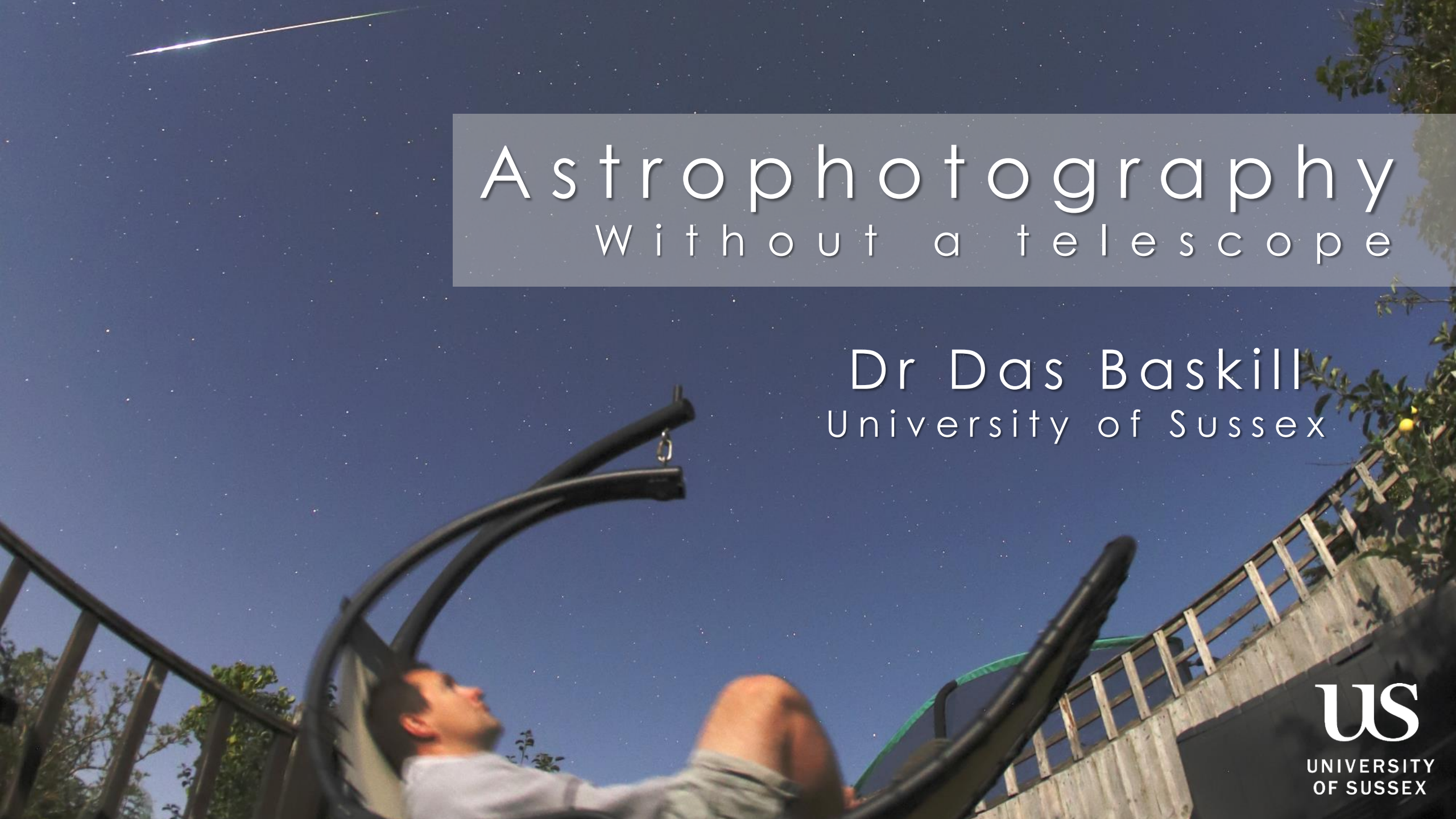


A low-angle shot of a man swinging on a swing set at night. The sky is dark blue and filled with stars. A bright meteor streaks across the upper left portion of the sky. The swing set's metal frame and wooden seat are visible in the foreground, and a wooden fence is partially seen on the right.

