The 2017 Solar Eclipse in Georgia and the Carolinas

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The 2017 Solar Eclipse

- What's happening
- How to watch it safely
- What else to look for
- How to photograph it
- Other questions

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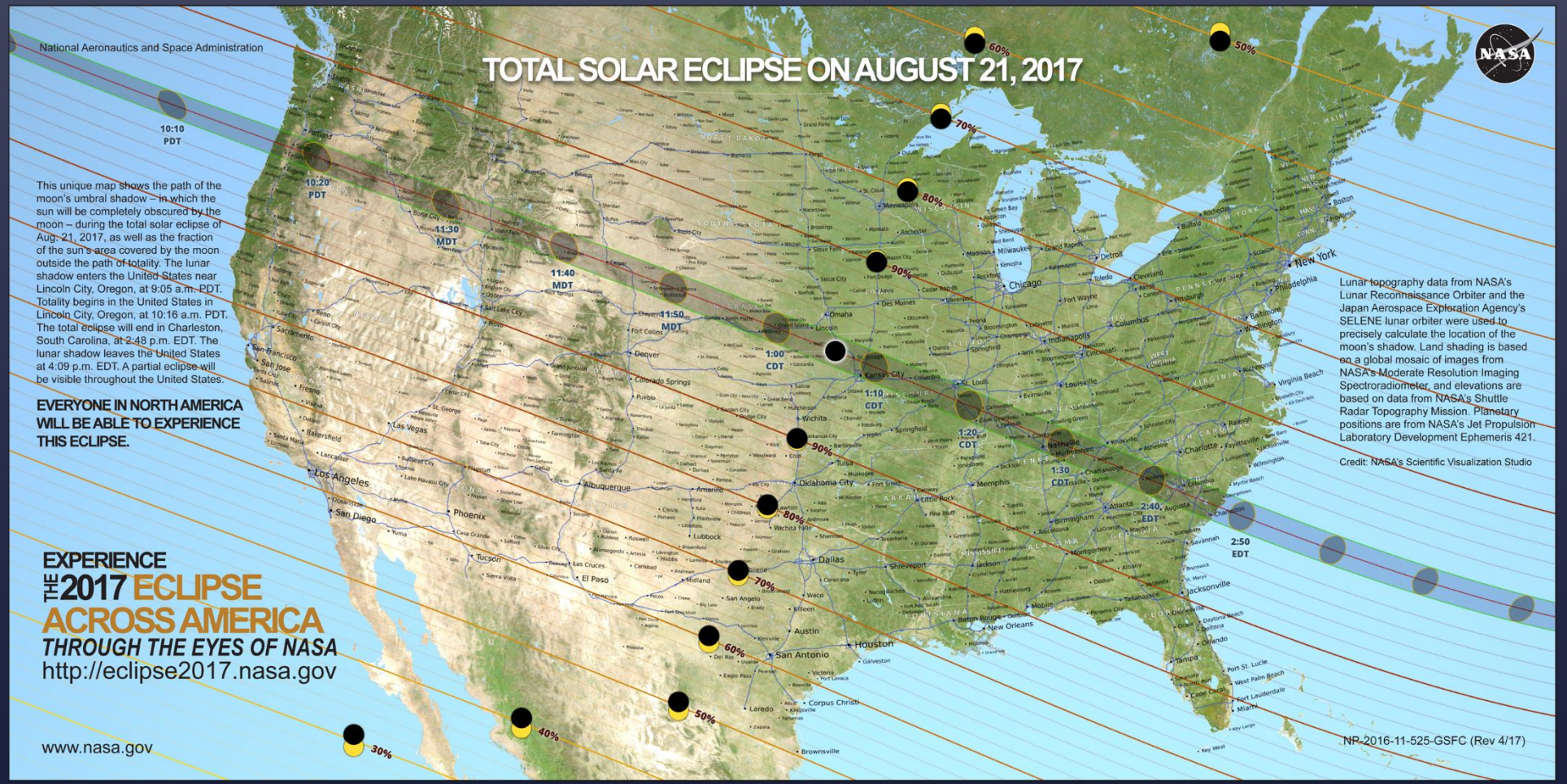
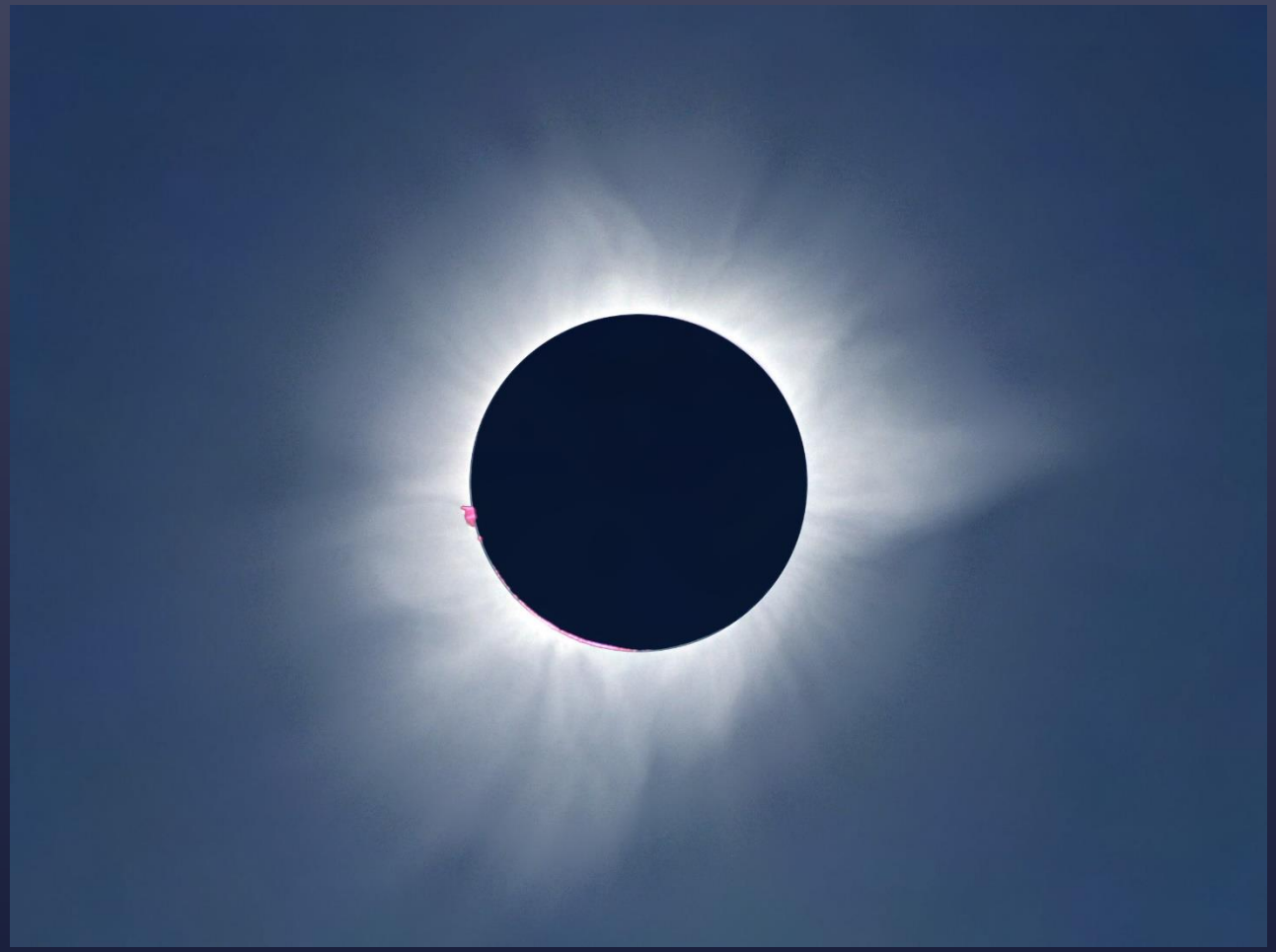
On August 21, 2017, all of North America will see an eclipse of the sun.



