NASA PUNCH website:
https://punch.space.swri.edu /

Welcome to Section 5: Appendices A-E

With More Insights and Fun Resources

Scan here to access all PUNCH Outreach products or visit:
https://punch.space.swri.edu/punch_outreach_products.php

For questions or to request our 1-page monthly newsletter:
Contact PUNCHOutreach@gmail.com

Photo: Alan Friedman

Essential viewing:

[6-minute "how-to-facilitate" video](https://punch.space.swri.edu/punch_outreach_pinholeprojector.php)

[https://punch.space.swri.edu/punch_outreach_pinholeprojector.php]

Outreach for the **NASA** PUNCH mission

Polarimeter to UNify the Corona and Heliosphere

Home | About | Science | Media | Outreach

3-HOLE PUNCH PINHOLE PROJECTOR

The PUNCH Outreach team designed the 3-Hole PUNCH Pinhole Projector (3HPPP) so that everyone can experience and explore the wonder of how a small, lens-less hole of any shape works to create real images of the Sun or other bright light sources, both indoors and outdoors.

Image credit: Vivian White

Our projector allows you to observe the Sun safely during eclipses or on any sunny day!

The 3HPPP is NOT your ordinary pinhole projector nor a simple give-away like a sticker or button, but a powerful learning tool when safely and effectively facilitated.

This **6-minute "how-to" video** shares what we've learned about how to facilitate use of the 3HPPP to excite a lifetime of curiosity and wonder in learners of all ages.

[*Really*] Understanding Pinhole Projection of the Sun

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Introducing Bhanu

[BAH-noo]

Bhanu means "ray of light" in Sanskrit

Bhanu helps guide our way through these Sections. You are in Section 5 of 5.

Section	Title of Section	Description of Section
1	How to Use the 3-Hole PUNCH Pinhole Projector	introduces the 3-Hole PUNCH Pinhole Projector, demonstrates how to use it both outdoors and indoors, and describes its differences from a pinhole camera/viewer.
2	Observing Pinhole Images of the Sun in Our Everyday Environments	teaches you how to observe the phenomenon of pinhole images of the Sun in our everyday world, both indoors and outdoors.
3	Exploring Pinhole Projection Using Your Own Hands	invites you to explore the behavior of pinhole projection by experimenting with your own hands (try both palms up!)
4	Explaining and Understanding How Pinhole Imaging Happens	interactively guides your quest for explanations and deeper understanding of how pinhole imaging happens. After this, you will *really* understand why small, lens-less holes can create images.
5	**APPENDICES A-E: More Insights & Fun Resources**	**offers more insights & resources (e.g., explaining the relationship between pinhole images and the view through "eclipse" glasses)**

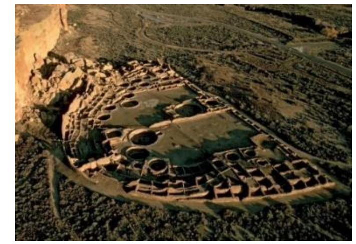
CONTACT:
Dr. Cherilynn Morrow, Outreach Director for the NASA PUNCH mission [cherilynn.morrow@gmail.com]

5. APPENDICES

Outreach for the **NASA** PUNCH mission

A. Discovering How Pinhole Images of Eclipses are Inverted (Slide 5)

Using images from the 2017 and 2012 Eclipses



B. Why are the 3-Hole PUNCH Pinhole Projector Images Fuzzy? (Slide 18)

What does it mean to be in focus?

C. What is the Difference Between a Pinhole and a Lens? (Slide 23)

Finding new appreciation for what the lens of an eye or a camera is doing

D. Why Doesn't Our Pinhole Projector Have Pin-Sized Holes? (Slide 24)

Includes: DESIGN TRADE-OFFs for our Pinhole Projector

E. A Shortlist of Our Favorite Pinhole-Related Resources (Slide 29)

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mission

APPENDIX A
Discovering How Pinhole Images of Eclipses are Inverted

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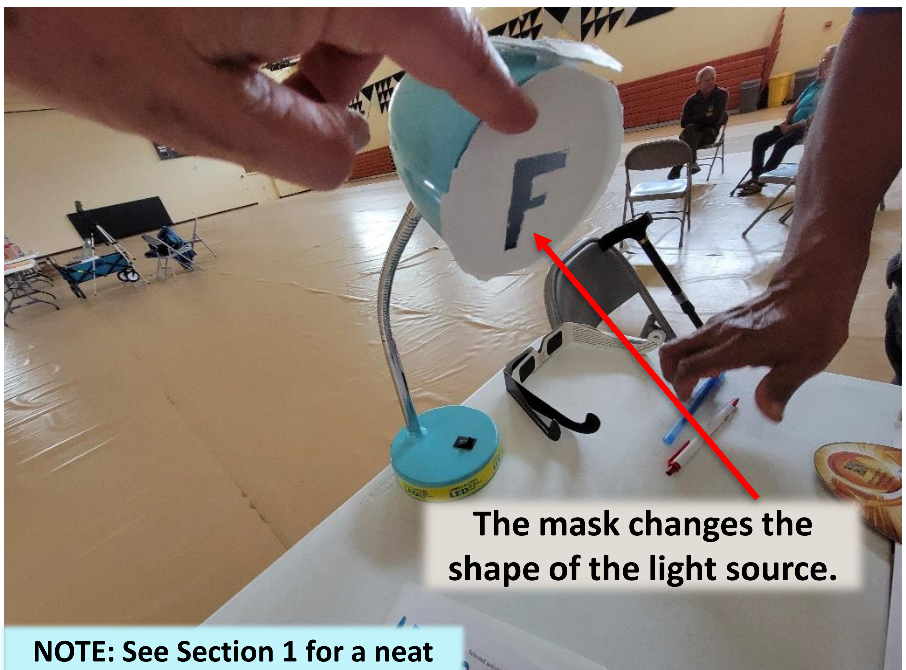
APPENDIX A1

