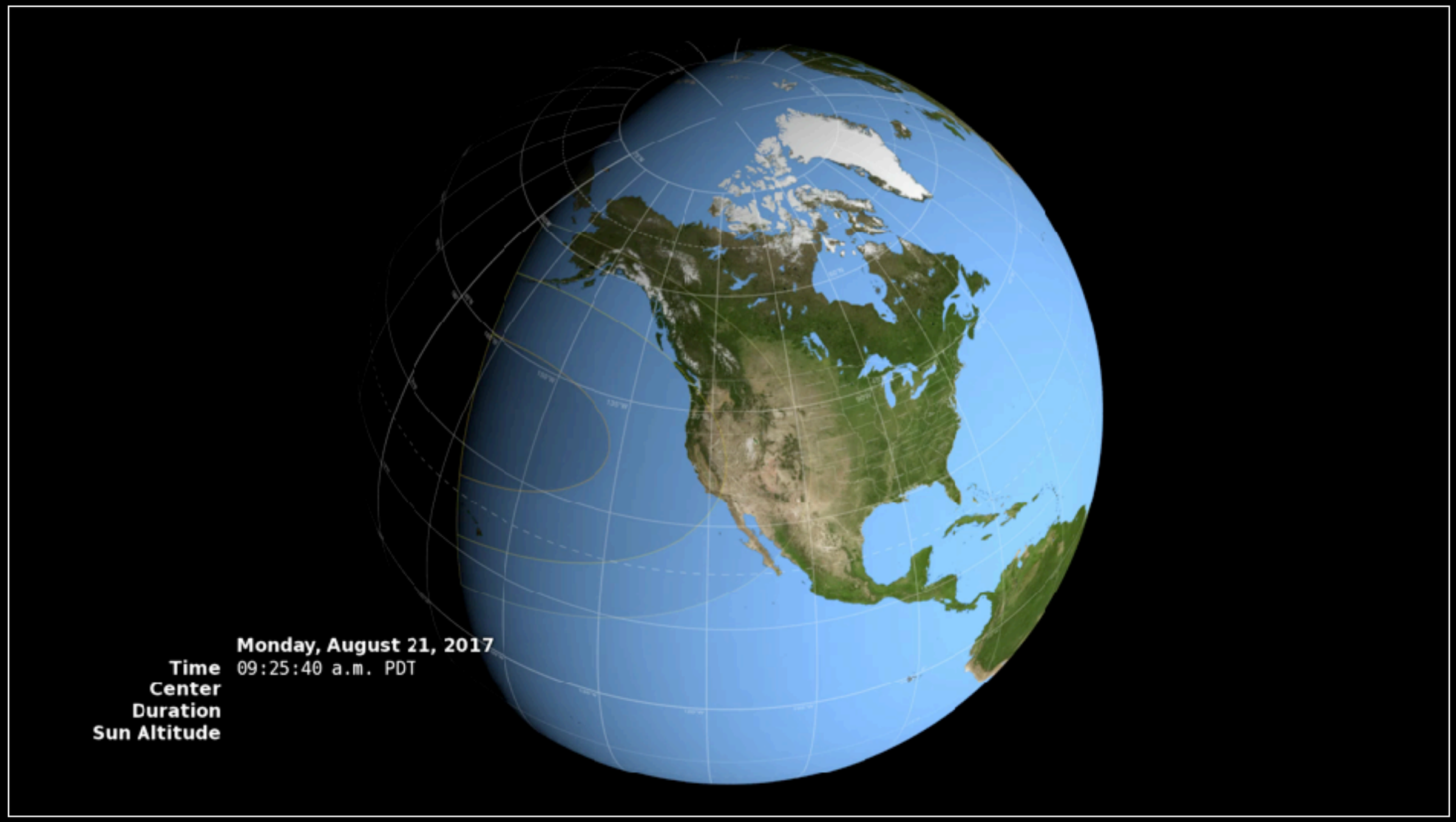
Photographing the

by Reed Hoffmann



Animation by NASA

Reed Hoffmann

Resources

American Astronomical Society – How to Shoot a Solar Eclipse
https://eclipse.aas.org/imaging-video/images-videos

"Mr Eclipse", Fred Espenak
http://www.mreclipse.com/

His solar exposure guide:
http://www.mreclipse.com/SEphoto/image/SE-Exposure1w.GIF

Interactive map:
http://www.eclipsewise.com/solar/SEgmap/2001-2100/SE2017Aug21Tgmap.html

Resources

NASA interactive map that show what you'll see based on where you are, and exactly what time all of that will happen
https://eyes.jpl.nasa.gov/eyes-on-eclipse-web-app.html#

Eclipse apps
https://eclipse.aas.org/resources/apps-software

Photographer who does astrophotography:
http://www.astropix.com/html/i_astrop/2017_eclipse/Eclipse_2017.html

NASA info on Eclipse Eyeglass safety
https://eclipse2017.nasa.gov/safety

Tonight’s

1 - How to view it safely

2 - Stages, Location, Timing

3 - Cameras, Settings

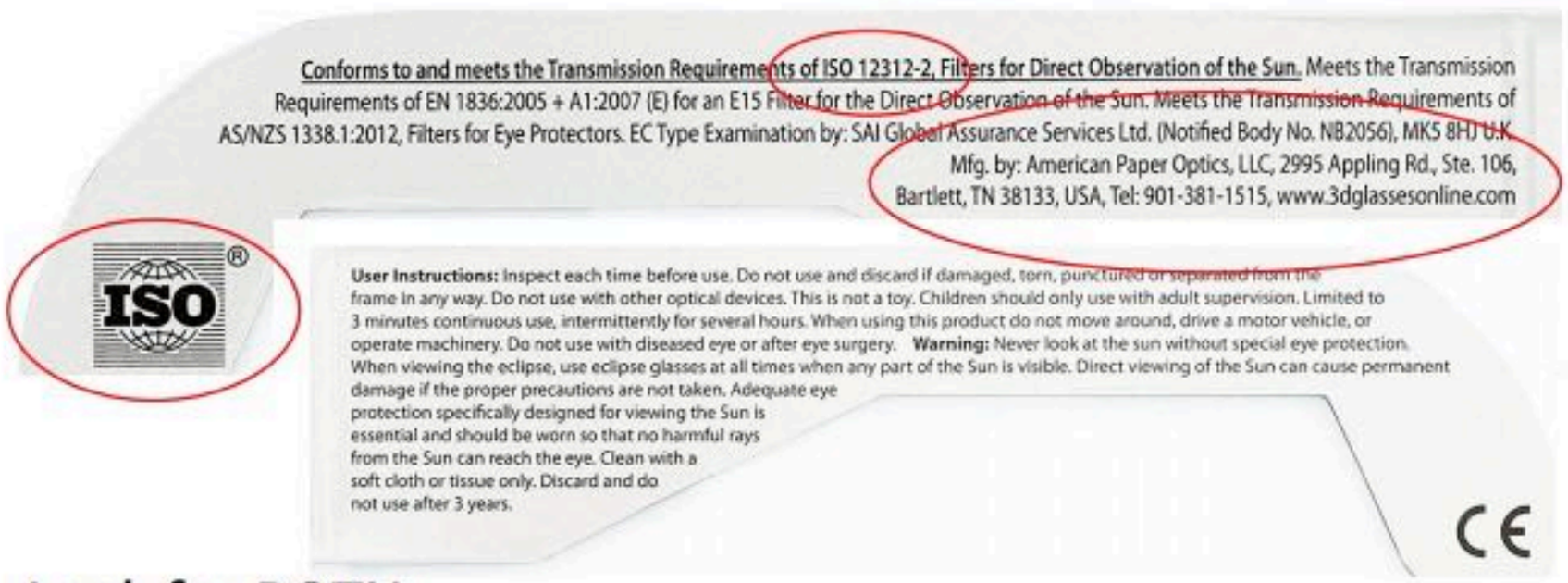
4 - Planning

1 - How to View it

1 - How to View it

Eclipse Eyeglass Safety:
Don't be Blindsided!

NASA has been alerted there are unsafe paper solar glasses being distributed. How to tell what is safe?