It will be TOTAL for up to 2½ minutes everywhere along the path of totality.



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It will be PARTIAL at all the other places and times.

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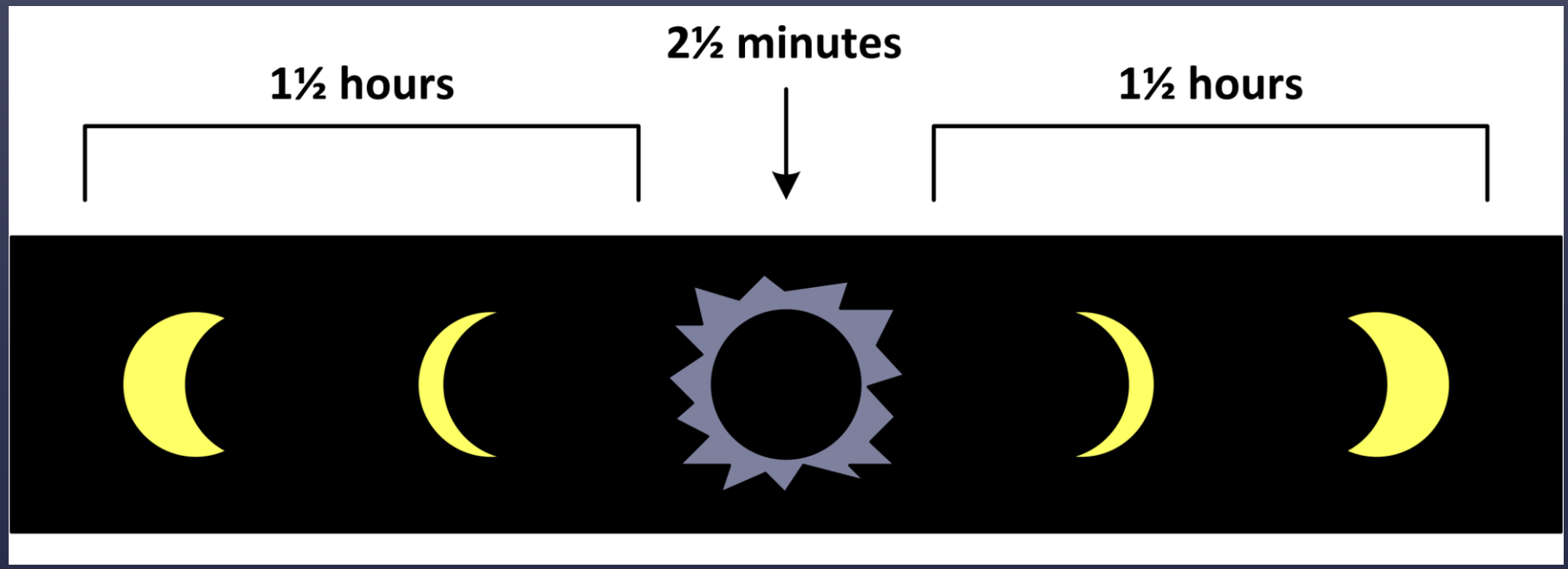
The path of totality goes through Franklin, Hiawassee, Clayton, Anderson, and Columbia.