A Pinhole Projector's Images are Inverted Top-to-Bottom and Left-to-Right

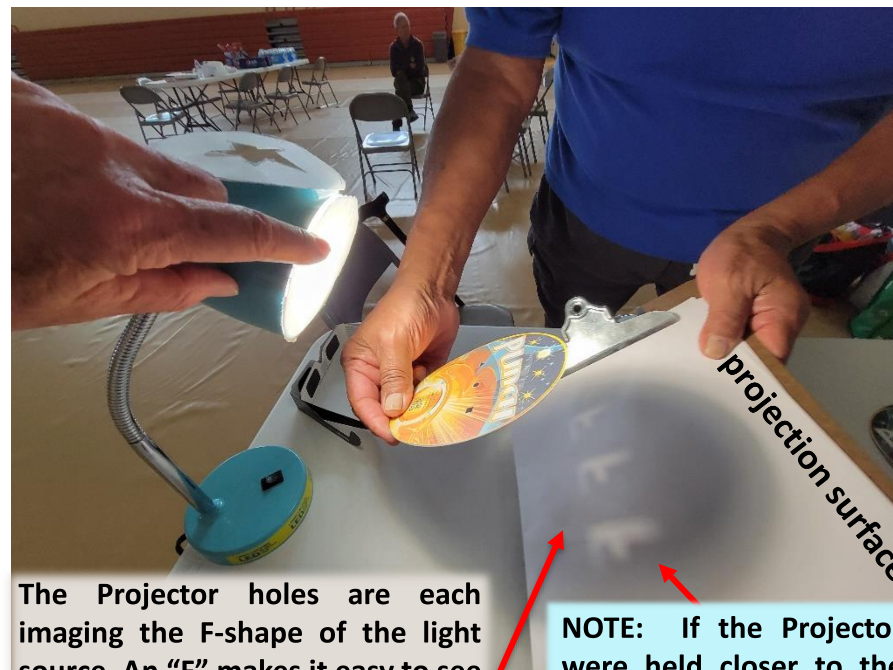
The images on the projection surface are F-shaped because the cut-out makes the light source F-shaped. But notice the pinhole images are upside down and flipped left-to-right.

Lamp OFF



NOTE: See Section 1 for a neat demo using a star-shaped mask.

Lamp ON



The Projector holes are each imaging the F-shape of the light source. An "F" makes it easy to see how pinhole images are upside down and flipped left-to-right.

NOTE: If the Projector were held closer to the surface, we would still see the triangular, round, and square-shaped holes.

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APPENDIX A2

A Pinhole Inverts Images Inverted Both Top-to-Bottom and Left-to-Right

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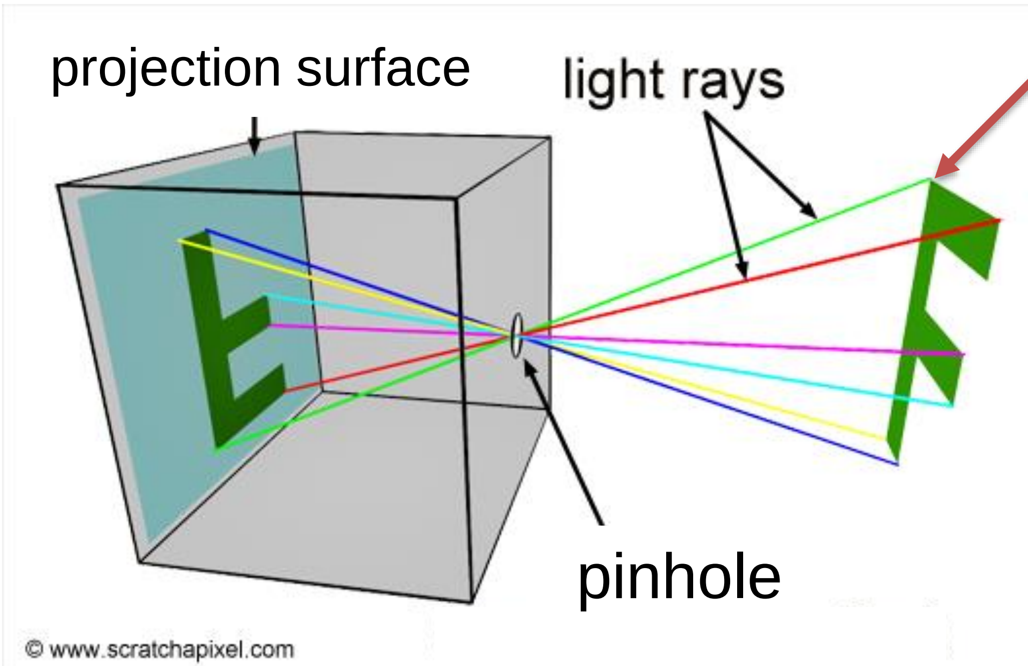
Start with the green line at the top left of the F. Trace the line with your fingers to see where it goes on the projection surface. Notice how this works for each colored line.



Start here. Trace the green line to the left.

Notice that the light from the top on *one* side of the F can only get to the bottom on *the opposite* side of the projection surface. Light traveling in other directions from the starting point is blocked by the box. This creates the correspondence between the light source and the projection surface needed to form an image.

Adapted from Figure 4
https://www.scratchapixel.com/lessons/3d-basic-rendering/3d-viewing-pinhole-camera/how-pinhole-camera-works-part-1.html

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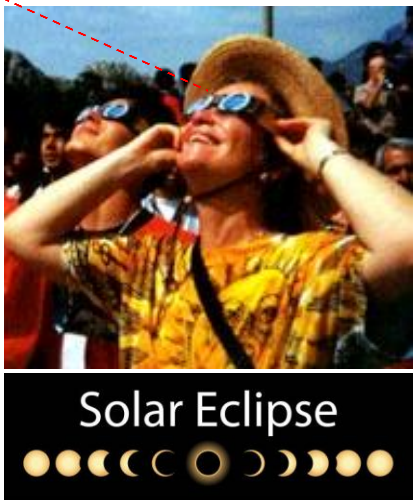
APPENDIX A3

How does the pinhole projection compare to what you see through solar protection glasses?

Outreach for the **NASA** PUNCH mission

1. Pinhole images of the round Sun being partially eclipsed by the Moon: Card and Hand methods.

2. Here's what you would see through solar protection glasses *at the same time*.



CM observing a solar eclipse

3. Compare the images. How can we make sense of the difference in appearance between the pinhole images and what we see through the solar protection glasses?

APPENDIX A4

During a solar eclipse, it is easier to tell that a pinhole image is inverted compared to direct viewing.