Astrophotography

Without a telescope

Dr Das Baskill
University of Sussex

Astrophotography

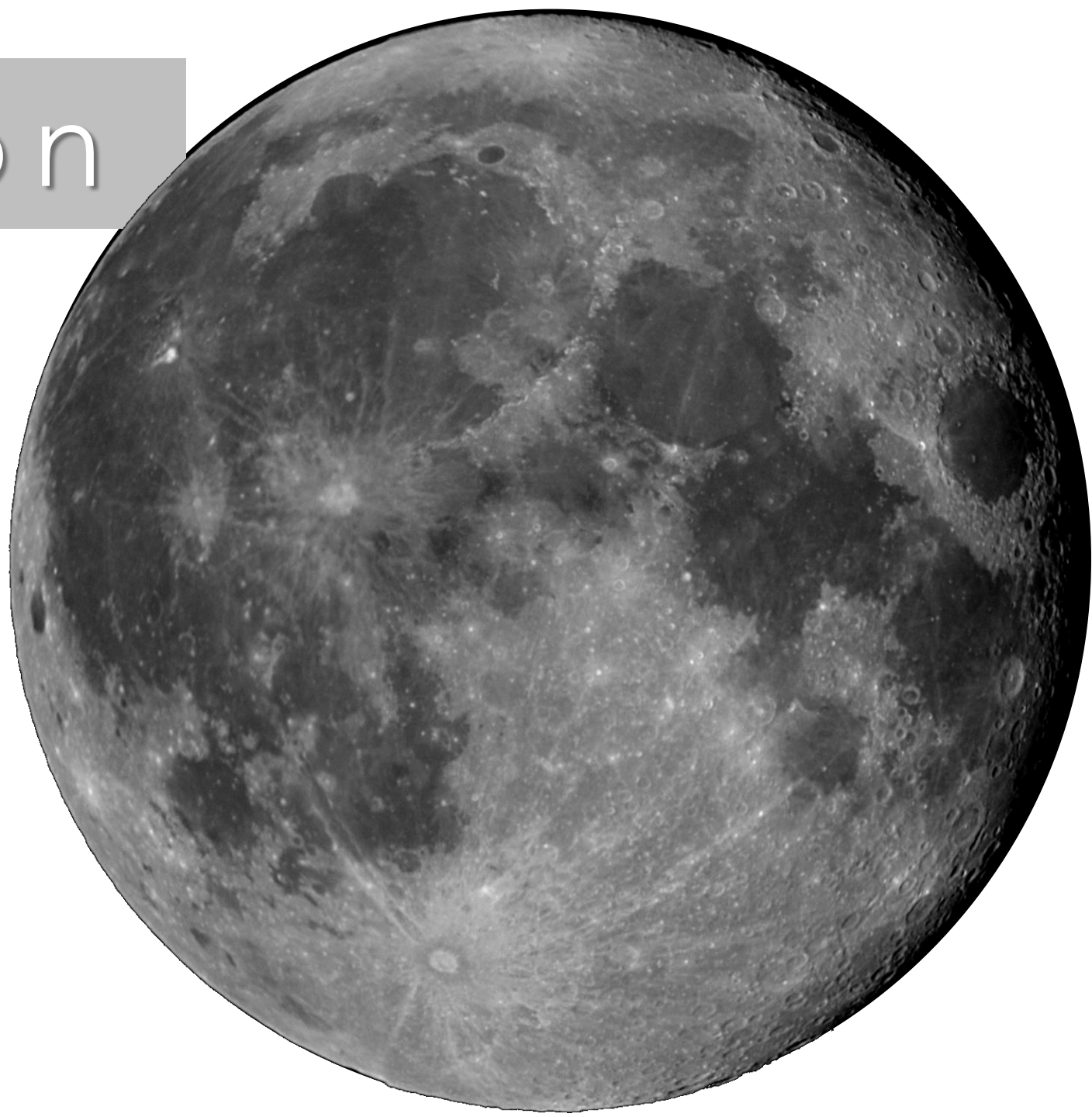
Without a telescope

- Moon
- Manual camera settings
- Star-trails
- Meteors (shooting stars)
- Milky-way

The Moon

Method:

- Autofocus
- Autoexposure
- Auto f/number



The Moon



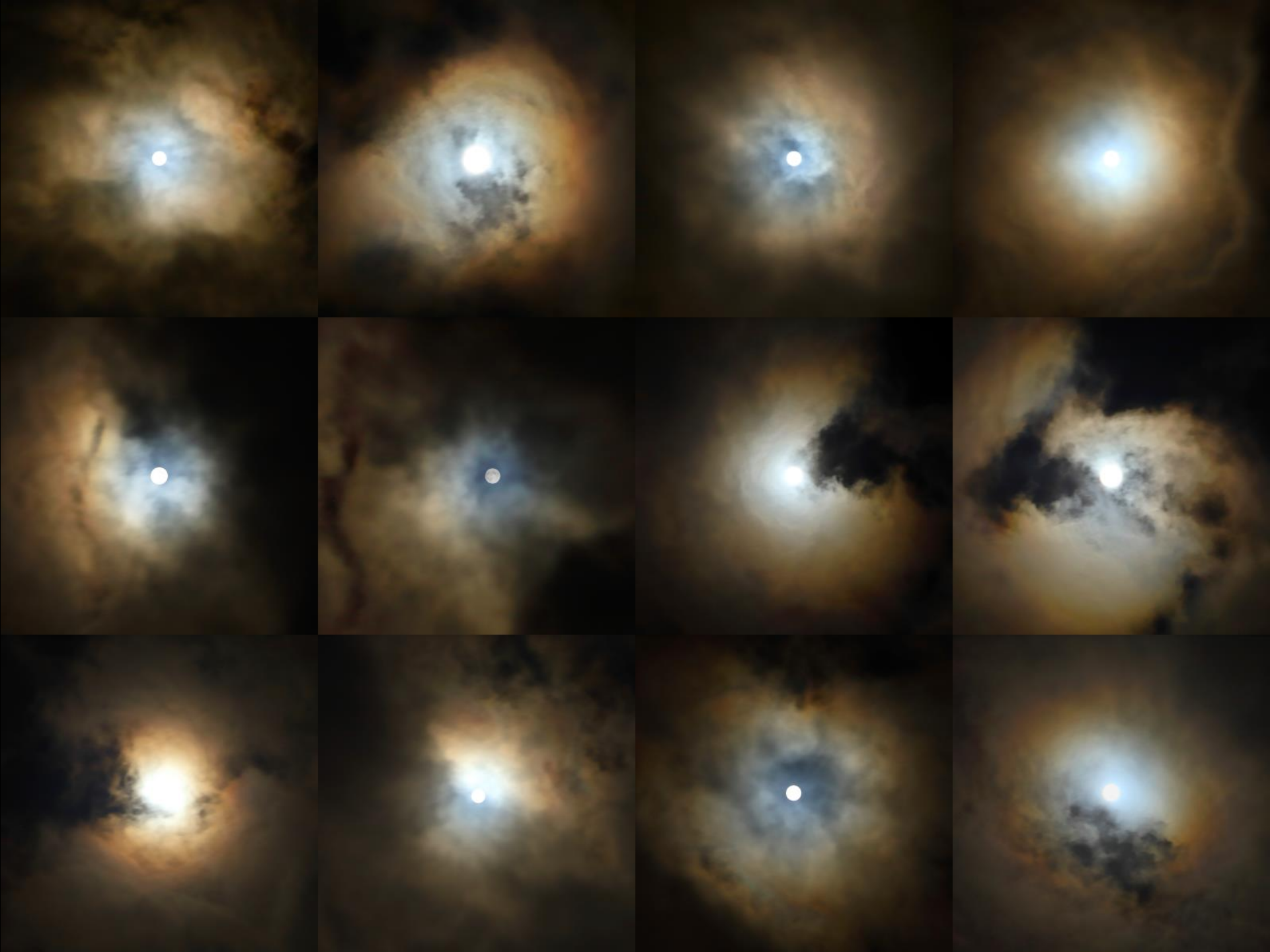
The Moon



The Moon



The Moon



Camera Settings

- Exposure time
- ISO setting
- f/number



Camera Settings

- Exposure time
- ISO setting
- f/number

Increase to collect more light...

... But objects move across the sky.





Exposure time: 10 hours

Exposure Time

Short: $\frac{1}{8}$ seconds



Exposure Time

Longer: 2s



Camera Settings

- Exposure time

- ISO setting

{ Increase to make the camera more sensitive to light...

- f/number

{ But that also makes the camera more sensitive to imperfections, too.

