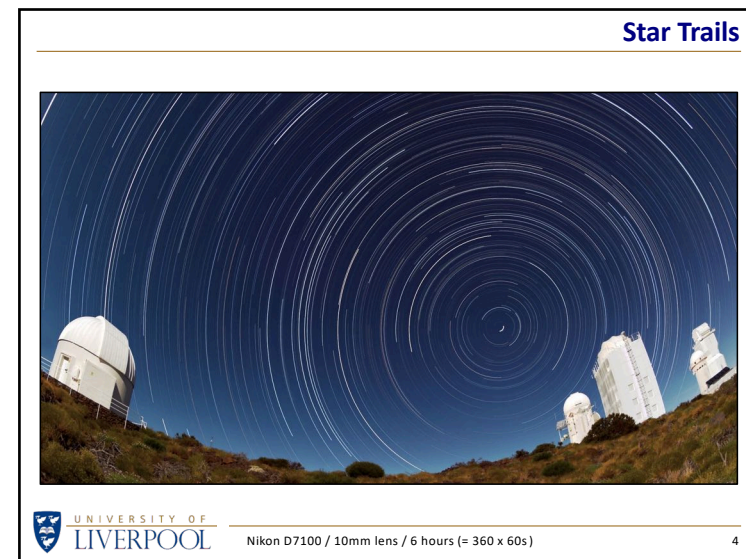
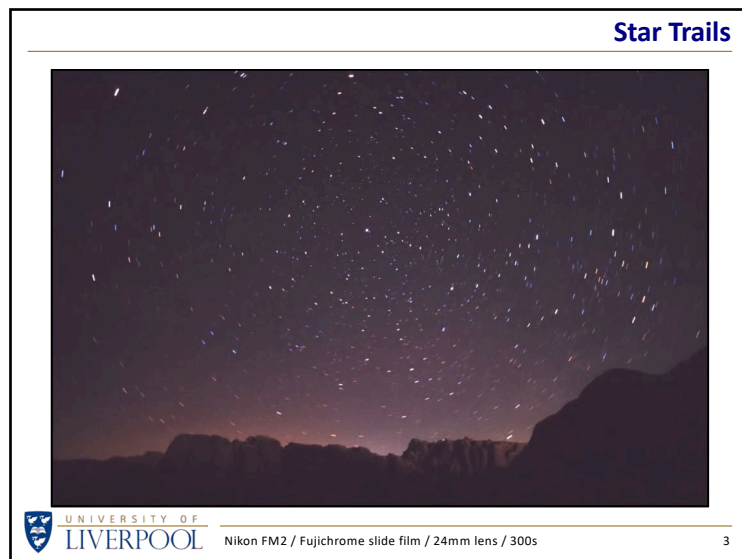
What Do You Need?

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

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2

This slide is titled 'What Do You Need?' in blue. It contains a table with four rows of information. The first row is 'Start Simple' with 'Just a camera and tripod'. The second row is 'Equipment' with 'Telescopes and mounts'. The third row is 'Equipment' with 'Cameras and star trackers'. The fourth row is 'Photo Gallery' with 'Some of my images'. The fifth row is 'Astro Africa' with 'Under the darkest skies'. At the bottom left is the University of Liverpool logo, and at the bottom right is the number '2'.



Astrophotography

Comet Holmes



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Nikon D200 / 300mm lens / 30s

5


Right Place ... Right Time



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

6

Right Place ... Right Time



Total Eclipse – Sahara Desert – 29 Mar 2006

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Nikon D200 / 300mm lens / Various exposures

7

What Do You Need?

Start Simple	Just a camera and tripod
Equipment	Telescopes and mounts
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Photo Gallery	Some of my images
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8

Astrophotography

What Do You Need?



Keep an eye on eBay



9

What Do You Need?

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



M51



M16



10

What Do You Need?

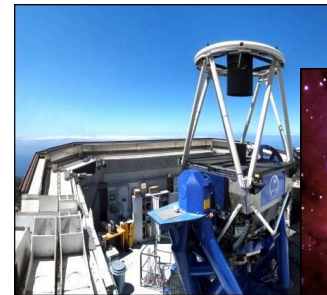
If you have a \$100 million to spare ...



11

What Do You Need?

If you have ~£million to spare ...



Liverpool Telescope, La Palma



M51



M16



12

Astrophotography

What Do You Need?

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



What Do You Need?