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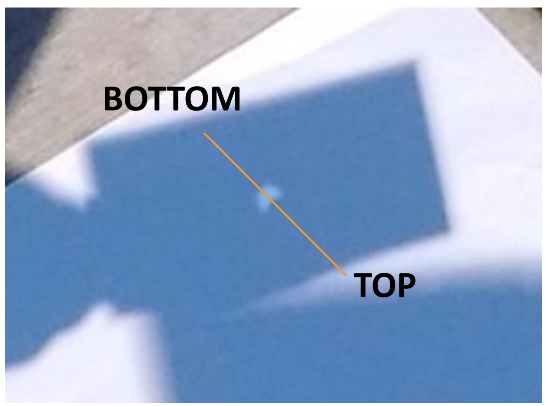
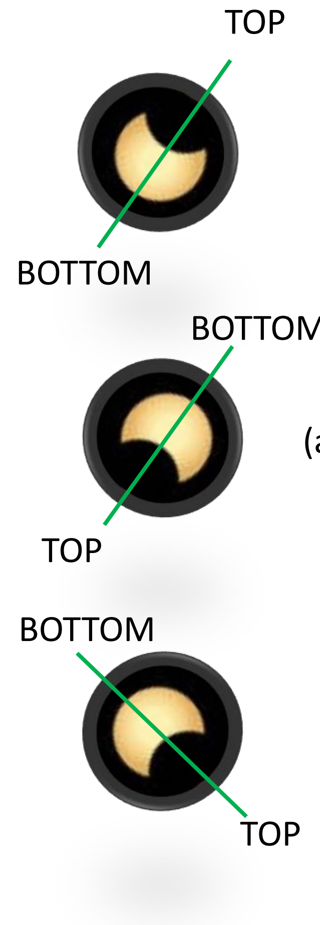


Pinhole image of the round Sun eclipsed by the Moon



Appearance through solar protection glasses
(re-created using Starry Night)

Flipped top-to-bottom
(along the green line of symmetry)

Then flipped left-to-right*
(looks like the pinhole image)

* Same if we'd flipped left-to-right first before flipping top-to-bottom

APPENDIX A5

You can also show that these pinhole images are inverted (upside down & left-to-right) compared to filtered viewing.

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CM is using her arms to project two pinhole images of the setting sun while it is eclipsed by the Moon. 20 May 2012, Chaco Canyon, ~6:30 pm

A filtered image of the eclipse as it was seen in the sky at about the same time 20 May 2012, Chaco Canyon, 6:34 pm.

The following six slides (APPENDIX A4-A9) will guide you step-by-step through this inquiry.

APPENDIX A6

Discovering How Pinhole Images of Eclipses Are Inverted

The next 5 slides guide you through an inquiry to discover how pinhole images of eclipses are inverted compared to direct, filtered viewing of what is in the sky.

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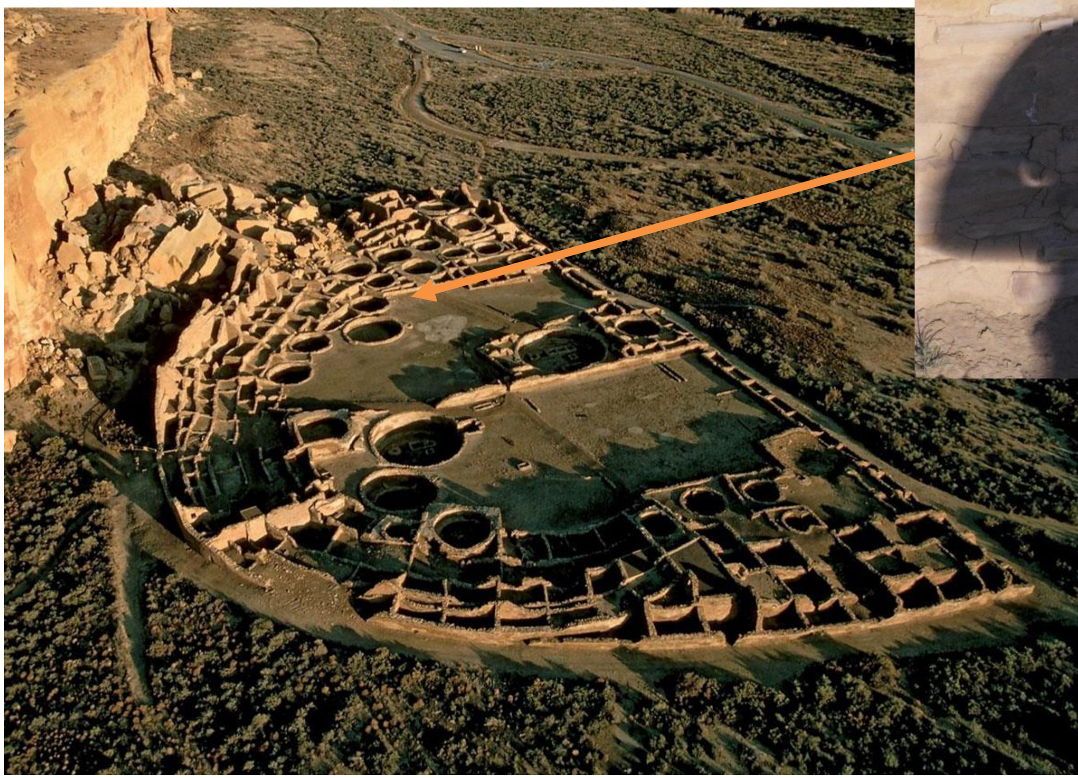


The two images (elbow pinhole images, and the filtered view of how the eclipse appeared in the sky) were made within minutes of one another while observing the 20 May 2012 annular solar eclipse from the plaza of Pueblo Bonito in Chaco Canyon, New Mexico. Enjoy!

APPENDIX A7

Discovering How Pinhole Images of Eclipses Are Inverted

Outreach for the **NASA** PUNCH mission

Can you show that these pinhole images are upside down and flipped left-to-right compared to the image of a partial eclipse as it appeared in the sky?

CM is using her arms to project two pinhole images of the setting sun while it is eclipsed by the Moon. 20 May 2012, Chaco Canyon, ~6:30 pm

A filtered image of the eclipse as it was seen in the sky at about the same time 20 May 2012, Chaco Canyon, 6:34 pm.

The next few slides lead you step by step through the process.