Look for BOTH:

1. U.S. Manufacturer Name (Recommend any of these: American Paper Optics, Rainbow Symphony, Thousand Oaks Optical, or TSE 17)
2. "ISO" Icon (Must have ISO reference 12312-2)

2- Stages, Location,

C1 11:42am

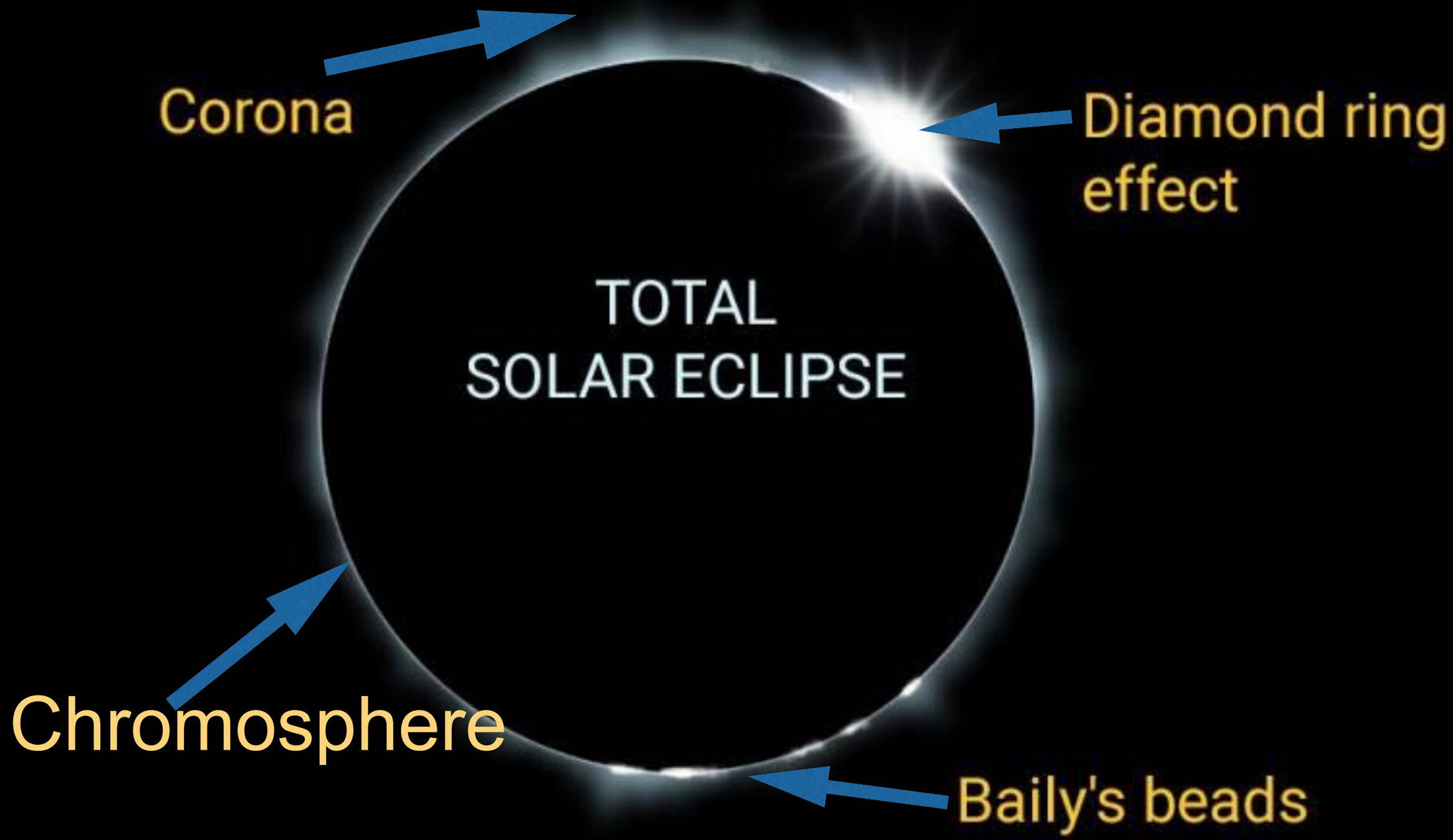
C2 1:08:42pm

C3 1:11:15pm

C4 2:36pm

Remember, the <u>ONLY</u> time it's safe to view the eclipse without eye protection is during Totality!!!

2- Stages, Location,



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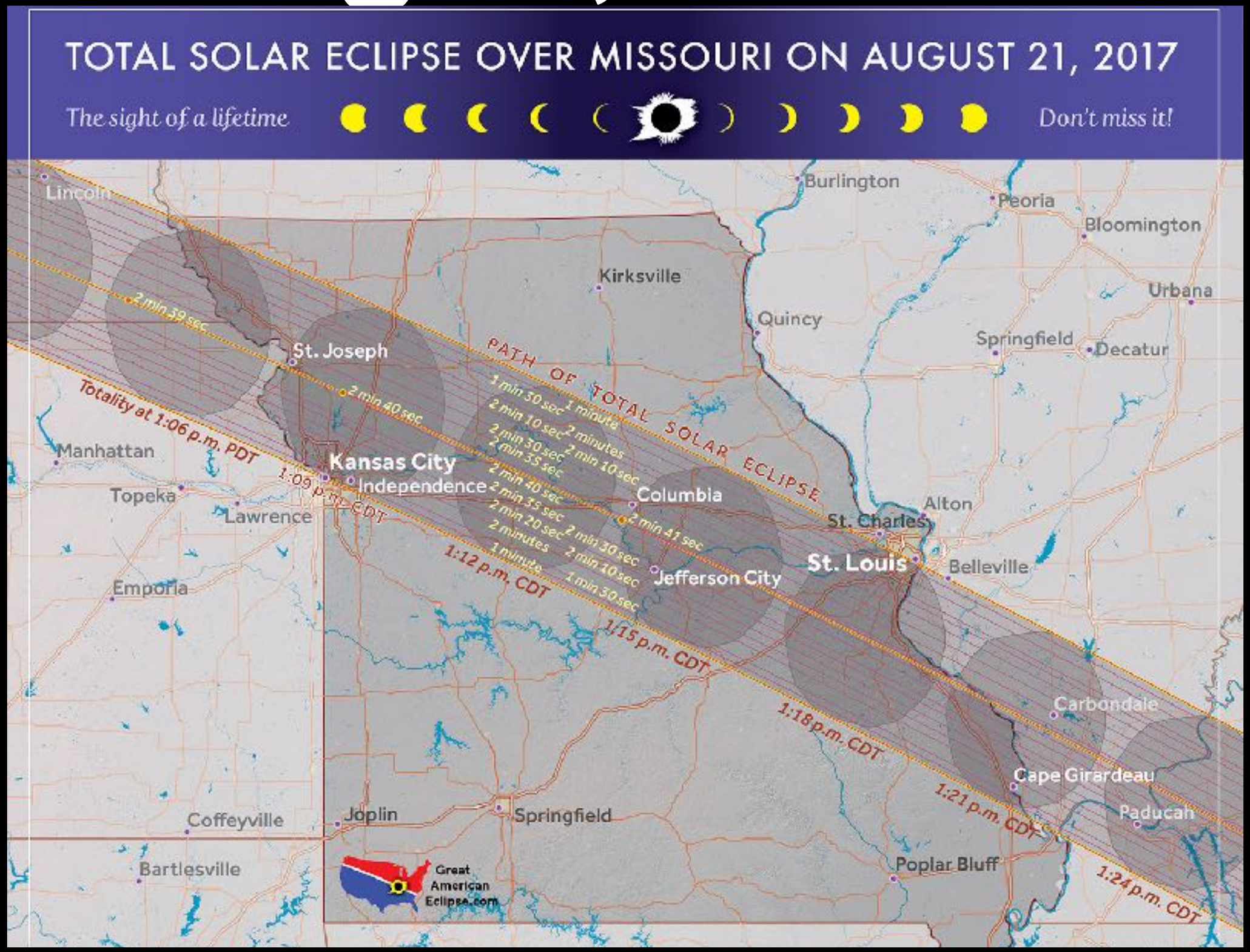
2- Stages, Location,