ISO setting

ISO 100

ISO setting

ISO 200

ISO setting

ISO 400

ISO setting

ISO 800



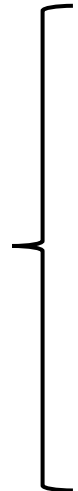
ISO setting

ISO 1600

ISO setting

ISO 3200

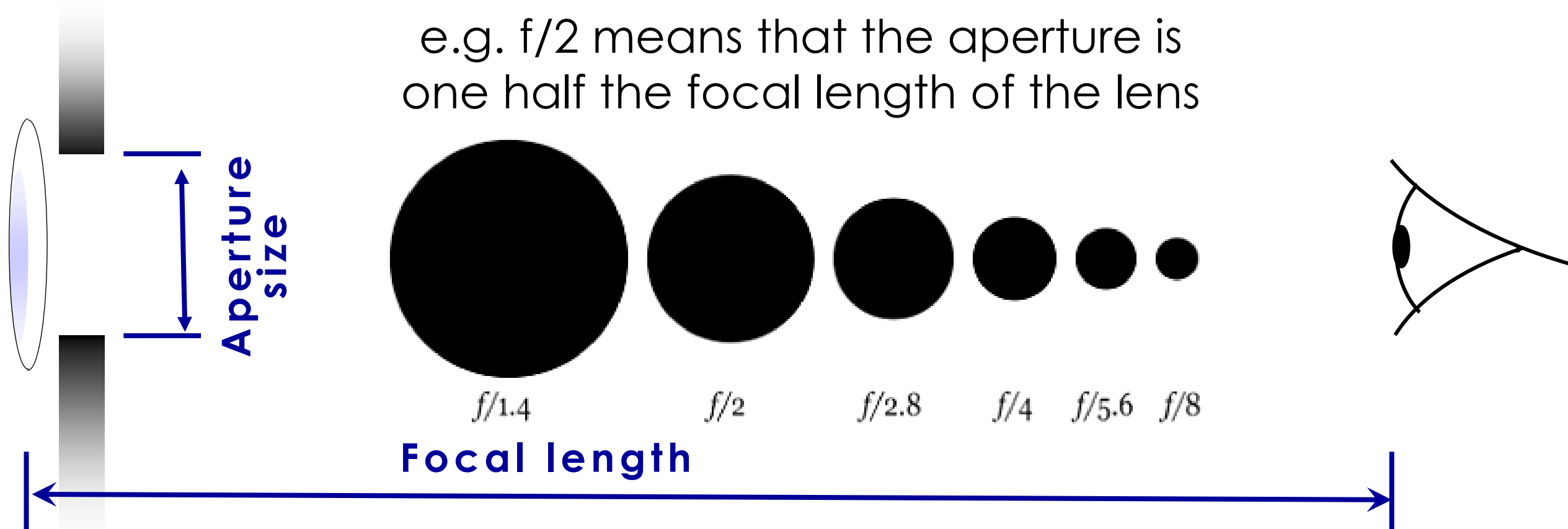
Camera Settings

- Exposure time
 - ISO setting
 - f/number
- 
- Increase to collect more light...
- ... Or decrease to increase the depth of field or for diffraction spikes.

Camera Settings

f/number is the aperture size (opening) of a lens, in terms of Focal length

e.g. $f/2$ means that the aperture is one half the focal length of the lens



f/4.5



f/13



f/32



The Moon

A photograph of a bright sun with a starburst effect, framed by dark silhouettes of tree branches against a dark sky. The sun is positioned in the center-right of the frame, creating a strong lens flare. The tree branches are silhouetted against the dark sky, with some leaves visible. The overall tone is dark and moody.

30 seconds
f/32
ISO 2000

f/5.6



The Moon

f/11



Camera Settings