Do your best to imagine the answers before advancing the slides.

APPENDIX A8

Discovering How Pinhole Images of Eclipses Are Inverted

Follow steps 1-3 below one-at-a-time using the next slides.

Carry out process step #1 using the the sky image (below, right)

Outreach for the **NASA** PUNCH mission

CM is using her arms to project two pinhole images of the setting sun while it is eclipsed by the Moon. 20 May 2012, Chaco Canyon, ~6:30 pm

A filtered image of the eclipse as it was seen in the sky at about the same time 20 May 2012, Chaco Canyon, 6:34 pm.

FOLLOW THESE PROCESS STEPS: Try to imagine the response to the **bold step** before advancing the slide

1. **Find the line of symmetry in the sky image. This line divides the image into two identical halves. If you could fold the image across this line it would match up exactly with the other side.**
2. Now rotate the image upside down so the top goes to the bottom and bottom goes to the top
3. Now flip the image left to right to see if it will look like the pinhole images

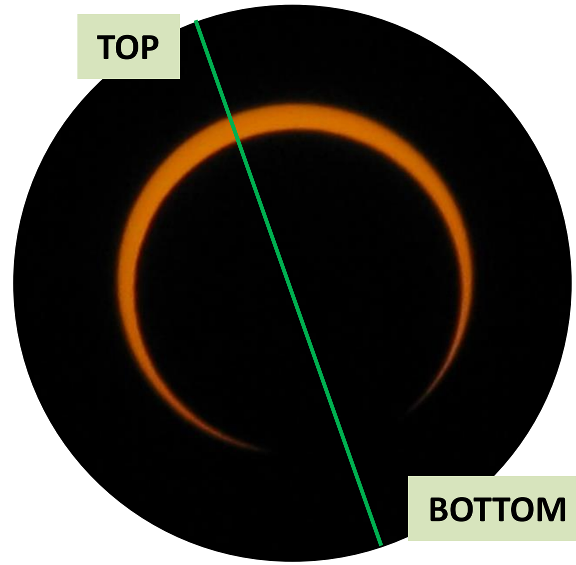
APPENDIX A9

Discovering How Pinhole Images of Eclipses Are Inverted

The green line is very close to a line of symmetry which divides the image into two identical halves. Now imagine carrying out step #2 below. Try to predict how the image will look before checking the answer on next slide.

Outreach for the **NASA** PUNCH mission

CM is using her arms to project two pinhole images of the setting sun while it is eclipsed by the Moon. 20 May 2012, Chaco Canyon, ~6:30 pm



A filtered image of the eclipse as it was seen in the sky at about the same time 20 May 2012, Chaco Canyon, 6:34 pm.

FOLLOW THESE PROCESS STEPS: Try to imagine the response to the **bold step** before advancing the slide

1. Find the line of symmetry in the sky image. This line divides the image into two identical halves. If you could fold the image across this line it would match up exactly with the other side.
2. **Now rotate the image upside down so the top goes to the bottom and bottom goes to the top**
3. Now flip the image left to right to see if it will look like the pinhole images

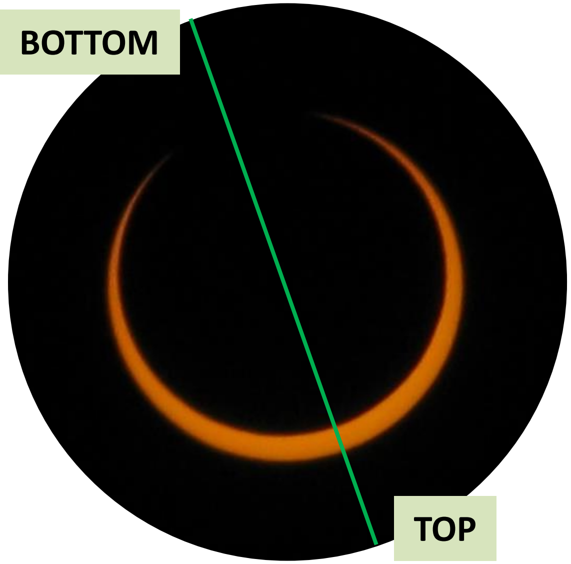
APPENDIX A10

Discovering How Pinhole Images of Eclipses Are Inverted

Outreach for the **NASA** PUNCH mission

Is this the same as the pinhole images? Not yet. Now imagine carrying out step #3 below. Try to predict how the image will look before checking the answer on the next slide. Do you think it will look like the pinhole images?

CM is using her arms to project two pinhole images of the setting sun while it is eclipsed by the Moon. 20 May 2012, Chaco Canyon, ~6:30 pm



The filtered sky image of the eclipse **turned upside down**

FOLLOW THESE PROCESS STEPS: Try to imagine the response to **bold step** before advancing the slide

1. Identify the line of symmetry in the sky image. Label top and bottom.
2. Rotate the image upside down so the top goes to the bottom and bottom goes to the top
3. **Now flip the image left to right to see if it will look like the pinhole images**

APPENDIX A11

Discovering How Pinhole Images of Eclipses Are Inverted

YES! We see that the pinhole images are *inverted* (upside down and flipped left-to-right) compared to what we see in the sky.

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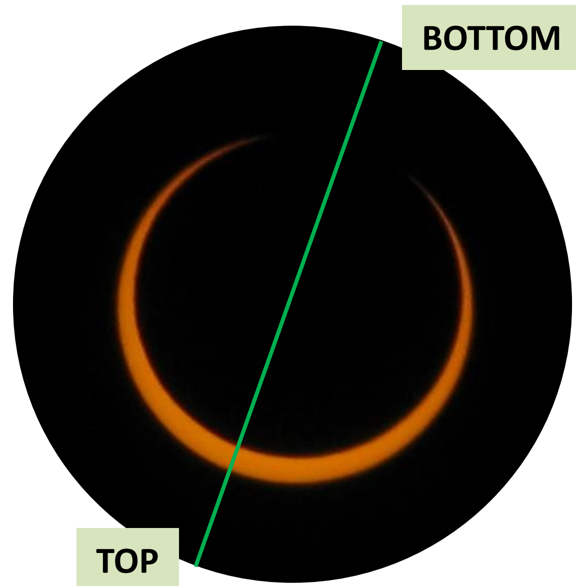
CM is using her arms to project two pinhole images of the setting sun while it is eclipsed by the Moon. 20 May 2012, Chaco Canyon, ~6:30 pm



The filtered sky image of the eclipse **turned upside down AND flipped left-to-right** looks like the pinhole images.