w

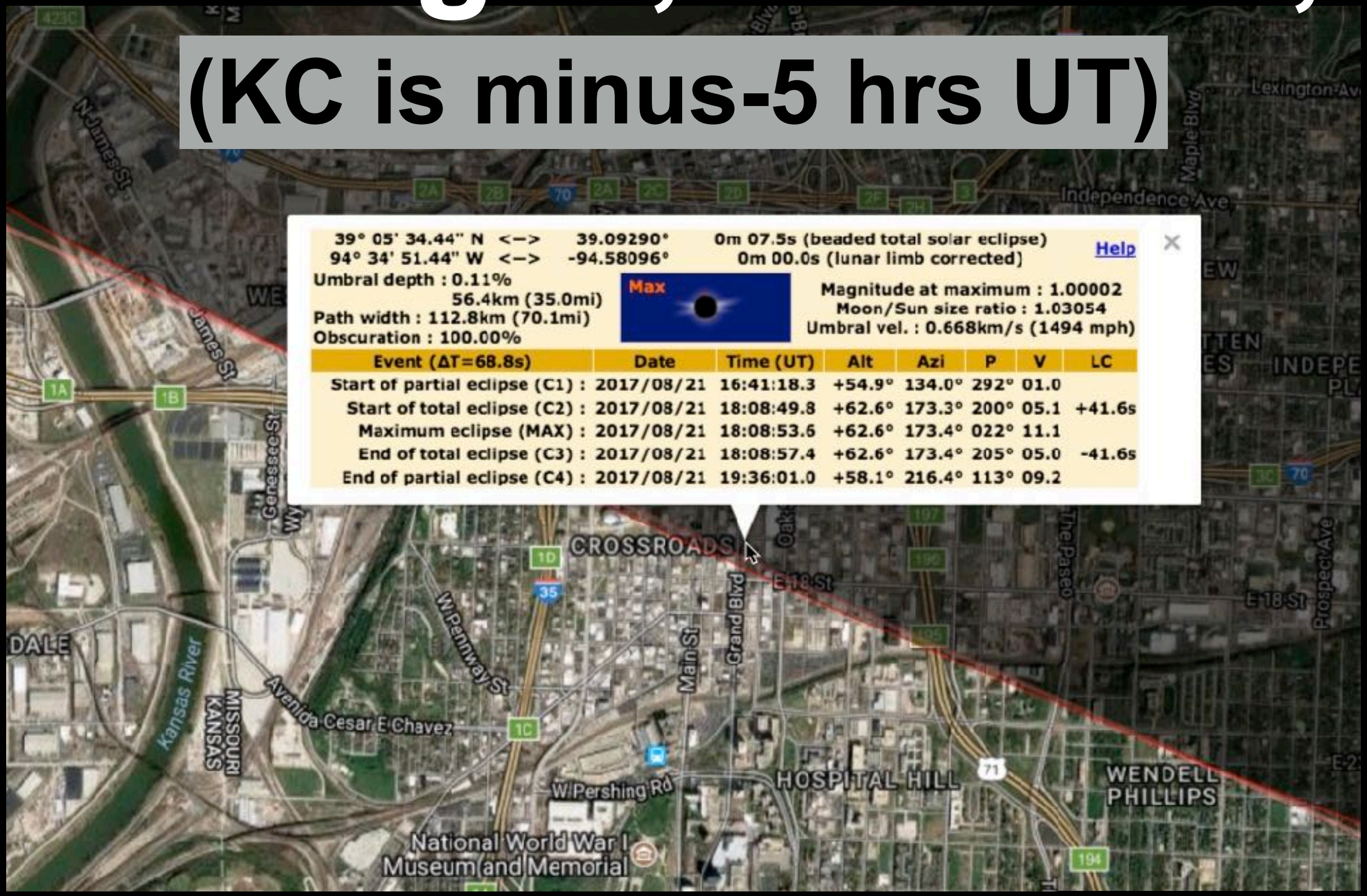
2- Stages, Location,



W

2- Stages, Location,

(KC is minus-5 hrs UT)



W

2- Stages, Location,

(KC is minus-5 hrs UT)

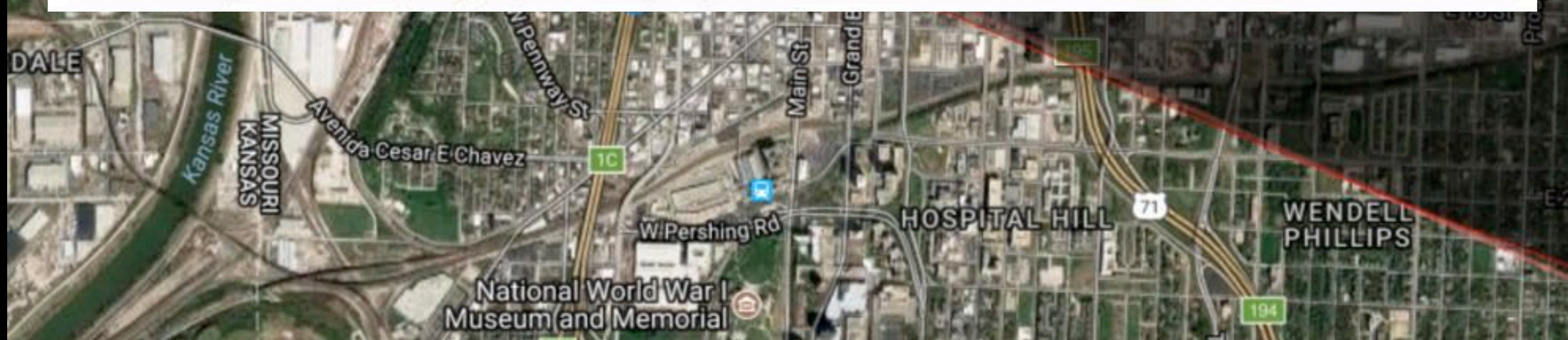
39° 05' 34.44" N <—> 39.09290° 0m 07.5s (beaded total solar eclipse)
94° 34' 51.44" W <—> -94.58096° 0m 00.0s (lunar limb corrected)

Help

Umbral depth : 0.11%
56.4km (35.0mi)
Path width : 112.8km (70.1mi)
Obscuration : 100.00%

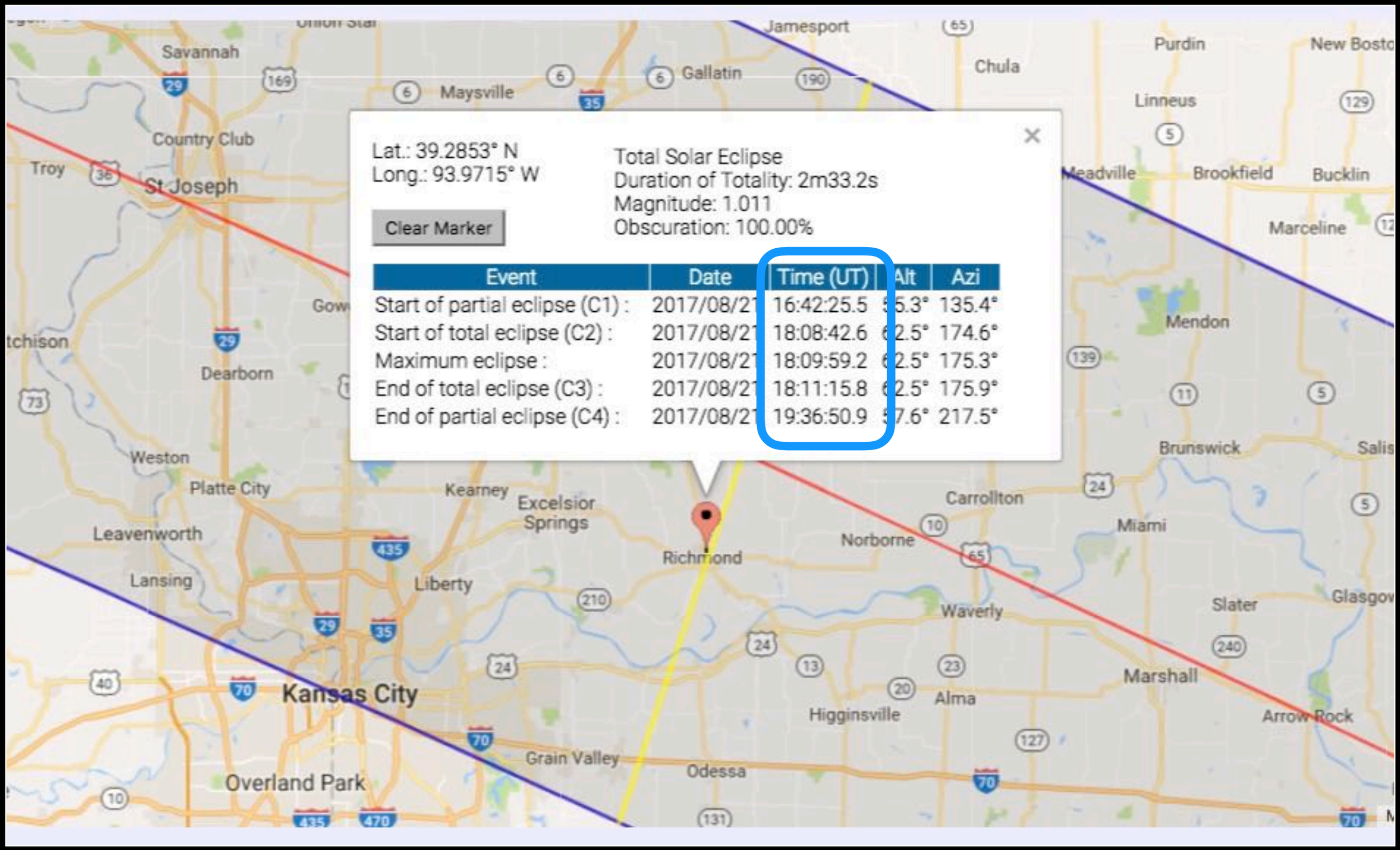
Magnitude at maximum : 1.00002
Moon/Sun size ratio : 1.03054
Umbral vel. : 0.668km/s (1494 mph)

Event (ΔT=68.8s)	Date	Time (UT)	Alt	Azi	P	V	LC
Start of partial eclipse (C1) :	2017/08/21	16:41:18.3	+54.9°	134.0°	292°	01.0	
Start of total eclipse (C2) :	2017/08/21	18:08:49.8	+62.6°	173.3°	200°	05.1	+41.6s
Maximum eclipse (MAX) :	2017/08/21	18:08:53.6	+62.6°	173.4°	022°	11.1	
End of total eclipse (C3) :	2017/08/21	18:08:57.4	+62.6°	173.4°	205°	05.0	-41.6s
End of partial eclipse (C4) :	2017/08/21	19:36:01.0	+58.1°	216.4°	113°	09.2	



W

2- Stages, Location,



W

3 - Cameras, Settings

Smartphones and Basic P&S

Still need a filter.

Set focus and exposure.

Perhaps accessory telephoto lens?

HDR mode?

Turn off the flash.