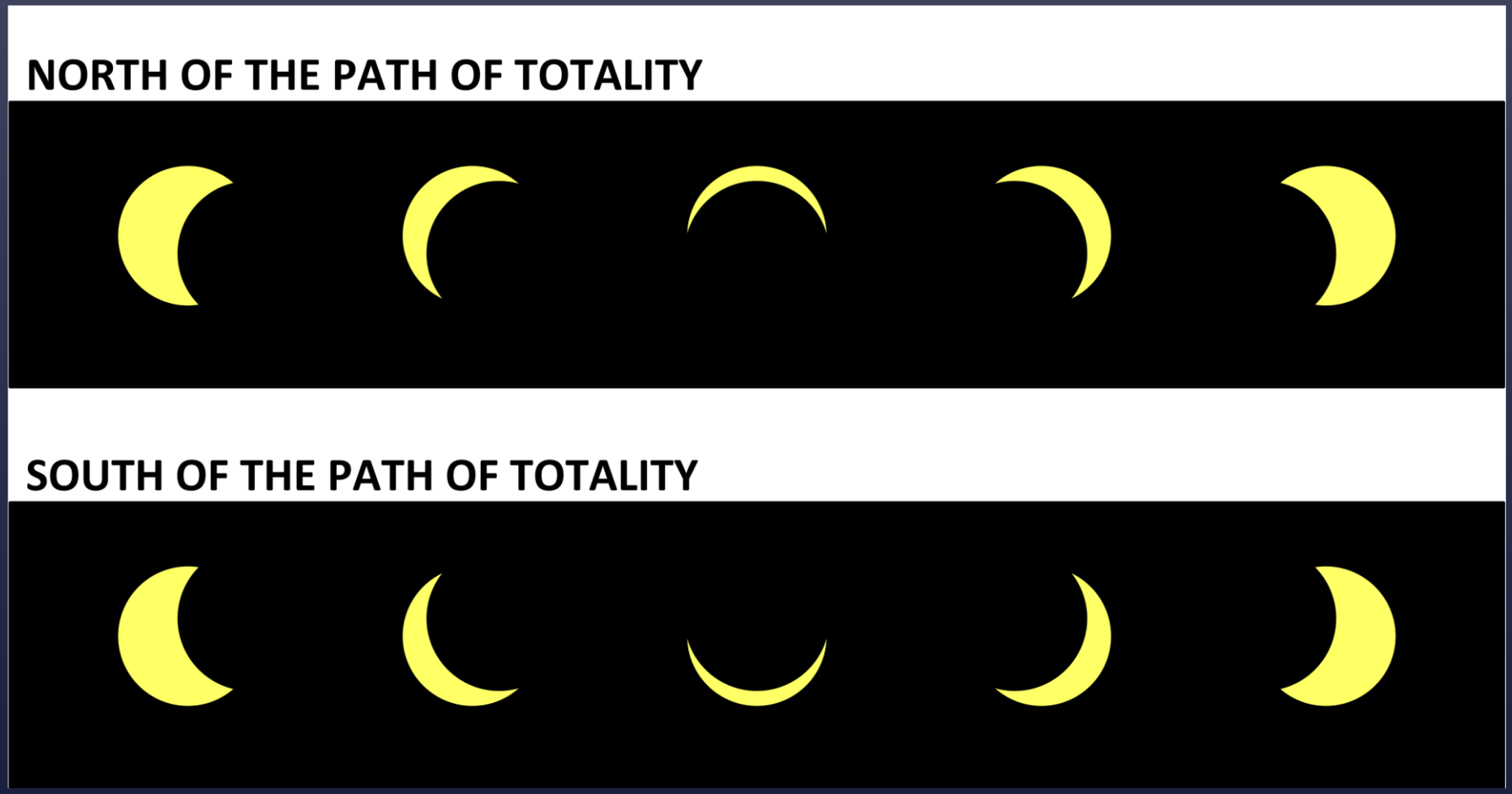
NASA

Here's what you'll see:

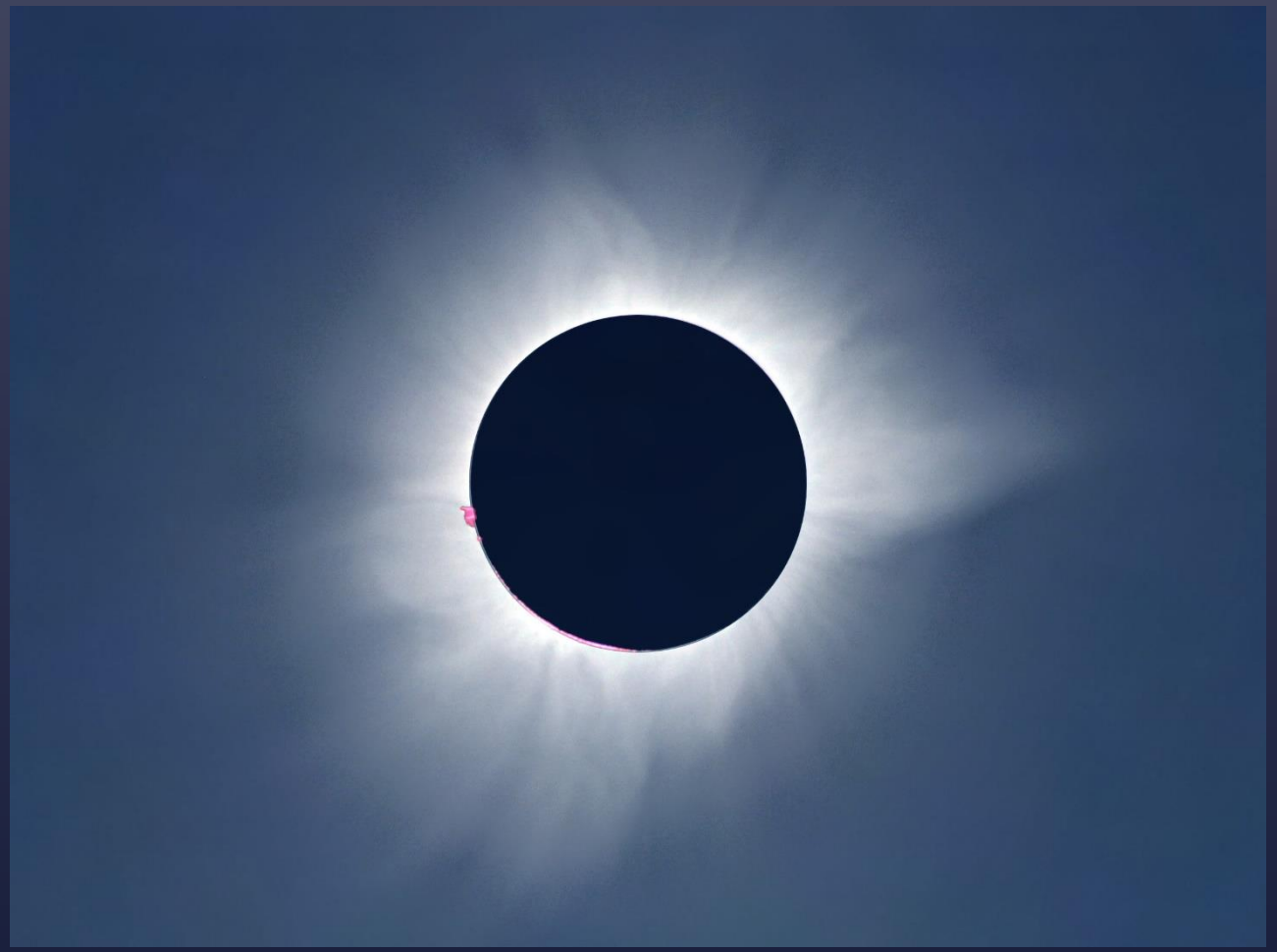


A partial eclipse, 2½ minutes of totality, and more of a partial eclipse.

If you’re not in the path of totality,
you won’t see the sun completely hidden.



If you want to see THIS, you must get into the path of totality. Being a few miles away is not good enough.



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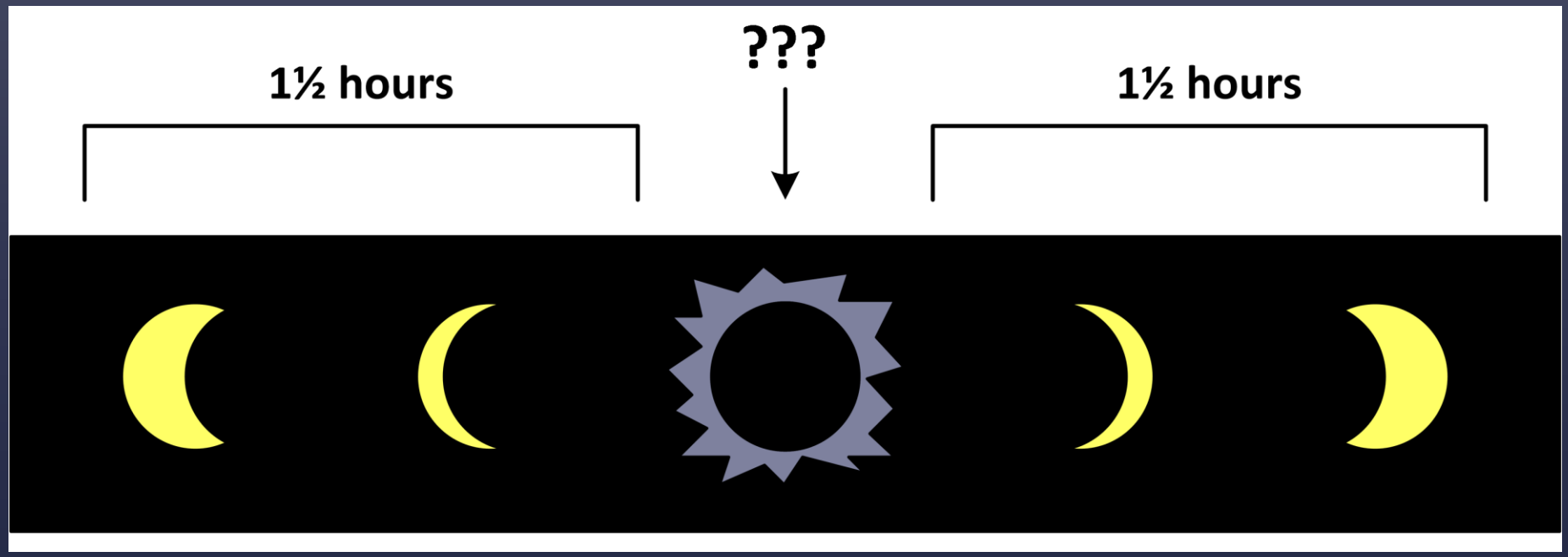
If you’re in the path, but not in the MIDDLE of the path, you won’t get your full 2½ minutes…



…so get fairly close to the middle of the 70-mile-wide path, if possible.

EXACT TIMES

	Partial eclipse begins	Totality begins	LENGTH OF TOTALITY	Partial eclipse ends
Hiawassee, GA	1:06 pm	2:35:01 pm	2m 27s	4:06 pm
Franklin, NC	1:07 pm	2:35:24 pm	2m 30s	4:07 pm
Clayton, GA	1:07 pm	2:35:46 pm	2m 35s	4:07 pm
Anderson, SC	1:09 pm	2:37:50 pm	2m 34s	4:09 pm
Columbia, SC	1:13 pm	2:41:50 pm	2m 30s	4:13 pm

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Why does safety matter?

What's dangerous about an eclipse of the sun?

Answer:

It's *always* dangerous to stare at the sun.
But eclipses are the only time people want to.

Sunlight is the same
whether or not
there's an eclipse going on.

The eclipse doesn't make the sun *more* dangerous.
It just makes people want to look at it.

Sunlight is the same
whether or not
there’s an eclipse going on.

It is not dangerous to be outdoors.