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



Turning a telescope into tech spaghetti

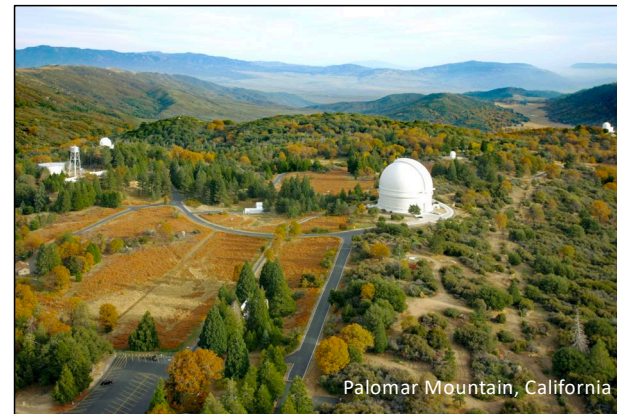
What Do You Need?

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.

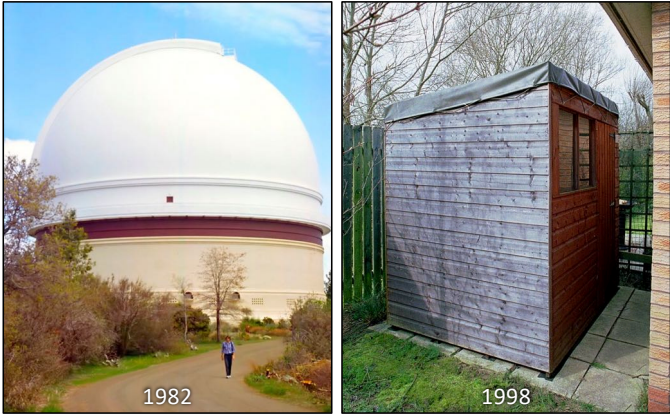
Where To Put the Telescope?



Palomar Mountain, California

Astrophotography

Back Garden Observatory

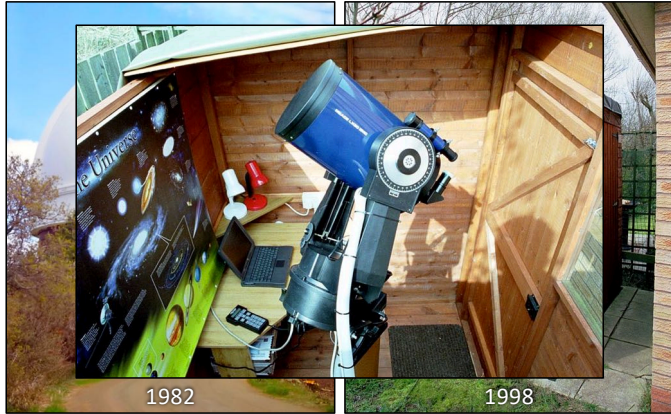


1982 1998

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17

Back Garden Observatory



1982 1998

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18



Our closest neighbour can be fascinating ...
... watching the shadows of the craters and mountains change from night to night

What Do You Need?

Start Simple	Just a camera and tripod
Equipment	Telescopes and mounts
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20

Astrophotography

Colour Imaging

Monochromatic film or CCD chip

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21

Colour Imaging

Bayer grid

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22

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 ...

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23

Star Trackers

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

Ioptron SkyTracker™
Used since 2015

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24

Astrophotography

Star Trackers



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25

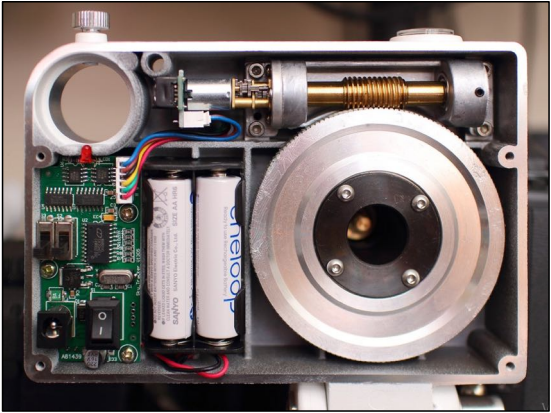
Star Trackers



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26

Inside a Star Tracker



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27

What Do You Need?