For shooting the Moon

- Exposure time { Can take short exposures for the bright Moon: 1/50s-1/200 s
- ISO setting { No need to be too sensitive as the Moon is bright: ISO200-800
- f/number { f/4.0 to f/13+, depending on diffraction spikes

The Moon

By Laurent Laveder

<http://www.pixheaven.net>







Moon trails & Movement

A series of overlapping circular images of the Moon, arranged diagonally from the top-left to the bottom-right. The color of the Moon transitions from a bright yellow at the top-left to a deep red at the bottom-right, illustrating the effect of different exposure times or filters. The background is black, with some faint, out-of-focus stars visible at the bottom.

Moon trails

Trough a telescope

Exposures:

0.2 second

ISO 1600

1000mm telescope

D=200mm, so f/5

Planning with Stellarium and a map





The Moon

during a lunar eclipse

University of Sussex
Meeting House chapel

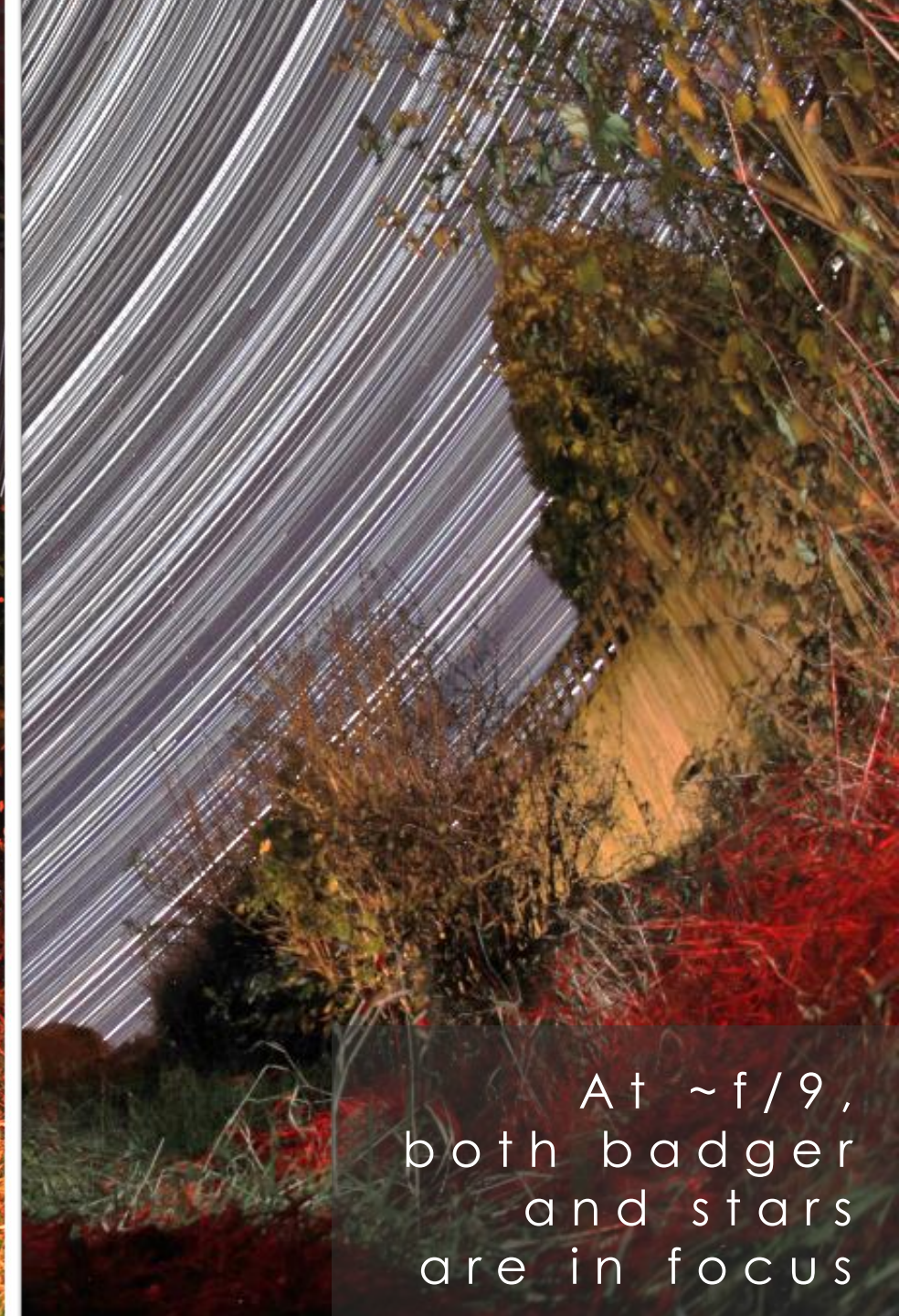
Star trails (Stacking)