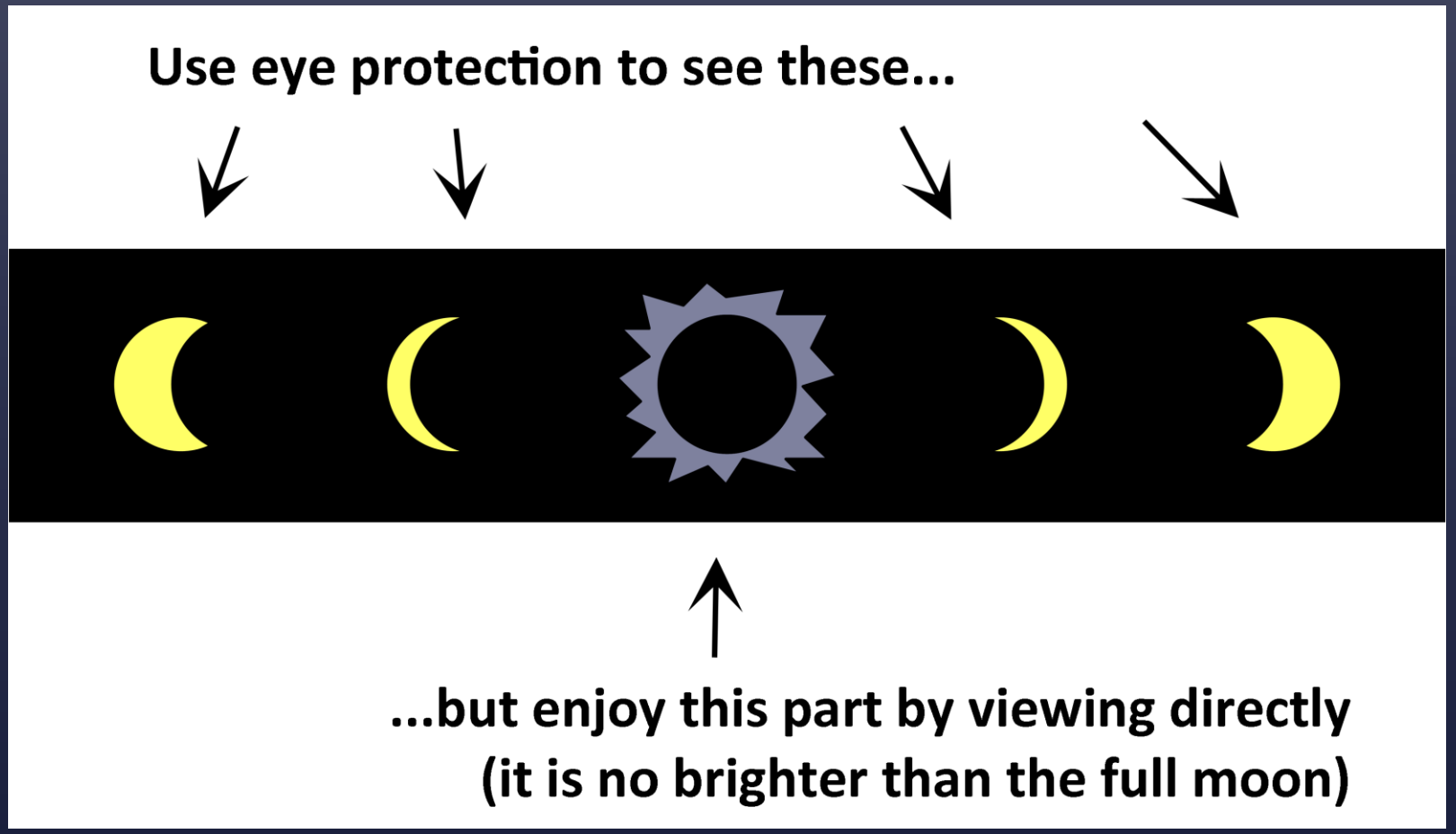
You don’t have to bring your dog, cat, or horse in.

Eye injury from staring at the sun is often painless.

It is similar to the “dazzle” from staring at a bright light except that it may never go away,
leaving permanent damage.

Don’t take chances.

Protect your eyes when looking at the sun if ANY PART of the bright surface is visible.



There are **2 ways to protect your eyes**:

METHOD 1: Using safe viewing filters

(available now, not available 50 years ago,
which is why you've been told they don't exist)

METHOD 2: Looking at a projected image
rather than directly at the sun

(amazingly easy – stand by for details!)

METHOD 1

It is safe to look at the sun through properly made eclipse glasses and handheld filters.

Eclipse glasses are not sunglasses.

They are about 1,000,000 times darker and usually have a silvery coating.

You can’t see anything but the sun through them.

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Get eclipse glasses from a reputable manufacturer and look for a safety certification.

EYE DOCTORS: The American Academy of Ophthalmology says they're safe.
See web site: https://www.aao.org/eye-health/tips-prevention/solar-eclipse-eye-safety

Eclipse glasses and viewers
must block infrared and ultraviolet light
as well as the light you can see.

That’s why some filters that
look dark enough
are not safe.

NOT SAFE:

- Sunglasses (nowhere NEAR dark enough!)
- Photographic filters not certified for solar astronomy
- Crossed polarizers
- Wratten #96 neutral-density filters
- Silvery plastic not certified for sun viewing
- Space blankets, DVDs, Pop-Tart bags
- Smoked glass
- Welding filters lighter than #14
- Filters used on the eyepiece of a telescope

CAUTION!

Any filter used with a camera, telescope,
or binoculars
MUST BE IN FRONT of all lenses.

It must be the FIRST thing the sunlight hits.

Eclipse glasses are for use by themselves,
NOT WITH TELESCOPES OR BINOCULARS.

Do not look into
an eyepiece while
wearing
eclipse glasses.