PROCESS STEPS:

1. Identify the line of symmetry in the sky image. Label top and bottom.
2. Rotate the image upside down so the top goes to the bottom and bottom goes to the top
3. Then flip the image left to right to see if it will look like the pinhole images

APPENDIX A12

Visual Summary: Now Can You Imagine the Flips?

View through solar protection glasses

Corresponding Pinhole images

Outreach for the **NASA** PUNCH mission

APPENDIX B
Why are the 3-Hole PUNCH Pinhole Projector Images of the Sun Fuzzy?

What does it mean to be “in focus”?

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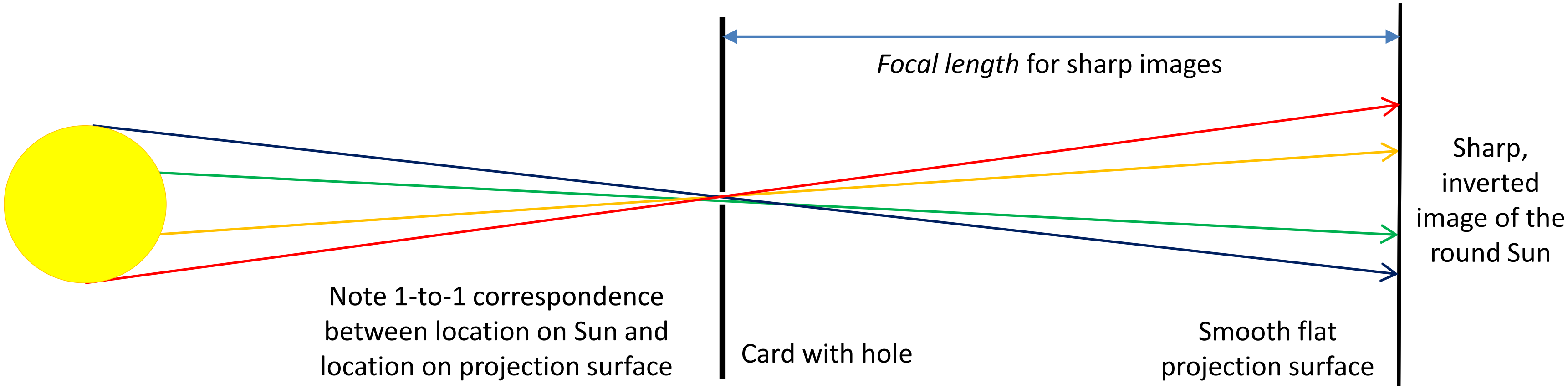
APPENDIX B1

What Does it Mean to be in Focus?

Why are images fuzzy (un-focused) using the 3-Hole PUNCH pinhole Projector?

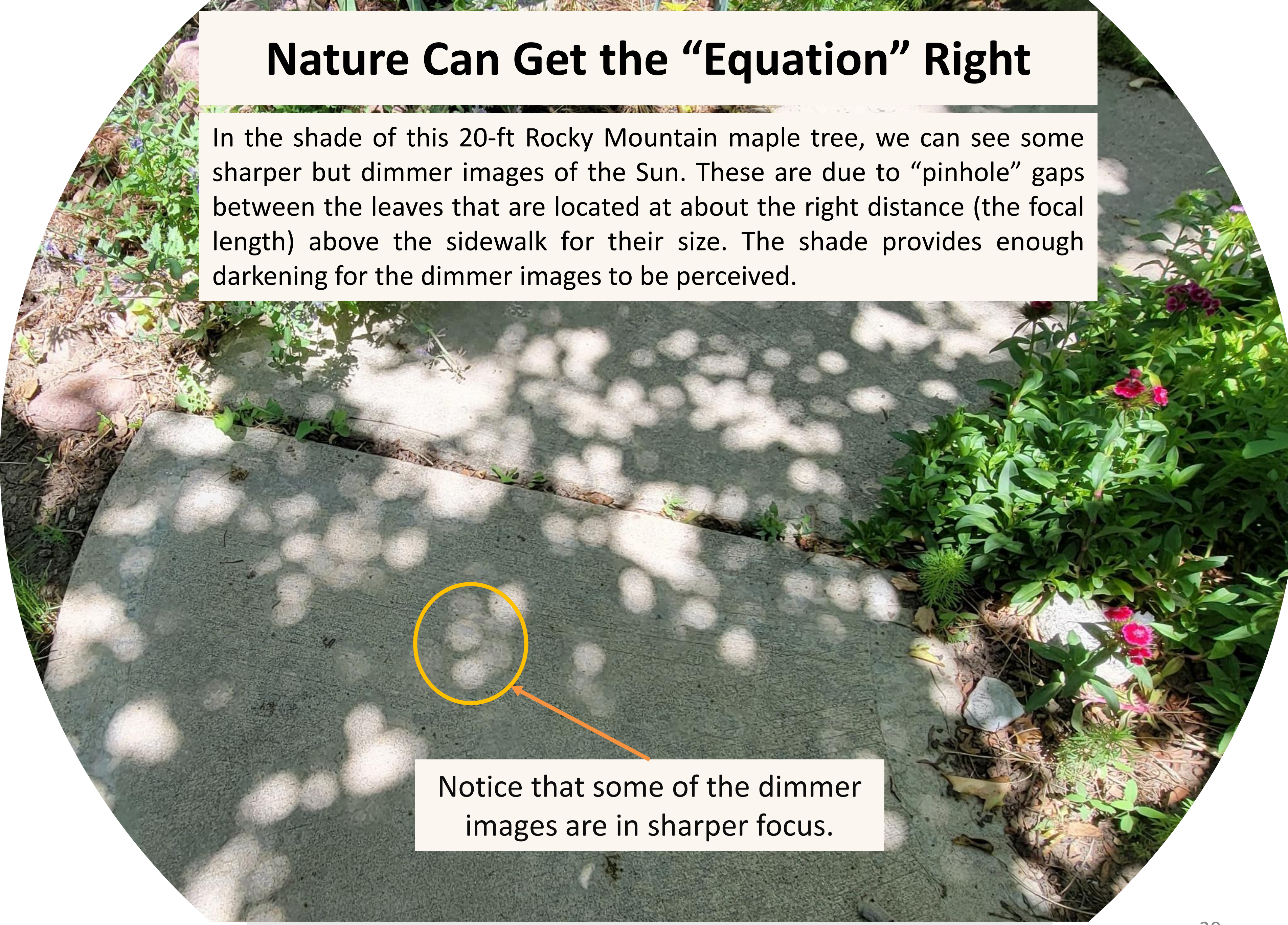
The solar images from our projector are fuzzy (or un-focused) because the three holes are not far enough away from the projection surface. For the sharpest image to form, our ~5 mm holes, would have to be about 12 meters (~40 feet) away from the projection surface (about the height of a medium-sized tree).