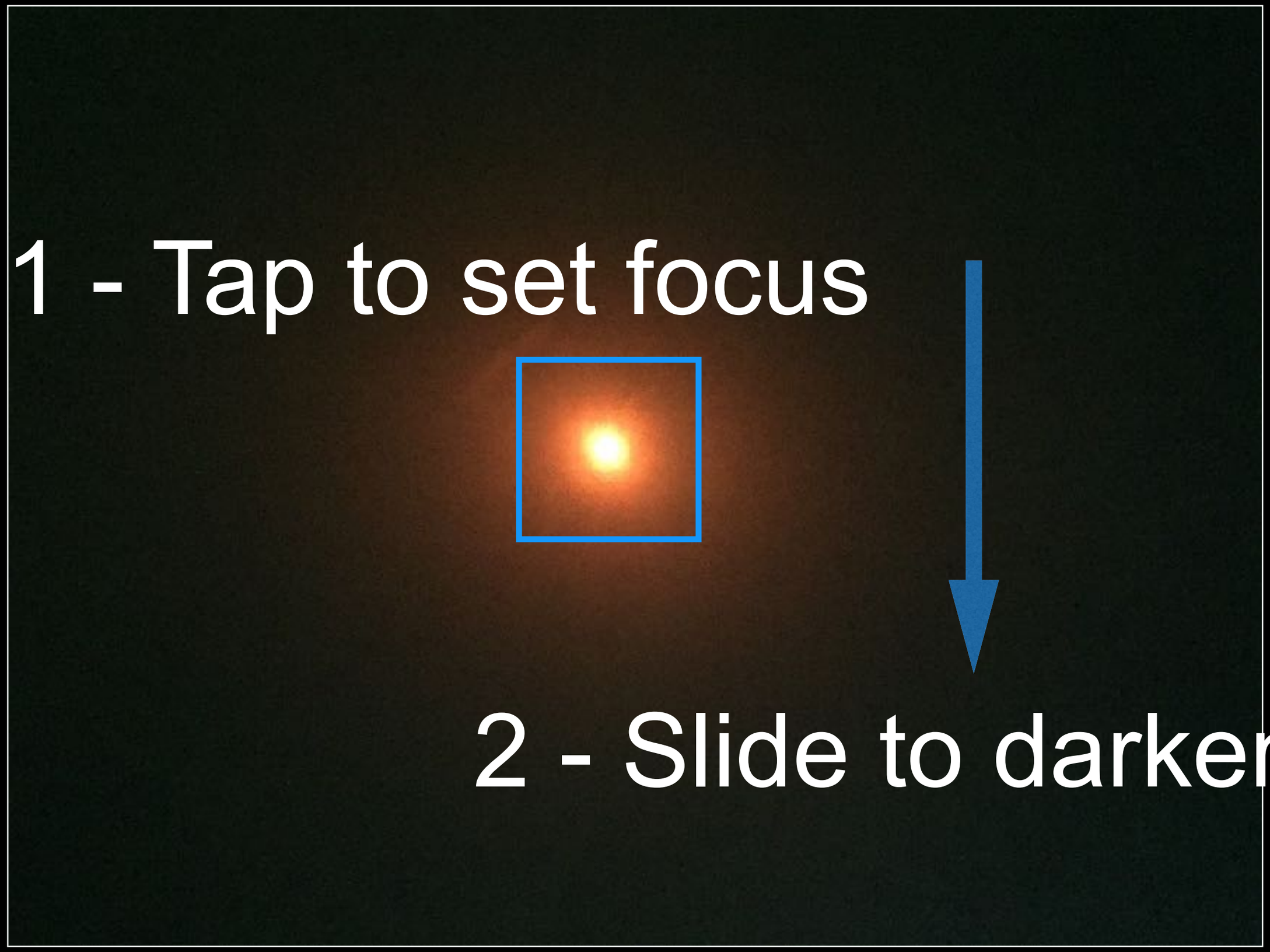
Use with telescope?

Capture video/audio.

Smartphone - no filter

Smartphone - with filter

Smartphone - with filter



Smartphone - with filter

Zoom smartphone?

Tape filter on

3 - Cameras, Settings

Have a telescope?

3 - Cameras, Settings

Cameras with Controls

Still need a filter.
Manual exposure.
Manual focus.
Daylight white balance.
Telephoto lens.
Tripod.

3 - Cameras, Settings

ISO 100, 1/8000 second, f/32, 550mm

No filter

10-stop ND

3 - Cameras, Settings

ISO 400, 1/500 second, f/11, 800mm

Solar filter (1/1,000,000 of light!)

3 - Cameras, Settings

Filters

"Solar," or "White Light"

10-stop Neutral Density filter

3 - Cameras, Settings

ND filters are <u>NOT VISUALLY SAFE!</u>

3 - Cameras, Settings

Manual Exposure

3 - Cameras, Settings

Manual ISO

3 - Cameras, Settings

Manual Exposure

Luckily, you can do some tests ahead of time…

(with solar filter)

3 - Cameras, Settings

Manual Exposure

And the moon is another way to test

ISO 400, 1/200 second, f/11

(with no filter)

3 - Cameras, Settings

Manual Exposure

ISO	f/Number								
25	1.4	2	2.8	4	5.6	8	11	16	22
50	2	2.8	4	5.6	8	11	16	22	32
100	2.8	4	5.6	8	11	16	22	32	44
200	4	5.6	8	11	16	22	32	44	64
400	5.6	8	11	16	22	32	44	64	88
800	8	11	16	22	32	44	64	88	128
1600	11	16	22	32	44	64	88	128	176

Eclipse Feature	Q	Shutter Speed								
Partial[1] - 4.0 ND	11	—	—	—	1/4000	1/2000	1/1000	1/500	1/250	1/125
Partial[1] - 5.0 ND	8	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15
Baily's Beads[2]	11	—	—	—	1/4000	1/2000	1/1000	1/500	1/250	1/125
Chromosphere	10	—	—	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60
Prominences	9	—	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30
Corona - 0.1 Rs	7	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8
Corona - 0.2 Rs[3]	5	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2
Corona - 0.5 Rs	3	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1 sec	2 sec
Corona - 1.0 Rs	1	1/30	1/15	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec
Corona - 2.0 Rs	0	1/15	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec	15 sec
Corona - 4.0 Rs	-1	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec	15 sec	30 sec
Corona - 8.0 Rs	-3	1/2	1 sec	2 sec	4 sec	8 sec	15 sec	30 sec	1 min	2 min

Solar Eclipse Exposure Guide from Fred Espenak

3 - Cameras, Settings

Filters off for these photos!

ISO	f/Number								
25	1.4	2	2.8	4	5.6	8	11	16	22
50	2	2.8	4	5.6	8	11	16	22	32
100	2.8	4	5.6	8	11	16	22	32	44
200	4	5.6	8	11	16	22	32	44	64
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Partial[1] - 5.0 ND	8	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15
Baily's Beads[2]	11	—	—	—	1/4000	1/2000	1/1000	1/500	1/250	1/125
Chromosphere	10	—	—	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60
Prominences	9	—	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30
Corona - 0.1 Rs	7	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8
Corona - 0.2 Rs[3]	5	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2
Corona - 0.5 Rs	3	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1 sec	2 sec
Corona - 1.0 Rs	1	1/30	1/15	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec
Corona - 2.0 Rs	0	1/15	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec	15 sec
Corona - 4.0 Rs	-1	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec	15 sec	30 sec
Corona - 8.0 Rs	-3	1/2	1 sec	2 sec	4 sec	8 sec	15 sec	30 sec	1 min	2 min