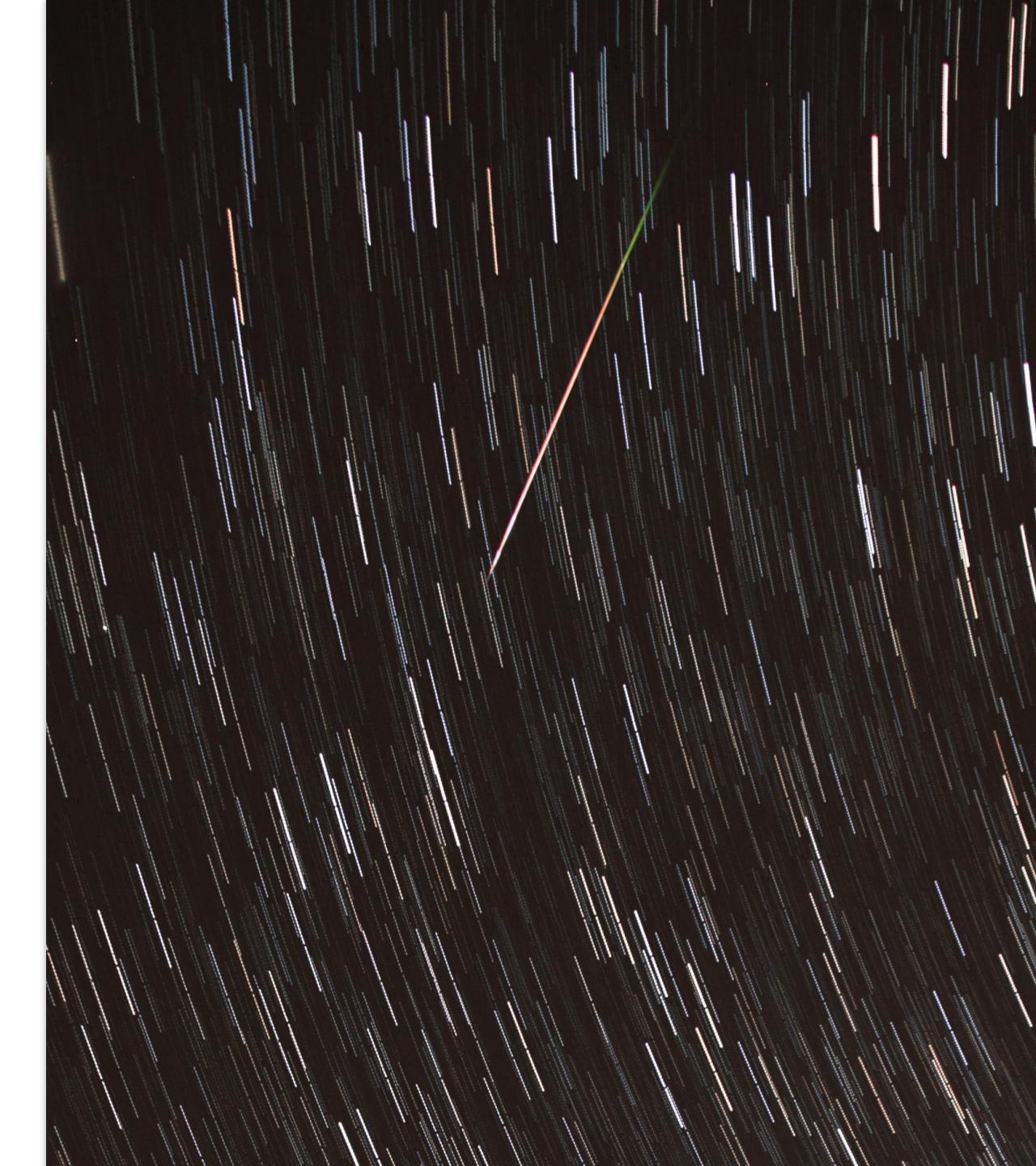


Exposure

30 seconds
f/9
ISO 3200
Repeat



At $\sim f/9$,
both badger
and stars
are in focus



Meteors

Shooting stars are very difficult to photograph!

- They're very quick
- Often faint
- And can appear anywhere in the sky

Camera settings for meteors/shooting stars

- Exposure time { ~10 seconds or until light pollution dominates...
- ISO setting { Camera needs maximum sensitivity: ISO 3200+
- f/number { Wide open aperture
e.g. f/2.8 or f/4 to allow as much light in as possible.