This distance is called the *focal length.* The sharper image would also be larger and dimmer because the light spreads out over the longer distance, and thus would be harder to see in broad daylight.

Nature Can Get the "Equation" Right

In the shade of this 20-ft Rocky Mountain maple tree, we can see some sharper but dimmer images of the Sun. These are due to "pinhole" gaps between the leaves that are located at about the right distance (the focal length) above the sidewalk for their size. The shade provides enough darkening for the dimmer images to be perceived.



Notice that some of the dimmer images are in sharper focus.

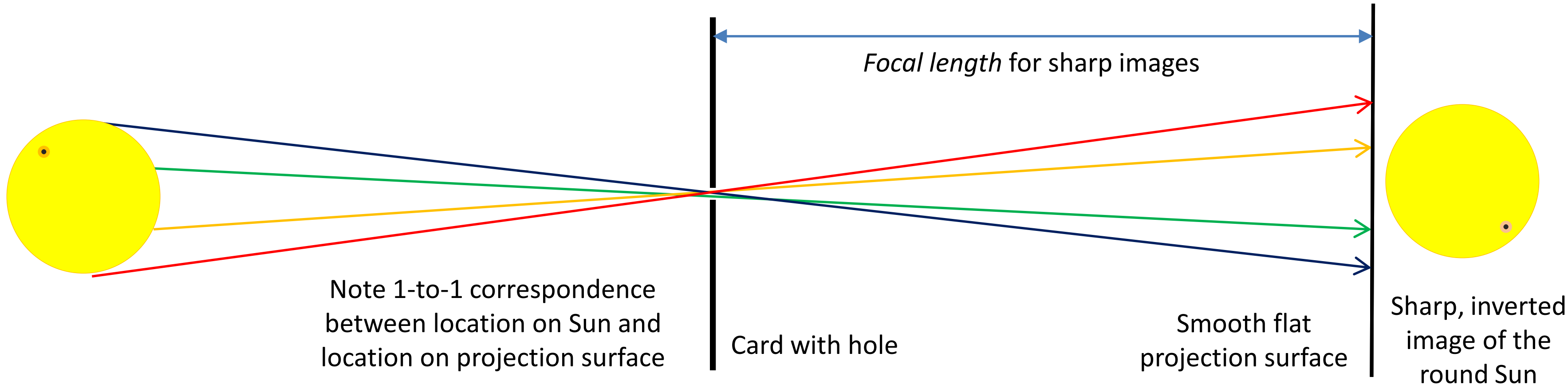
Images of the round Sun projected on a sidewalk as midday sunlight passes through the small gaps between leaves of a tree

APPENDIX B3

What Does it Mean to be in Focus?

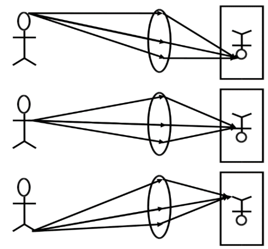
Why are images fuzzy (un-focused) using the 3-Hole PUNCH pinhole Projector?

When a pinhole is a *focal length* away from a projection surface (depicted in the diagram below), light from each *particular* place on the Sun passes through the hole to a *particular* opposite place on the projection surface. This tight one-to-one correspondence between light emitted from locations on the Sun and light received at corresponding locations on the projection surface forms a focused image of the Sun.



What is the Difference Between a Pinhole and a Lens?

See **Appendix C**



APPENDIX B4

Larger "pinhole" gaps have longer focal lengths and can make larger images beneath tall trees.

Ponderosa Pines Can Have Pine-Sized Pinholes

The larger the "pinhole" gaps, the longer the focal length, and so taller trees like these Rocky Mountain Ponderosa Pine can produce some large, well-focused images as the sunlight streams through the gaps between their branches and needles.

But if the gaps are too large, they do not form solar images, but simply cast shadows of their shapes on the surface. Note the fascinating lack of shadows that look much like pine needles or branches.

APPENDIX C

Difference Between a “Pinhole” and a Lens?

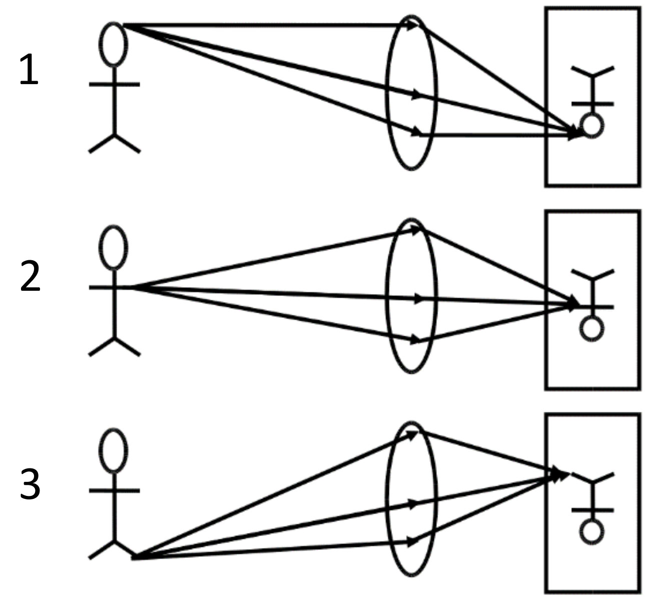
Our study of pinhole imaging helps us to better appreciate what an eye or camera lens is doing to support image formation

The “holes” in the 3-Hole PUNCH Pinhole projector are acting as a limited sort of lens to form inverted images. To form an image, each region of the projection surface must receive the light from a corresponding region of the object.