Solar Eclipse Exposure Guide from Fred Espenak

3 - Cameras, Settings

Can try AF first, then turn it off

3 - Cameras, Settings

Manual Focus - tape it down

3 - Cameras, Settings

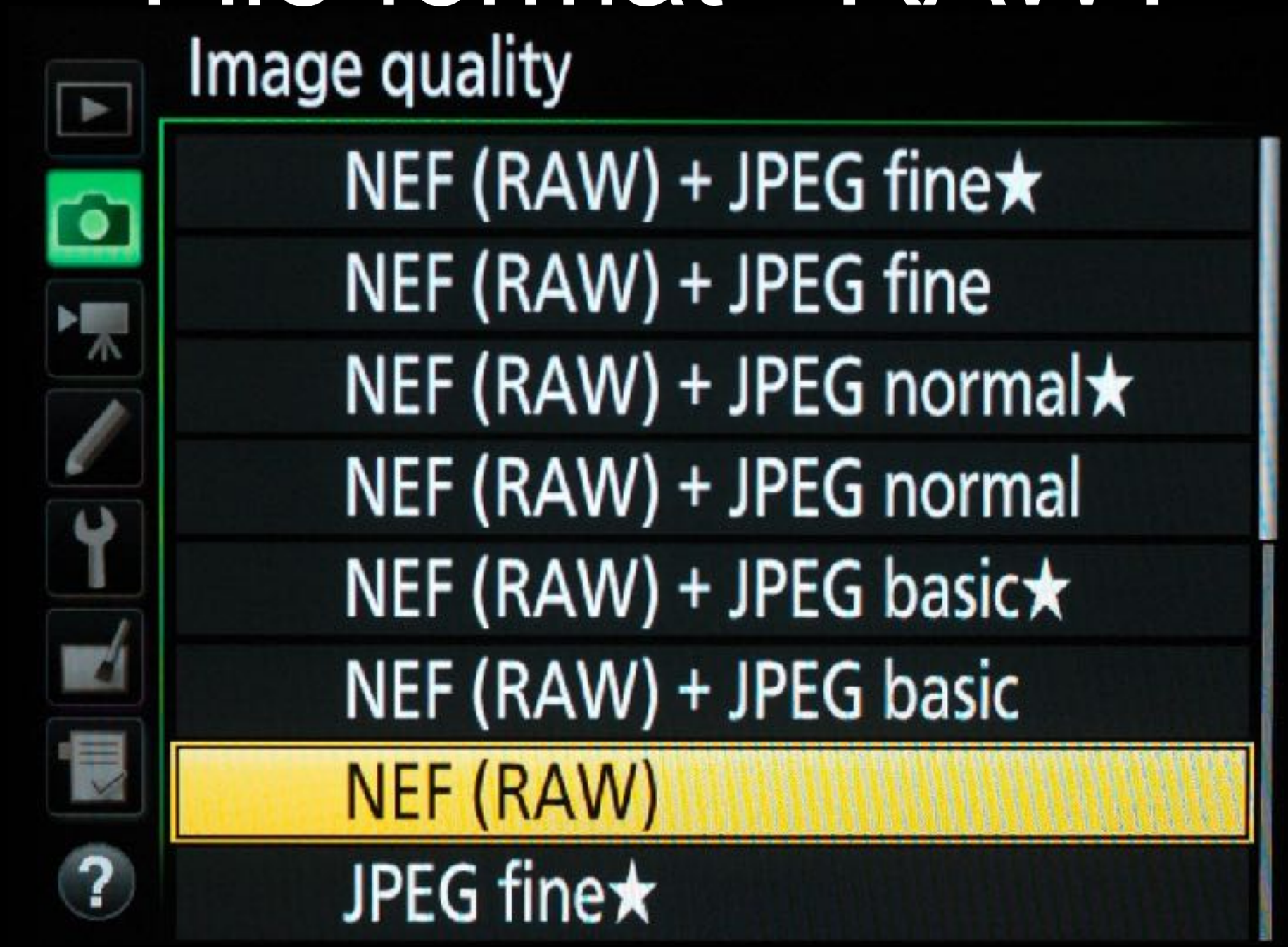
Manual Focus - infinity isn't!

3 - Cameras, Settings

Daylight White Balance

3 - Cameras, Settings

File format - RAW?

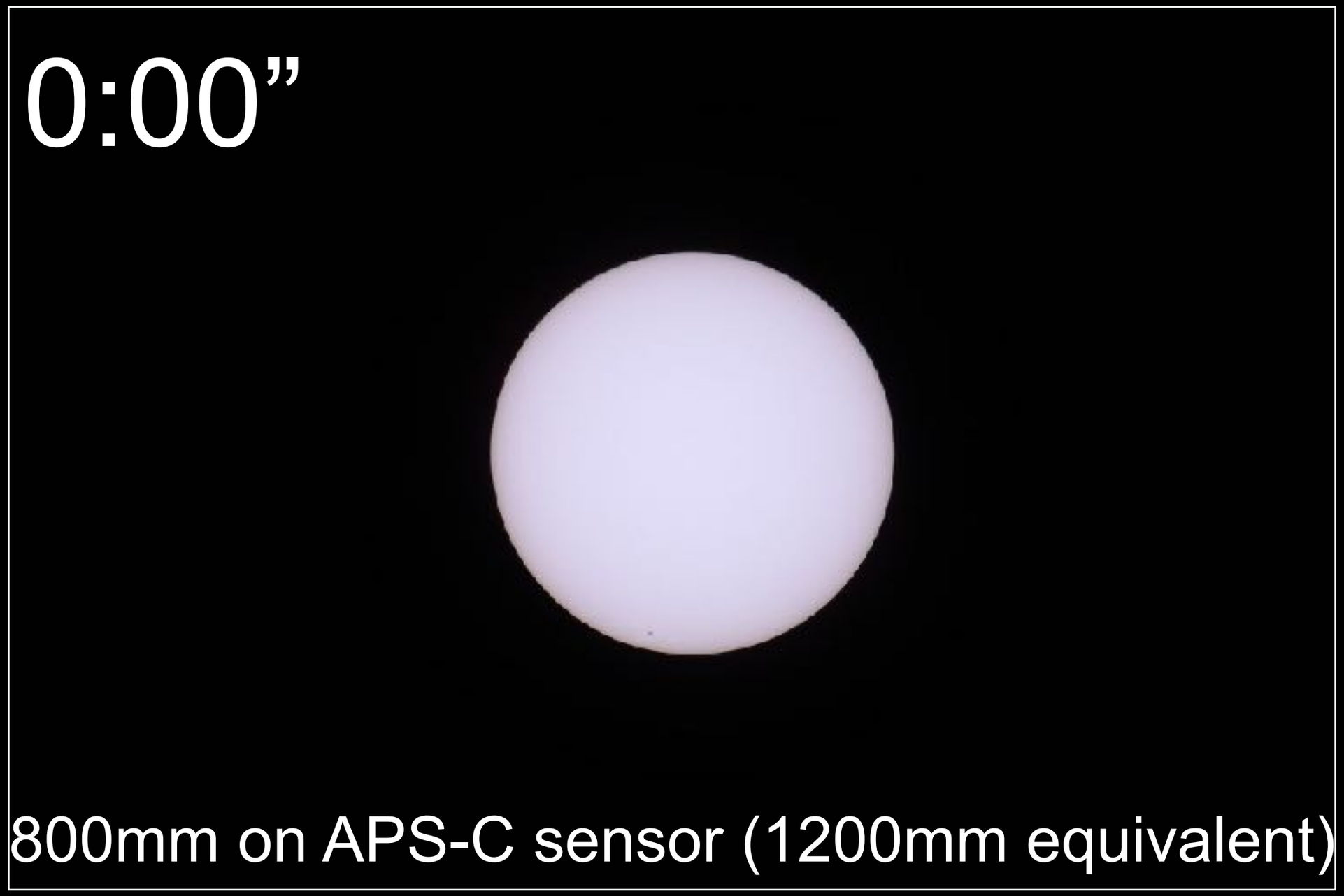


3 - Cameras, Settings

Lens choice (APS-C sensor)

3 - Cameras, Settings

The earth rotates, so the sun will move across your frame, about one diameter's width in two minutes



3 - Cameras, Settings

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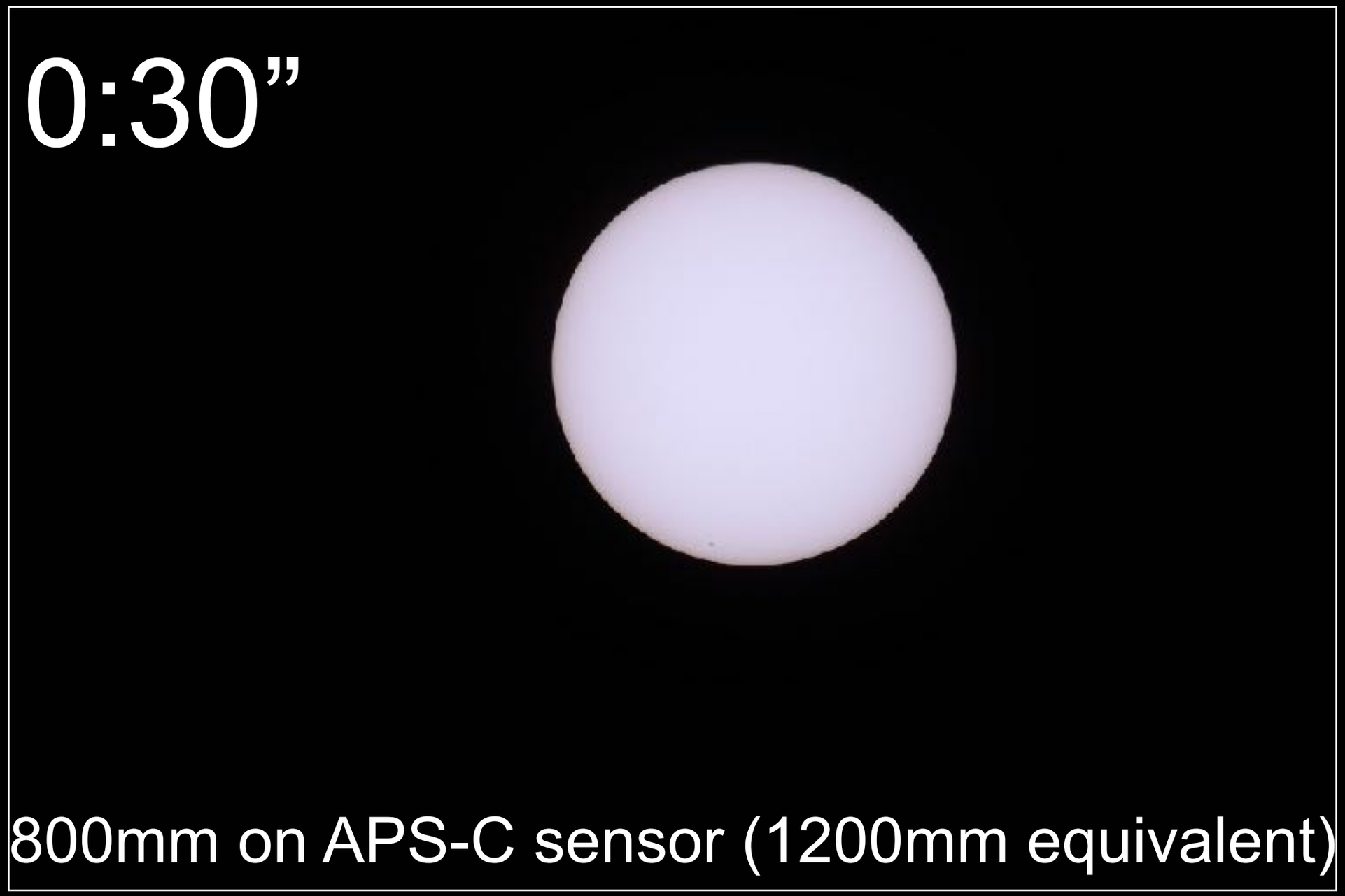