*That's not what
they're for!*

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METHOD 2

Projecting an image

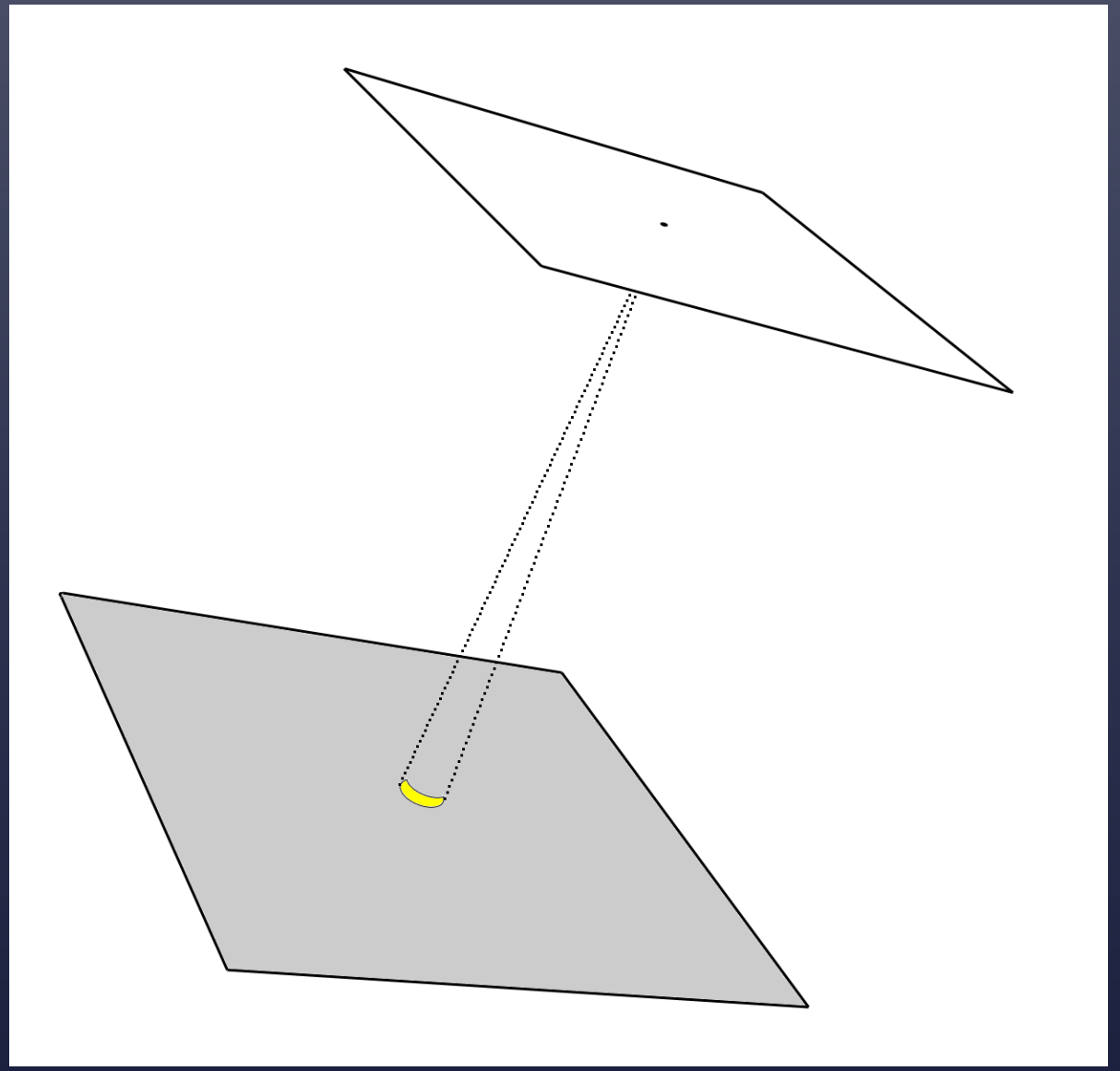
You can watch the eclipse
without looking directly at the sun
and without special equipment.

Recommended especially for school groups –
cheap, easy, and safe…

How it works

When sunlight passes through a small hole, it forms an image of the sun in the shadow.

Round on an ordinary day, crescent during an eclipse…



Make a small hole in a piece of paper.
Look at its shadow during the partial eclipse.

R. Dasher

This is called **pinhole projection**
even though the hole is bigger than a pin.

You can build it big or small.

Suggested hole sizes:
1/16 inch to put a spot 1 foot away
1/4 inch to put a spot 4 feet away

Try a 1/16-inch hole in the end of a shoebox.

You can try this out
on a day when clouds are
passing in front of the sun.

(Simulated eclipses!)

Look at natural holes that light is passing through, such as between leaves in trees...

R. Dasher

You can even make a hole with your thumb and forefinger, then look at the shadow of your fist on the ground.

(The hole does not have to be round!)

Pinhole projection is especially good for groups of school children…

the teacher can see at a glance that they are all facing **away** from the sun!

Make sure they understand that we are not going to *look at the sun through the hole.*

That’s not how this works.

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Just before and after totality,
when only a thin sliver of the bright sun is visible,
look for **SHADOW BANDS** on the ground –

rippling patterns of light that look like water,
caused by heat waves in the air.

If you take a good picture of them, let me know!
Nobody ever has!

At the beginning and end of totality,
the last few spots of the bright sun are called
BAILY'S BEADS.

We see them between
mountains on the edge
of the visible moon.

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When only one spot of the bright sun is visible, it looks like a DIAMOND RING.

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The red CHROMOSPHERE of the sun
(with PROMINENCES that look like flames)
is the layer of the sun just outside the bright part.