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28

Astrophotography

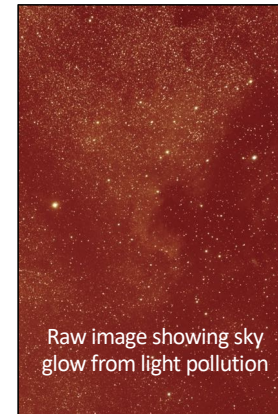
Some Of My Images

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

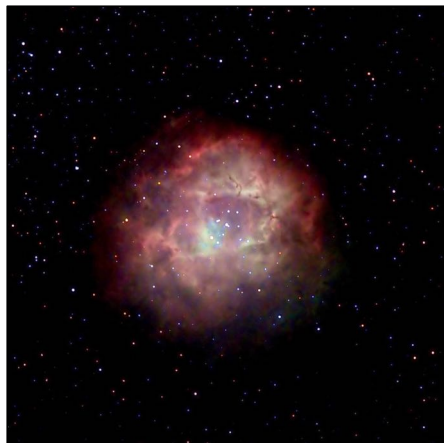


Raw image showing sky glow from light pollution



Software can mitigate the impact of moderate LP

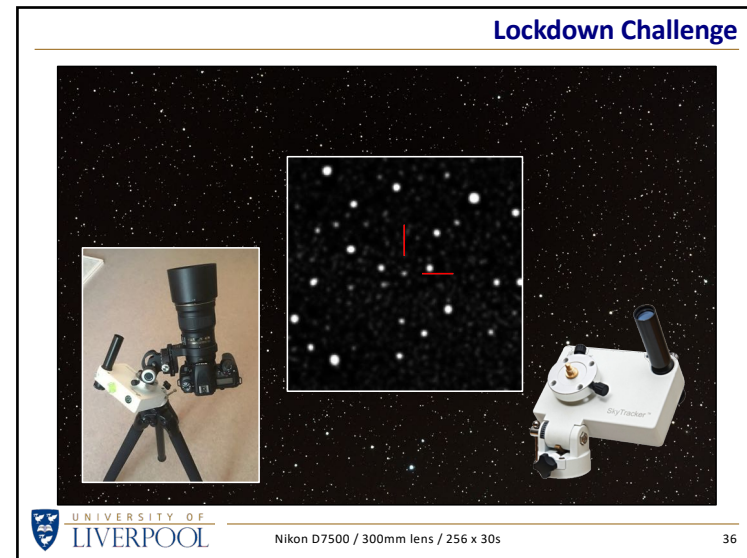
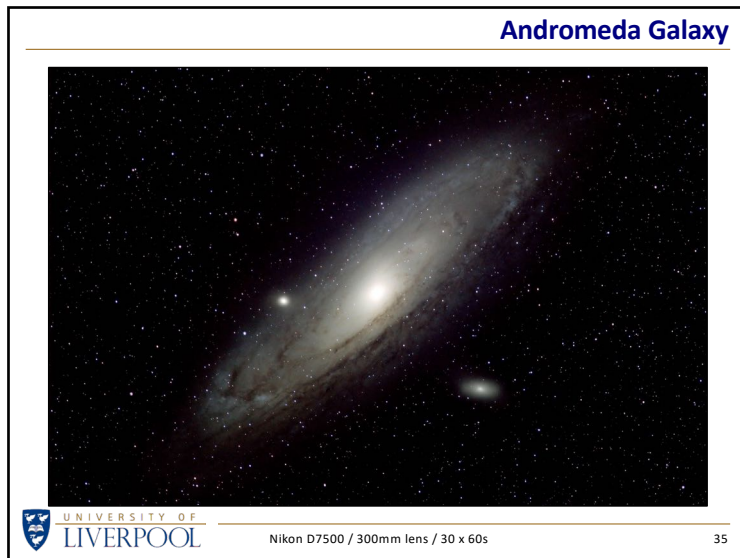
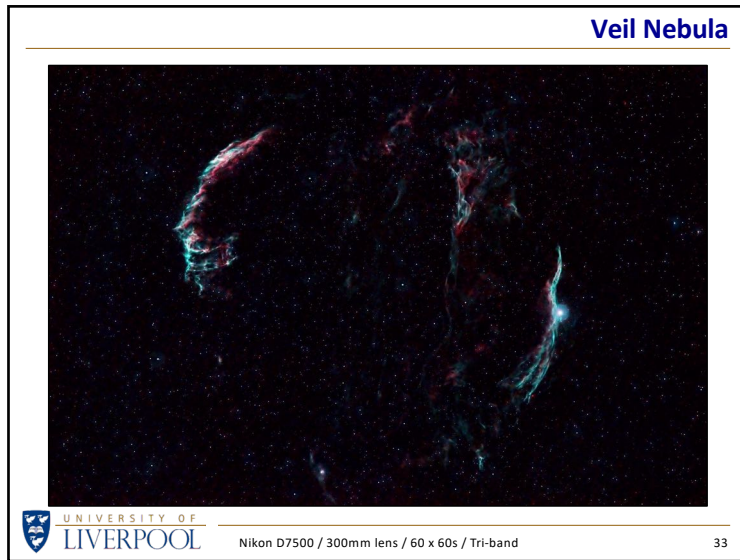
Rosette Nebula



Carina Nebula



Astrophotography



Astrophotography

Lockdown Challenge

Most of the light from the quasar is focussed into one pixel!