3 - Cameras, Settings

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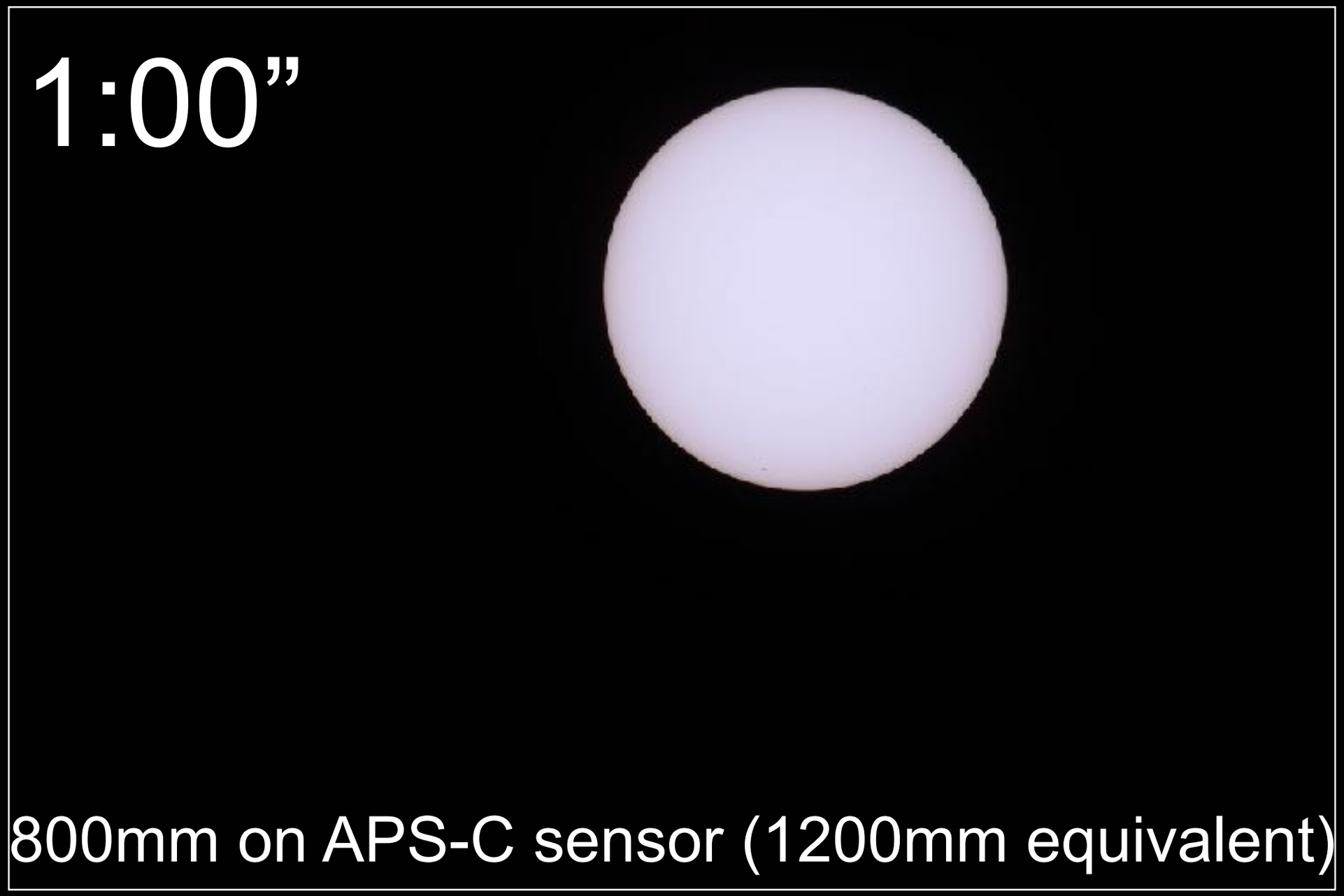

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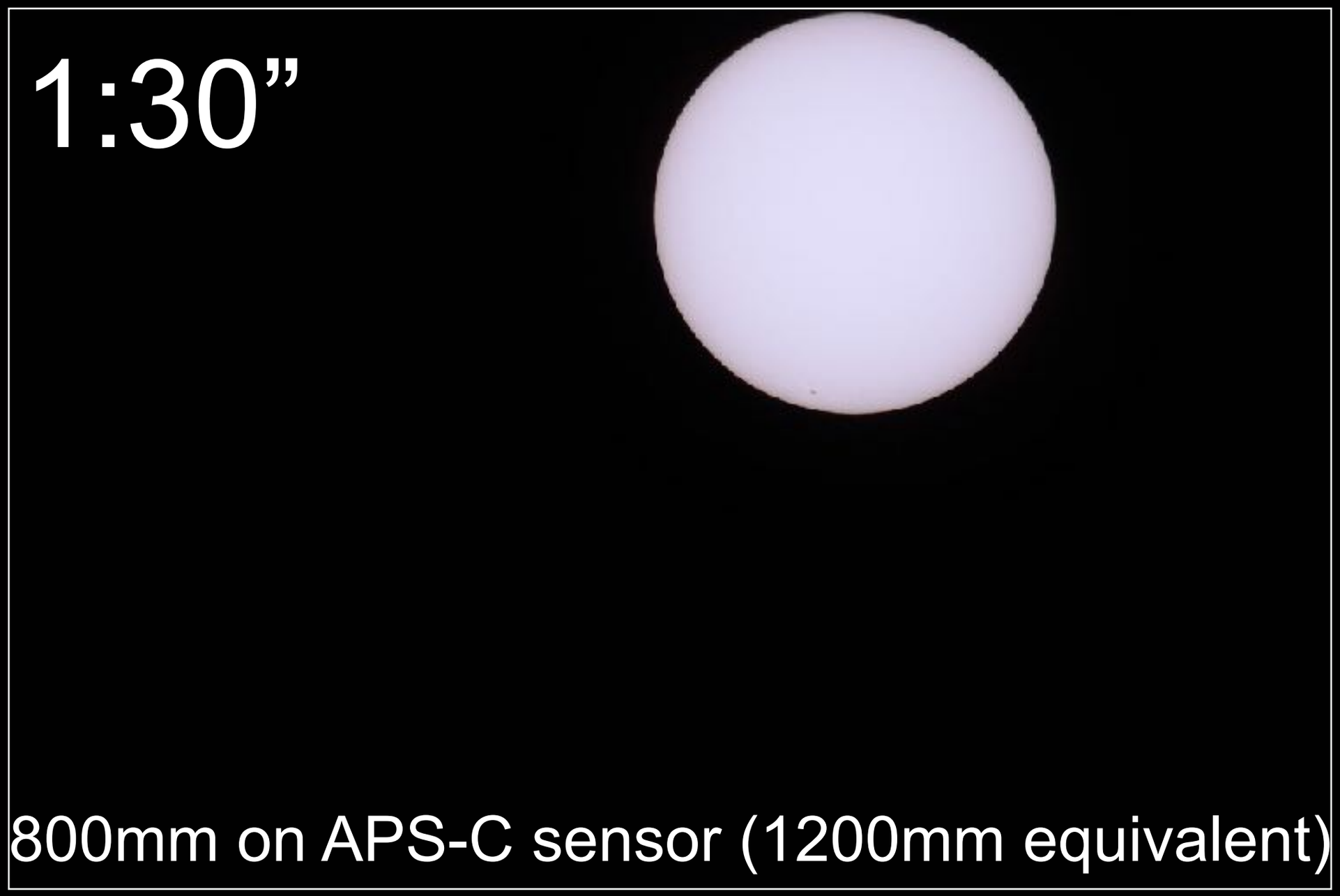