Meteors



Light pollution

Typical view of the night sky
from a light polluted location



Light pollution

Typical view of the night sky
from a dark location



Light pollution from the inefficient
lights of Brighton

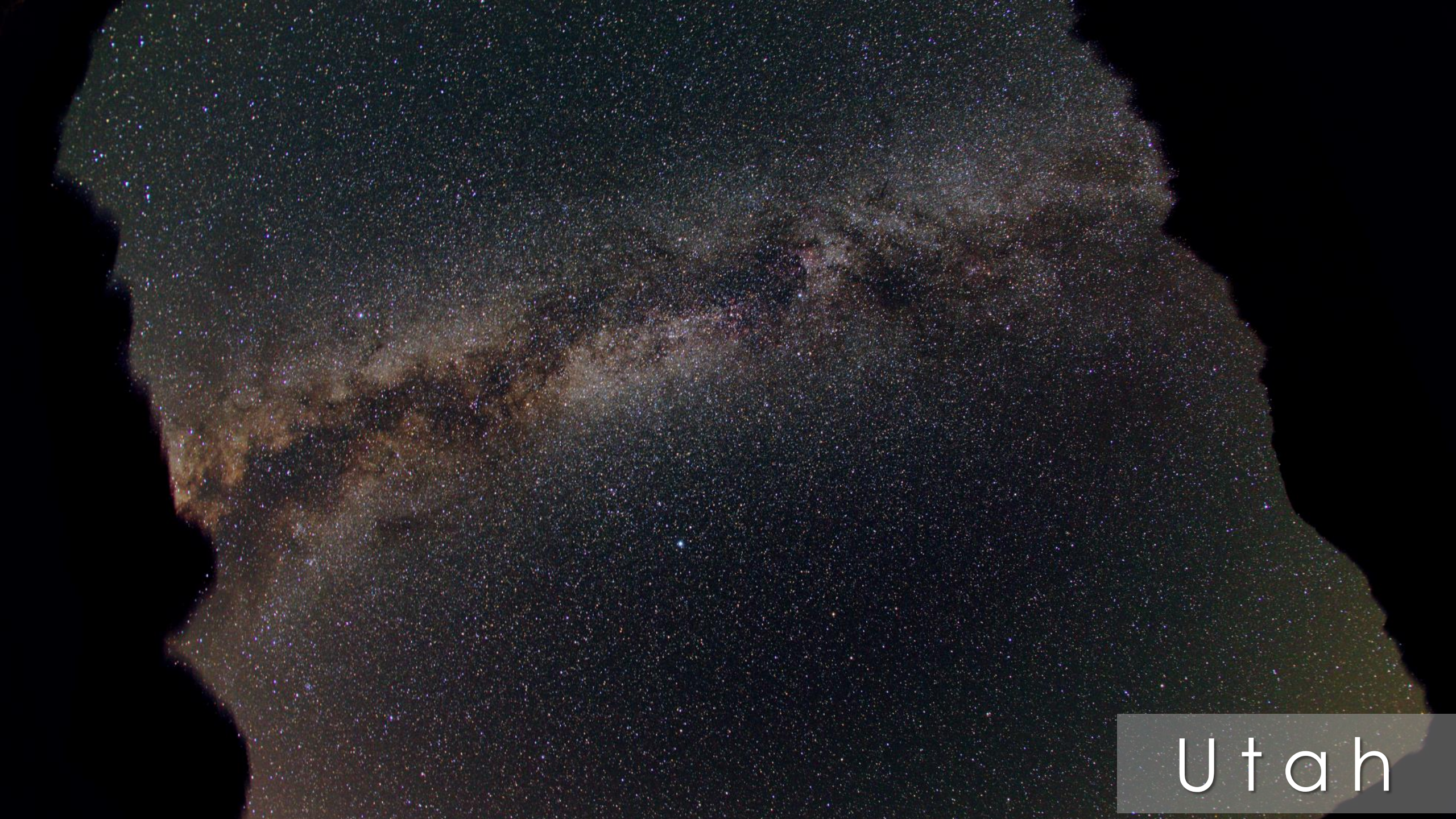


A wide-field photograph of the night sky, showing the Milky Way galaxy as a dense band of stars and dust stretching across the frame. The Andromeda galaxy is visible as a distinct, bright, elliptical object on the left side. The sky is dark blue with numerous stars of varying brightness. The text "Milky way" is written in a white, sans-serif font, tilted diagonally across the upper right portion of the image. The text "< Andromeda galaxy" is written in a white, sans-serif font, positioned to the right of the Andromeda galaxy. The text "Brighton" is written in a white, sans-serif font, centered within a dark gray rectangular box in the bottom right corner.