The diagram at the right shows the formation of an inverted image with a lens. **In each of the three rows (1-3), only the central ray would contribute to a pinhole image.**

A lens bends (refracts) the light, which allows more light from any particular region on the object to be focused on the corresponding region of the projection surface. This creates a better and brighter image at the focal length of the lens.

Pinhole images are dimmer than when a lens is used because less light comes from any particular region of the object to a corresponding region on the projection surface.



https://www.wikiwand.com/en/Real_image

Our study of pinhole imaging helps us to better appreciate what an eye or camera lens is doing to support image formation. The lens is bending *more* light from a particular region of an object (say the head) to a particular region of a light-sensitive surface (e.g., the bottom of the projection surface). This helps to create a brighter and clearer image than a pinhole could produce in the same amount of time.

Outreach for the **NASA** PUNCH mission

APPENDIX D
Why doesn't our Pinhole Projector have Pin-sized holes?

What are the trade-offs in the design of our *3-Hole PUNCH Pinhole Projector* that have led us to choose larger (~5 mm) holes instead of pinholes? First, we must be reminded how pinhole cameras work.

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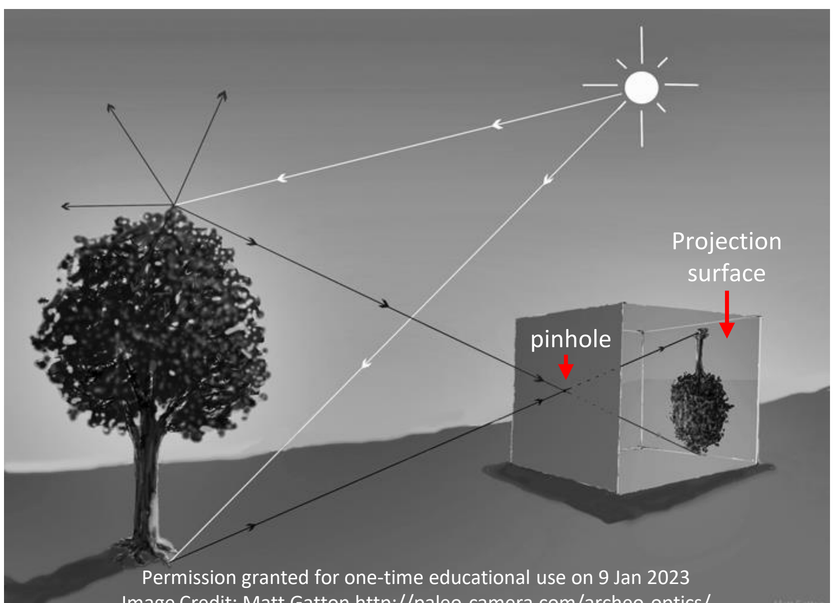
Outreach for the **NASA** PUNCH mission

APPENDIX D1

Why Doesn't Our Projector Have Pin-Sized Holes?

A pin-sized hole can focus light over a much shorter distance than the larger holes of our pinhole projector, so a sharp image can be formed inside a pinhole camera box.

Pinhole *cameras* do not typically make images of the Sun. Instead, they make images of objects that REFLECT sunlight. How does this work?



Permission granted for one-time educational use on 9 Jan 2023
Image Credit: Matt Gatton http://paleo-camera.com/archeo-optics/

1. We can see things because they either *emit* or *reflect* light.

2. The white rays represent light *emitted* from the Sun.

3. The black rays represent sunlight *reflected* from a point on the tree.

4. All points on the tree reflect sunlight in all directions (shown only for the top of the tree).

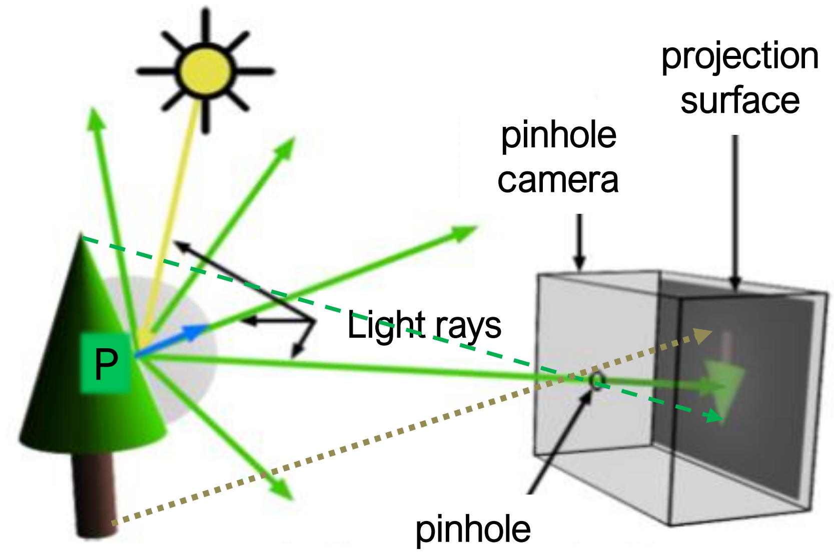
5. The pinhole is so small that only one ray of light from each particular point on the tree makes it through the pinhole to a particular corresponding point on the projection surface.

6. This forms a sharp, inverted image on the projection surface.

APPENDIX D2
Why Doesn't Our Projector Have Pin-Sized Holes?

How does a pinhole camera work?

- Light *emitted* from the Sun (yellow ray) strikes a leaf at the center of the tree (P) and is *reflected* in all directions (solid green rays).
- Only one of the green streams of reflected light from this spot can make it through the tiny pinhole to reach the projection surface.
- One stream from the top of the tree can get through the pinhole and reach the bottom of the surface (green dashed line).
- One stream from the root at the base of the tree can make it to the top of the surface (brown dotted line).
- Light reflects off all other parts of the tree and reaches an opposite part of the projection surface, forming an inverted image.
- Most of the sunlight reflected from the different parts of the tree does not make it through the pinhole to the projection surface so the image is very dim.
- Because the image is very dim, it needs to form inside a dark box to be seen or captured on film.