3 - Cameras, Settings

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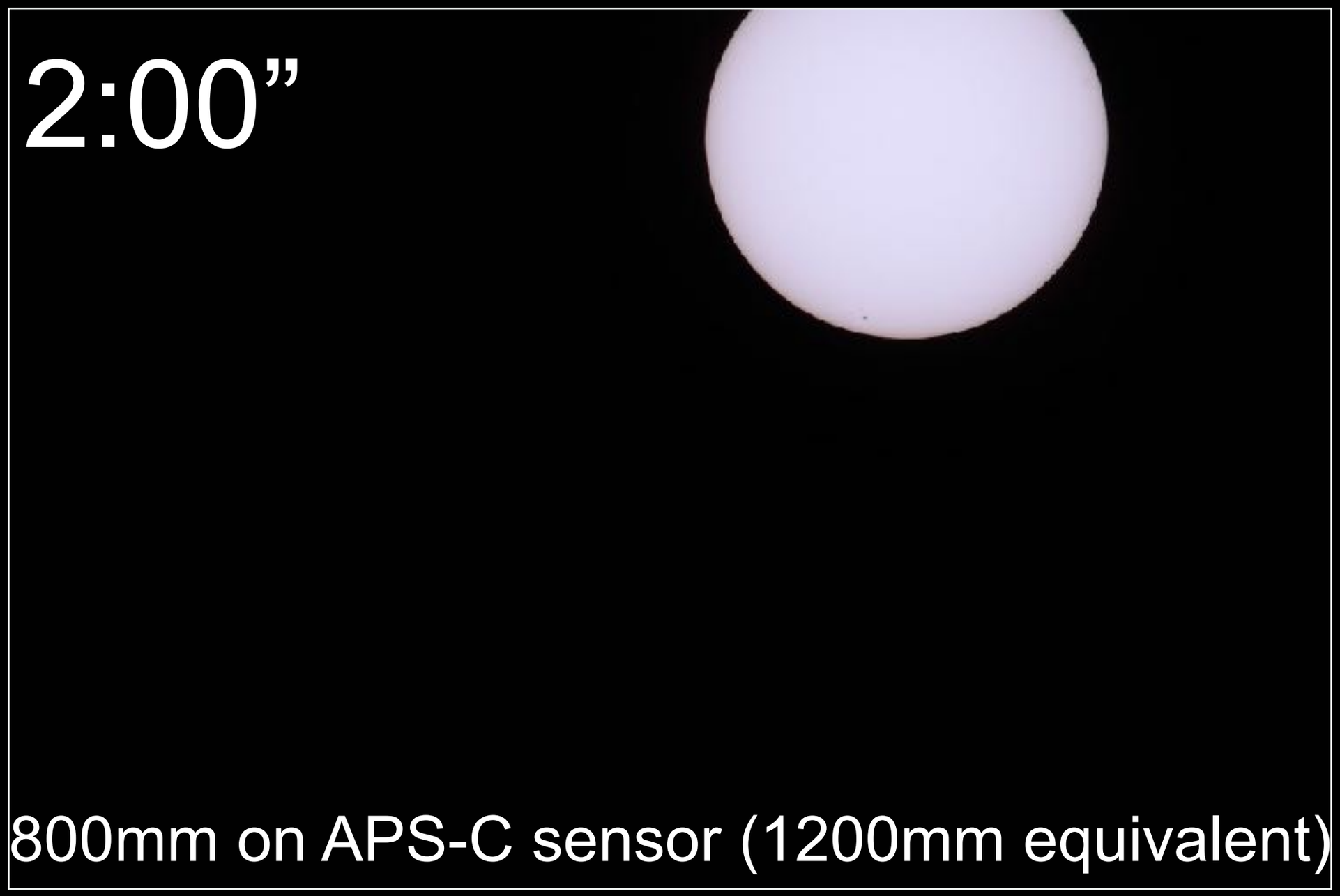

3 - Cameras, Settings

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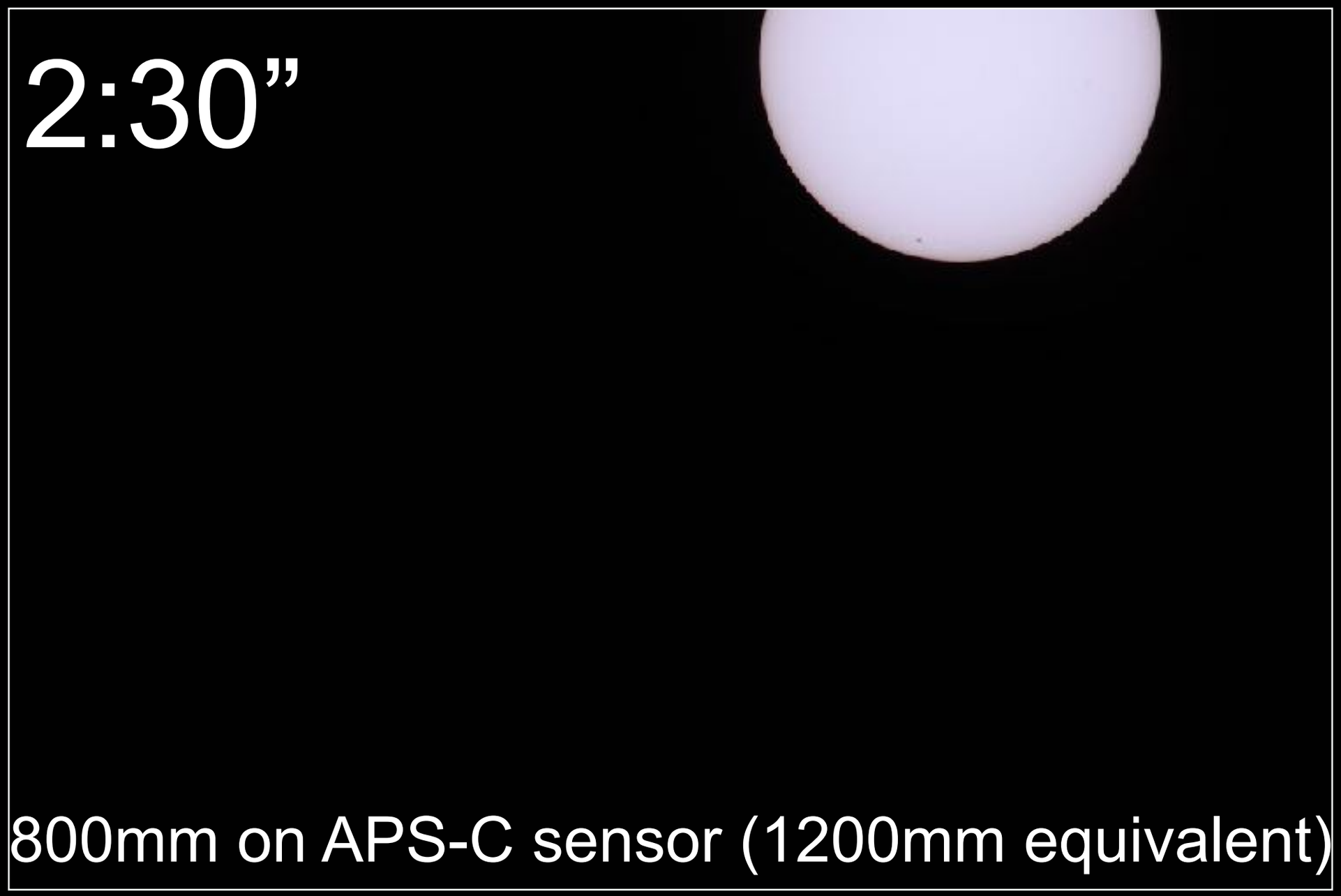
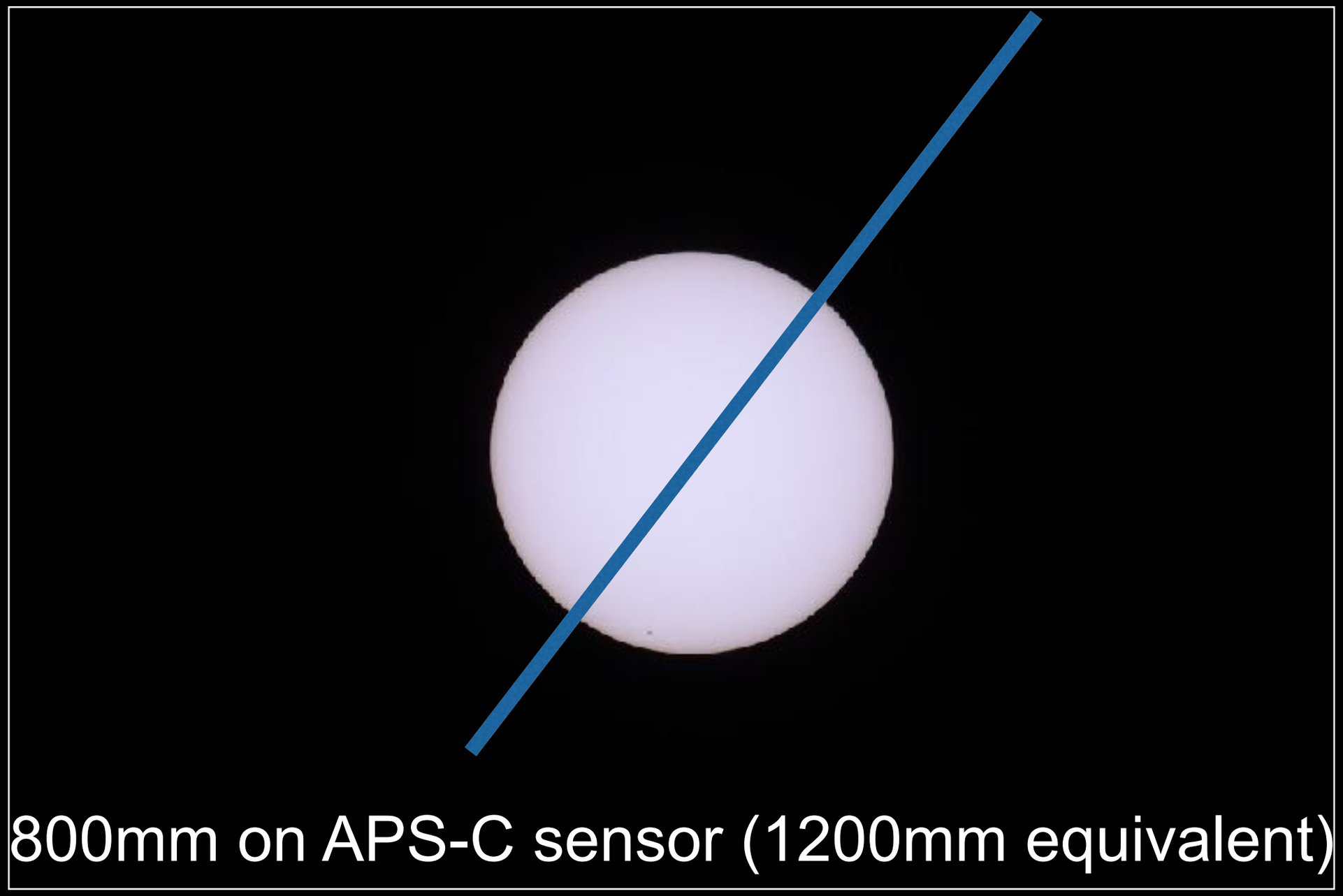