Milky way

< Andromeda
galaxy

Brighton



Utah

Mauna Kea Hawai'i



Mauna Kea Hawai'i

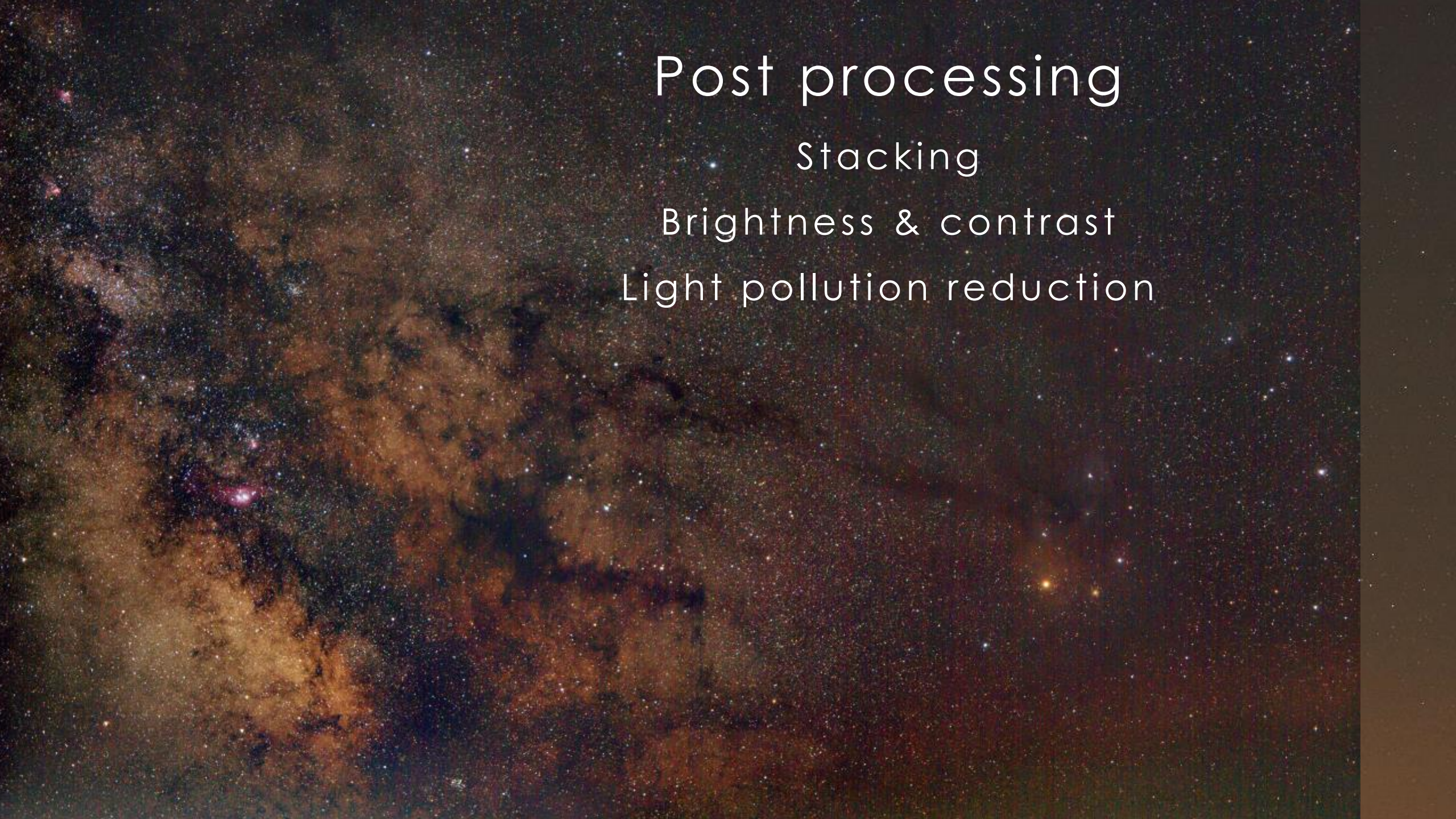


Post processing

Stacking

Brightness & contrast

Light pollution reduction



Aurora

Exp: 1.6s

ISO: 3200

f / # : 3.5



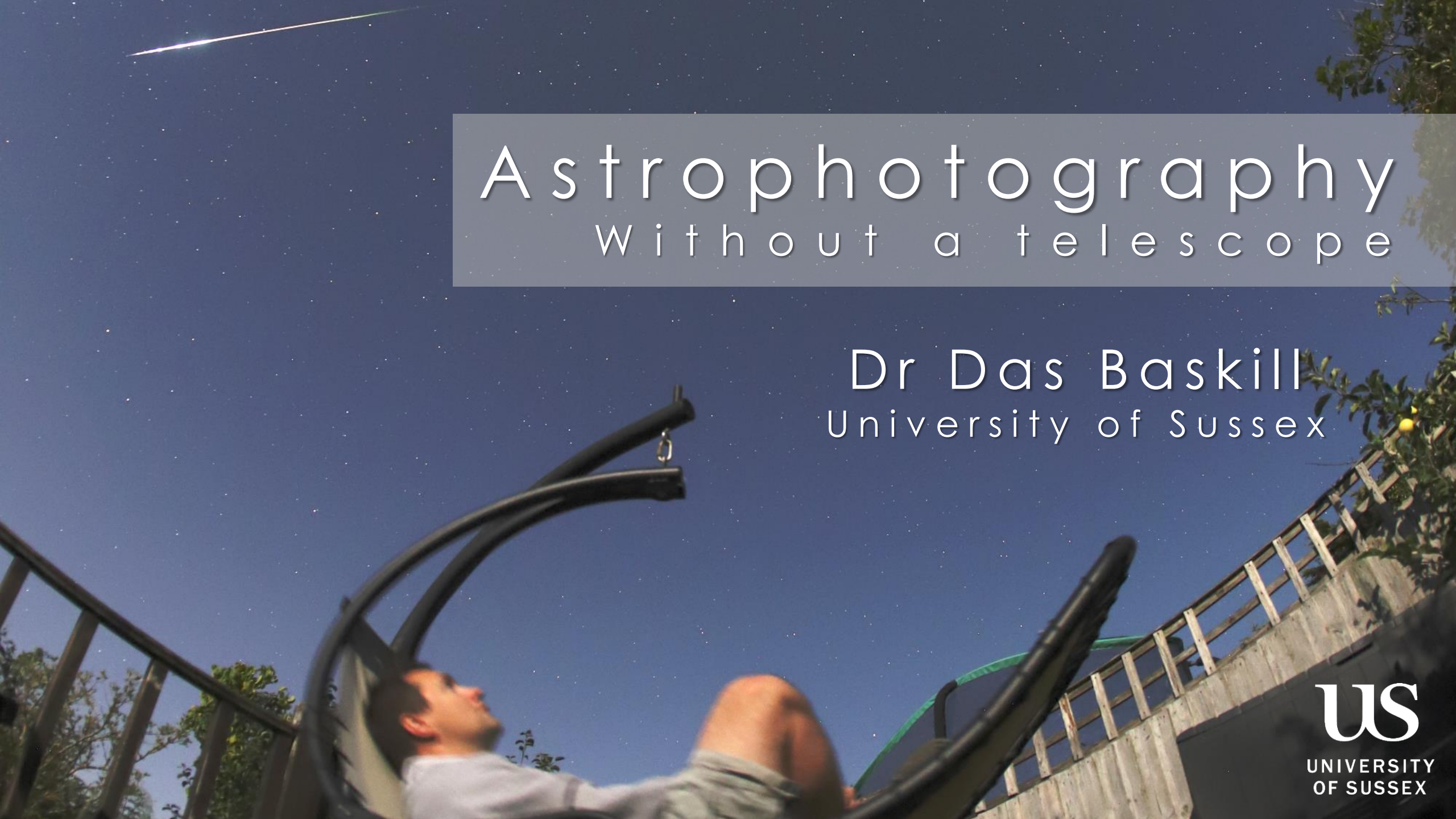
Aurora

Exp: 2s

ISO: 4000

f / # : 5.6



A low-angle, upward-looking shot of a person lying on a black lounge chair on a wooden deck at night. The person is looking up at a dark blue sky filled with stars. A bright meteor streaks across the upper left portion of the sky. The background shows the wooden railing of the deck and some foliage on the right side.

Astrophotography

Without a telescope

Dr Das Baskill
University of Sussex