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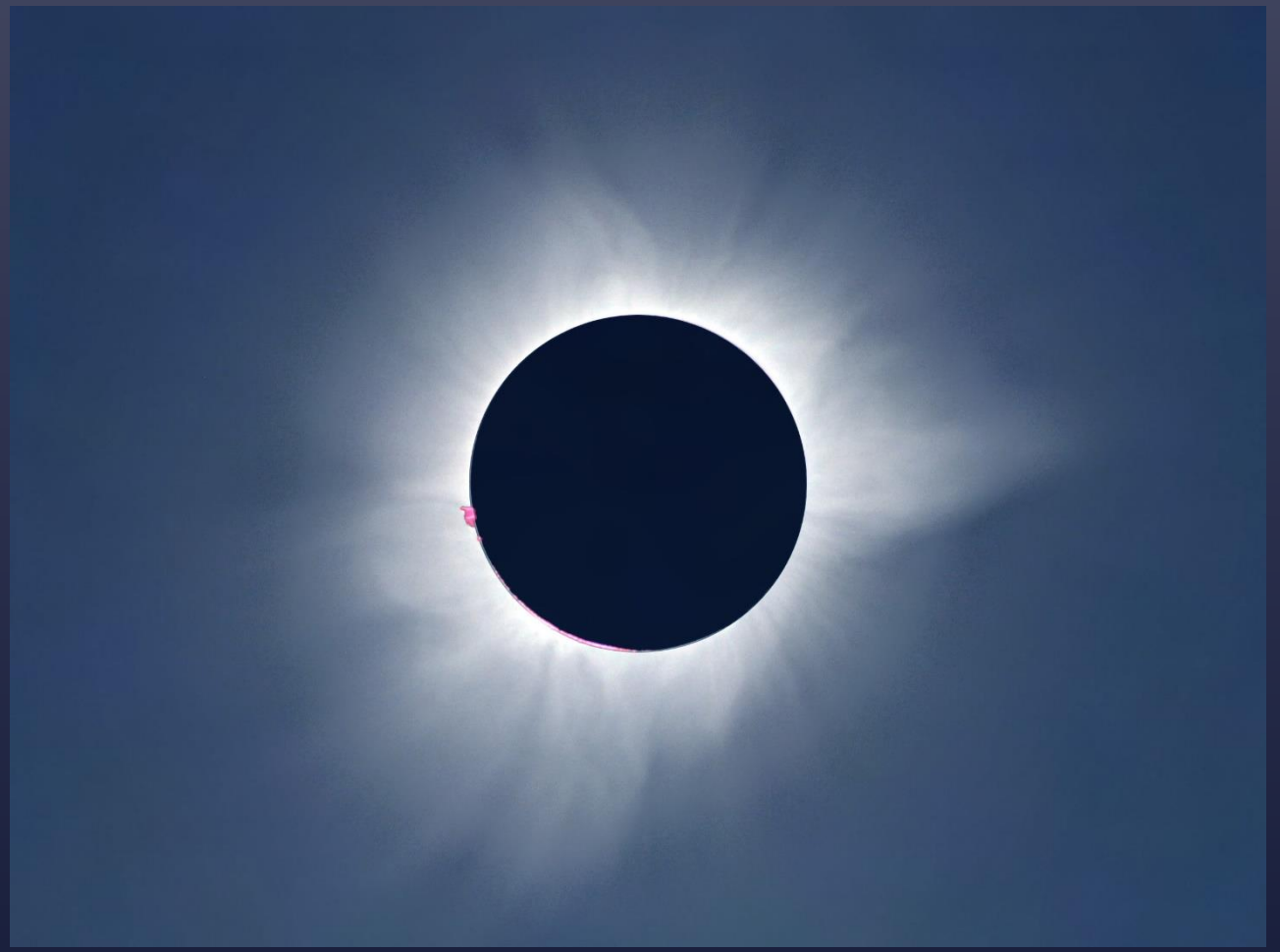
The faint, pearly CORONA of the sun is of course what we all came to see!



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Photographs don’t do justice to the corona.

It has faint, long streamers that
the camera does not record.

Be sure to take time to enjoy the view!

You will also see…

- The zone of totality sweeping across you from west to east, moving 2000 miles per hour;
- A few bright stars and planets
  - Regulus just to the left of the sun
  - Venus low in the west
  - Jupiter low in the southeast
  - Mars northwest of the sun
  - Mercury southeast of the sun but not bright
  - Arcturus low in the east
- Possibly an undiscovered comet (it has happened!)

IF IT’S CLOUDY,

you can still watch (and video-record) totality (the moon’s shadow) sweeping across from west to east

and check for sudden changes in the structure of the clouds (such as I saw at the 1970 eclipse).

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The last time we had a total eclipse in North America was 1979.

Cameras have changed a lot since then!

Automatic cameras don’t necessarily know how to photograph an eclipse,
so let me give a few pointers.

Practice by **taking pictures of the moon**
during the weeks and months before the eclipse.

It is about the same size
in the sky as the sun,
and you can judge
how much “zoom” to use
and how to make
other adjustments.

Set focus to infinity (the mountain symbol).
Autofocus probably won’t work.

DSLR users:

Don’t trust the infinity mark or autofocus.
Confirm focus ON THE SCREEN using live view.

Do not look in the viewfinder
because the bright part of the sun
might become visible while you’re fiddling.

Use a tripod.

Use the screen (“live view”), not the eyepiece.

A small mirror will help you see the screen
on the back of a camera that is aimed upward.

Sharon Covington

You may have to put your camera on the tripod head **backward** to aim high in the sky.

For the PARTIALLY eclipsed sun,
you must use a
safe solar filter
in front of your lens.

Exposure is by trial and error.
Practice on the uneclipsed sun.

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You can buy a filter for your camera, or use material from **eclipse glasses** or a safe sun viewer, taped to the lens.

Putting filter material in front of a camera…

- The filter must be safe for sun viewing.
- Light must not get in around the edges.

  (That's the reason for the tape.
  Just holding a filter in front of
  the camera isn't good enough.)

- The opening does not have to be round.
- IDEA: Tape the filter material
  to a lens cap with a hole in it.

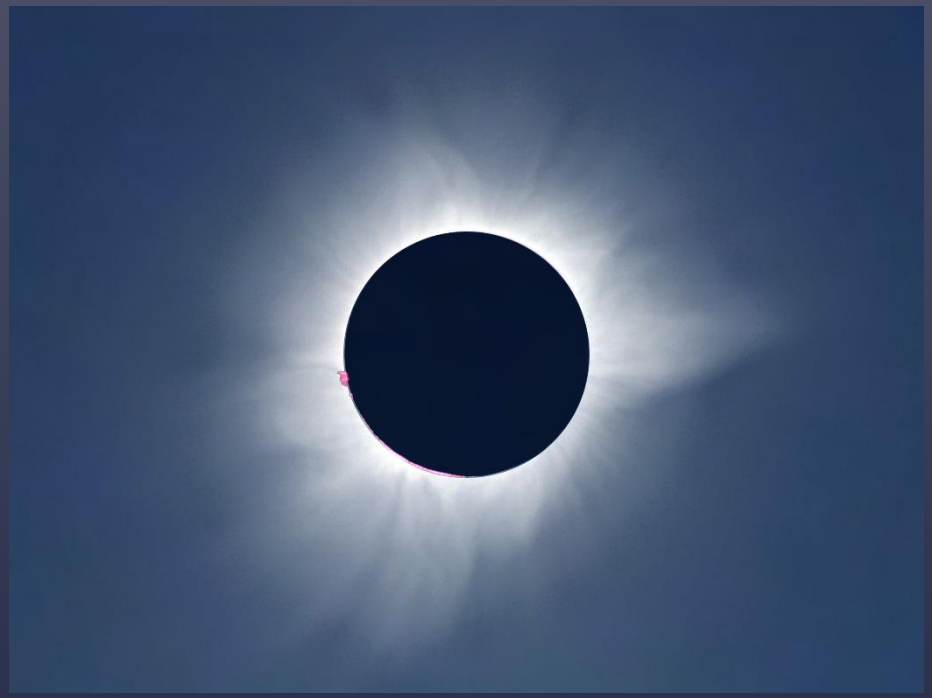
When any part of the bright surface of the sun is visible, PROTECT THE CAMERA.