3 - Cameras, Settings

Also, the sun won’t move across the sky in a straight, horizontal line. Know that and plan for it.



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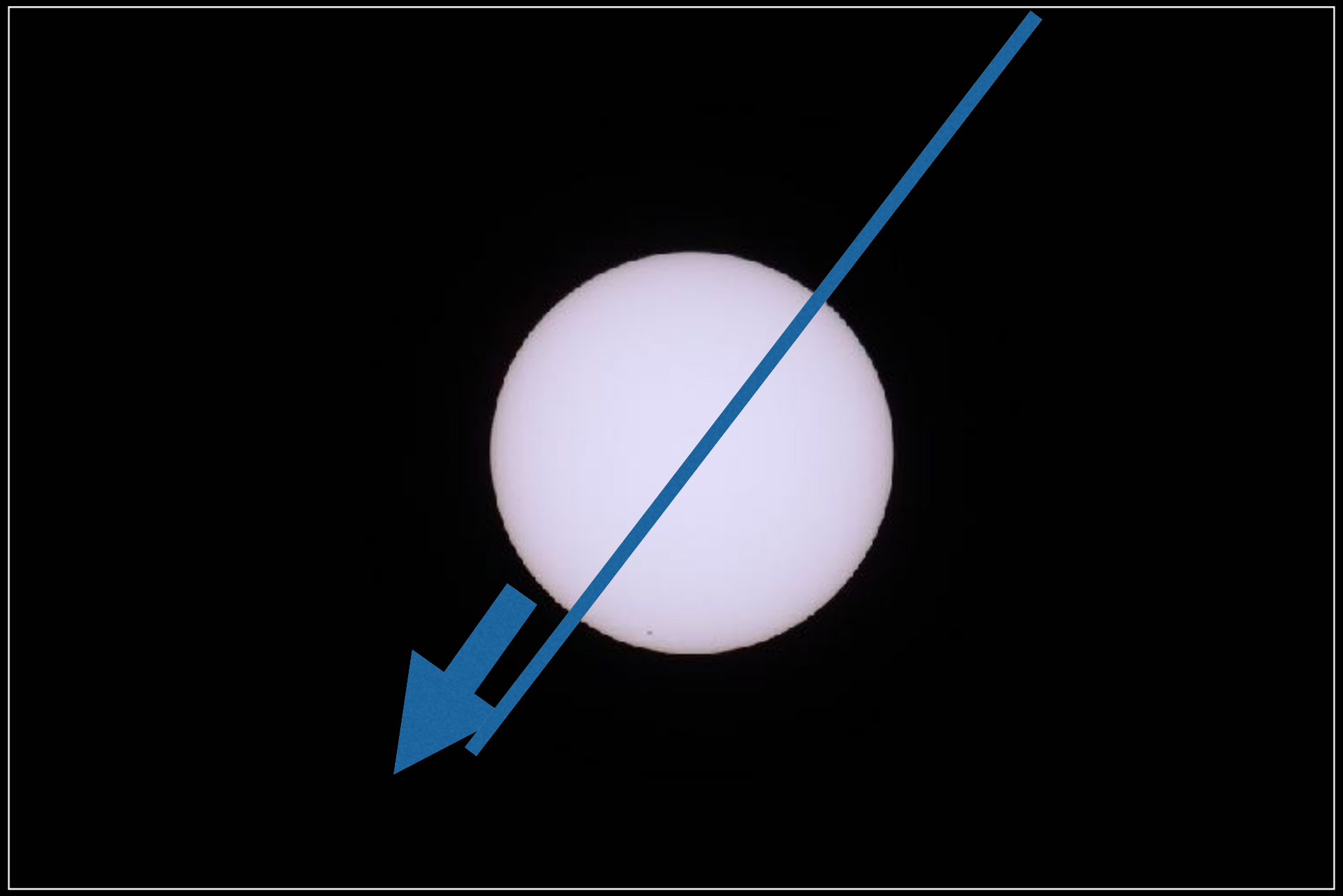

3 - Cameras, Settings

And that movement can also mean blur at slow shutter speeds

ISO	f/Number								
25	1.4	2	2.8	4	5.6	8	11	16	22
50	2	2.8	4	5.6	8	11	16	22	32
100	2.8	4	5.6	8	11	16	22	32	44
200	4	5.6	8	11	16	22	32	44	64
400	5.6	8	11	16	22	32	44	64	88
800	8	11	16	22	32	44	64	88	128
1600	11	16	22	32	44	64	88	128	176

Eclipse Feature	Q	Shutter Speed								
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Baily's Beads[2]	11	—	—	—	1/4000	1/2000	1/1000	1/500	1/250	1/125
Chromosphere	10	—	—	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60
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Corona - 0.2 Rs[3]	5	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2
Corona - 0.5 Rs	3	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1 sec	2 sec
Corona - 1.0 Rs	1	1/30	1/15	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec
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Solar Eclipse Exposure Guide from Fred Espenak

3 - Cameras, Settings

Plus, the longer the telephoto lens, the higher the minimum shutter speed needed

ISO | *f*/Number

200mm lens - 1/2 to 1/15

400mm lens - 1/4 to 1/30

Corona - 0.1 Rs	7	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8
Corona - 0.2 Rs[3]	5	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2
Corona - 0.5 Rs	3	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1 sec	2 sec
Corona - 1.0 Rs	1	1/30	1/15	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec
Corona - 2.0 Rs	0	1/15	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec	15 sec
Corona - 4.0 Rs	-1	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec	15 sec	30 sec
Corona - 8.0 Rs	-3	1/2	1 sec	2 sec	4 sec	8 sec	15 sec	30 sec	1 min	2 min

Solar Eclipse Exposure Guide from Fred Espenak

3 - Cameras, Settings

Tripod

3 - Cameras, Settings

Help avoid camera movement blur? Use a release, intervalometer (in some cameras), smartphone app or even the self-timer.

3 - Cameras, Settings

HDR (composite of corona)

3 - Cameras, Settings

HDR (composite)

Changing only the shutter speed, while keeping the ISO, aperture and framing the same (must be on a tripod, no movement).

ISO 200, f/8

1/4000	1/250	1/15
1/2000	1/125	1/8
1/1000	1/60	1/4
1/500	1/30	1/2

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3 - Cameras, Settings

Wideangle Lens

2001 Eclipse Over Zambia
This wide angle eclipse photo used a 28mm lens and tripod.
during the total solar eclipse of 2001 Jun 21.

You can do this in Auto exposure

3 - Cameras, Settings

Wideangle Lens

Ben Cooper, www.LaunchPhotography.com

3 - Cameras, Settings

Don’t forget about video!

4 - Planning

1 - Make a list of what you'll need.
(extra batteries, memory cards, food, water, etc.)
2 - Make a schedule for what you'll do.
(especially for the brief period of totality)
3 - Practice, practice, practice!
(remember, that filter will have to come off and go back on, and you'll need to change your exposure settings)

Most important?

Pray for sunny weather!

Miss this one?

April 8, 2024

Questions?

(much of this material can be found in a blog post on my website)

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Instagram, Twitter - @reedhoffmann