Distance = 24.6 billion light-years Recession speed $\approx 2c$
 Look back time = 12.4 billion years = 90% of age of Universe

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 Nikon D7500 / 300mm lens / 256 x 30s

37

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

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38

Wild Astronomy

Animals by day ...

Wildlife

Astronomy

Safari!

Photography

... stars by night

(Sleep when you get home)

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39

Aligning Using Polaris

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

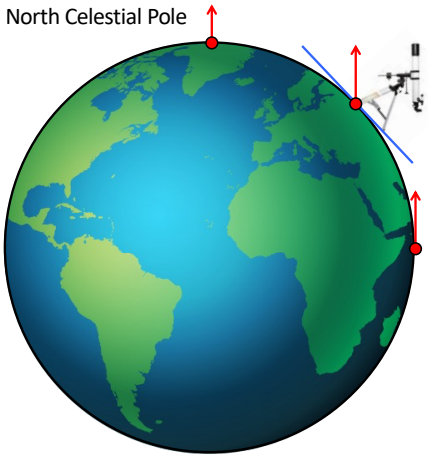
But ...

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40

Astrophotography

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.

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41

Large Magellanic Cloud



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Nikon D7100 / 85mm lens / 30 x 60s

42

Milky Way



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Nikon D7500 / 35mm lens / 10 x 120s

43

Milky Way



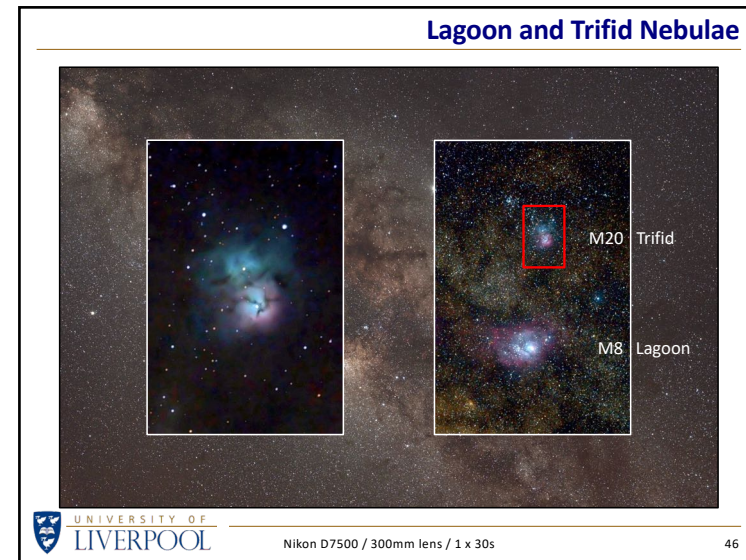
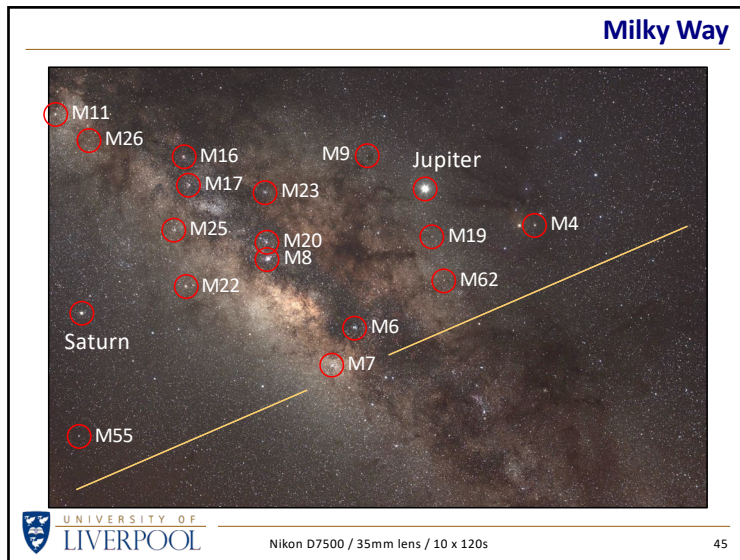
ISO 200
Slide film
Untracked

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Nikon D7500 / 35mm lens / 10 x 120s

44

Astrophotography



Astrophotography

www.liverpool.ac.uk/~sdb/Talks

Photographing the night sky
... without ridiculously expensive equipment

Dr Steve Barrett
AAS 2 Oct 2023