Do not let sunlight shine into the camera lens without a filter in front.

If preparing for totality, use a lens cap,
and remove it at totality,
then put it back as soon as the bright sun reappears.

For the TOTALLY eclipsed sun,
suggested exposures:

ISO 400, f/5.6
1/8 second (outer corona)
1/30 second (inner corona)
1/500 second (chromosphere)



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Try a wide variety of exposures.
If you're adventurous, try HDR mode.

Don’t get so wrapped up in photography that you forget to enjoy the view!

Your eyes can see things the camera can’t.

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QUESTION:

Is the moon passing in front of the sun,
or are we passing into the moon's shadow?

ANSWER:

Those are the same thing.
When I block your view of the light, you are in my shadow.

To keep things simple, I haven't used shadow terminology (umbra, penumbra, etc.). See an astronomy book.

QUESTION:

Should I bring my telescope?

ANSWER:

No, unless you are a very experienced solar observer.

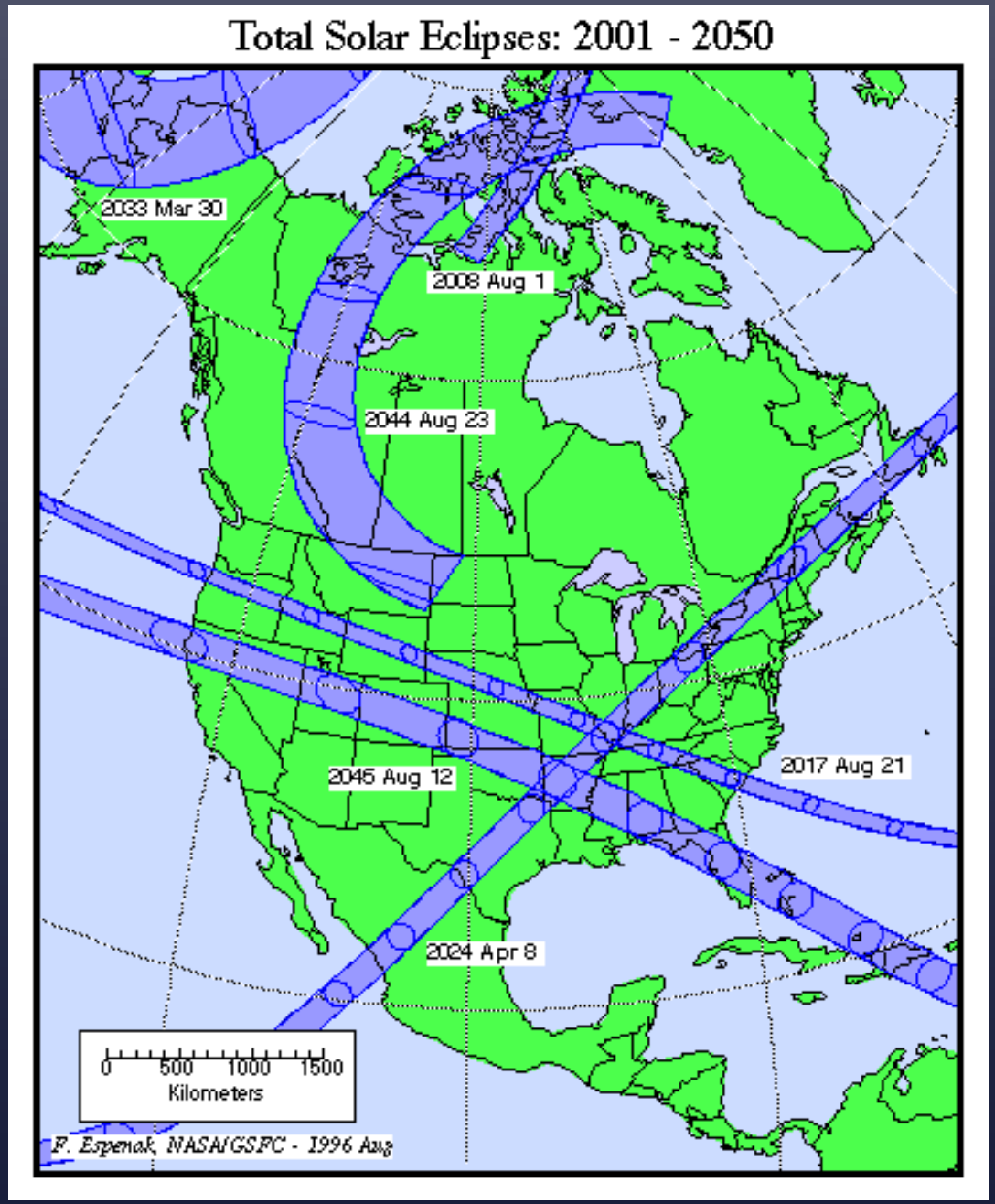
Bring binoculars, but be very careful to use them ONLY during totality, and not when any part of the bright surface of the sun is visible.

QUESTION:

When is the next one?

ANSWER:

North America's
next total
solar eclipse is
April 8, 2024.



QUESTION:

Why don’t we have an eclipse every time the moon goes around the earth?

ANSWER:

The orbits of the moon and the earth are not in the same plane. Only occasionally does the moon pass in the direction of the sun while also in line with the earth’s orbit. Usually it “misses” the sun, passing north or south of it.

QUESTION:

What about eclipses of the moon?

ANSWER:

An eclipse of the moon happens
when the shadow of the earth falls on the moon.

It is visible everywhere that the moon is in the sky,
and you don't need eye protection.
Our next good one is January 20, 2019.

M. Covington

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