Adapted from Figure 3
https://www.scratchapixel.com/lessons/3d-basic-rendering/3d-viewing-pinhole-camera

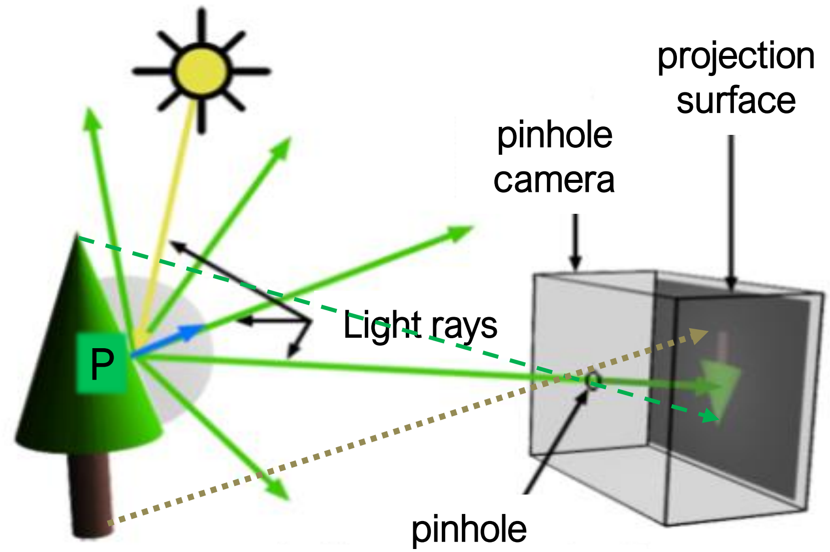
The hole of a pinhole *camera* is pin-sized (much smaller than our pinhole *projectors*). The hole is so small that only one of the many rays of light *reflected* from any particular point on the tree can pass through the hole to a corresponding, opposite location on the projection surface (top-to-bottom and left-to-right). This forms a focused, inverted image that would be too dim to see without the box to provide darkness for the projection surface.

APPENDIX D3

Why Doesn't Our Projector Have Pin-Sized Holes?

A pin-sized pinhole geometrically forces a much tighter correspondence between light reflected from different parts of the tree and light received by opposite parts of a projection surface. The tighter this correspondence, the sharper the inverted image will be.

A larger hole would let more light through to make a brighter image, but it would also allow light from a larger region of the tree to reach a particular location on the projection surface. This reduces the tight correspondence and causes the image to be fuzzier. This same effect explains why the 3-Hole PUNCH pinhole projector produces brighter yet fuzzier images of the Sun. The images are inverted but you cannot tell unless there is an eclipse.



Adapted from Figure 3
https://www.scratchapixel.com/lessons/3d-basic-rendering/3d-viewing-pinhole-camera

The *larger-hole* design of our 3-Hole PUNCH pinhole projector compromises on the degree of image sharpness to ensure that enough light passes through the holes for image formation to be seen in broad daylight at hand-held distances without having to darken the projection surface.

APPENDIX D4

Why Doesn't Our Projector Have Pin-Sized Holes?

SUMMARY of Design Trade-Offs for the 3-Hole PUNCH Pinhole Projector

Hole Sizes	Effect on What We See (or Don't See) on the Projection Surface
Too large	If the holes are too large, images of the Sun cannot form over reasonable hand-held distances. You would only see the shape of the holes (triangle, round, and square) in the shadow of the projector (Case 1).
Too small	Smaller holes can produce sharper (more focused) images over shorter distances but if the holes are too small the images would be too dim to see in broad daylight and you would have to darken the projection surface like you do for a pinhole camera (which has pin-sized holes).
Size chosen for our projector	The ~5 mm hole size for our pinhole projector is intentionally in-between the extremes described in the previous two rows. Our projector produces fuzzy, yet clearly round, images of the Sun through the square and triangular holes when held far enough away from the projection surface. This *larger-hole* design compromises on the degree of image sharpness to ensure that enough light passes through the holes for image formation to be seen in broad daylight at hand-held distances without having to darken the projection surface.

Outreach for the **NASA** PUNCH mission

APPENDIX E
Favorite Pinhole-Related Resources
[an evolving list]

E1: Build a Personal Pinhole Theatre (Exploratorium)

E2: A Public Pinhole Theatre in North Carolina (where you can visit)

E3: Solargraphy – Long Exposure Pinhole Photography (so simple & artful)

E4: Khan Academy Lesson about Virtual Cameras (very helpful aminations!)

E5: Khan Academy Article about *Hasan Ibn al-Haytham*– Extraordinary!

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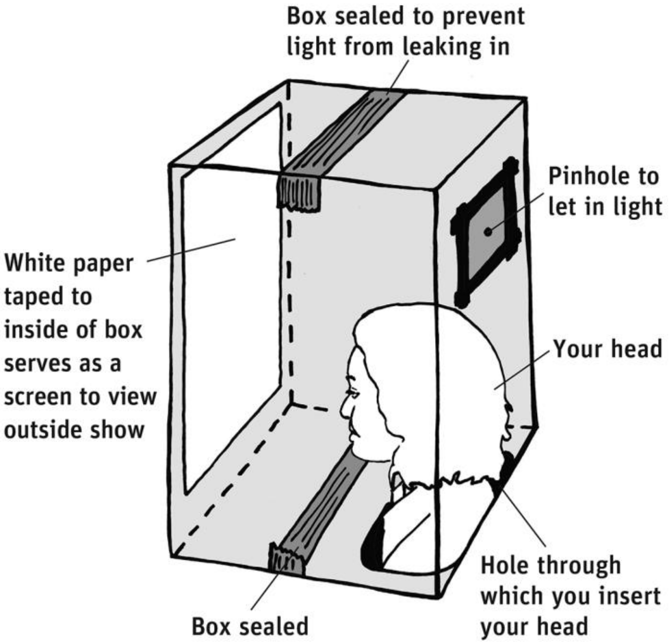
APPENDIX E1

Favorite Pinhole-Related Resources

1. A Personal Pinhole Theatre

https://www.exploratorium.edu/snacks/personal-pinhole-theater

Your Personal Pinhole Theater is actually a giant *camera obscura* (Italian for "dark room"), or pinhole camera. Light rays from the sun reflect off every point on every object—including, say, a tree. The rays from the tree then hit the outside of the box, except where they can pass through the pinhole. Each light ray, in effect, carries an image of the point on the tree where it originated.



APPENDIX E2

Favorite Pinhole-Related Resources

3. A Public Pinhole Theatre

https://learn.ncartmuseum.org/artwork/cloud-chamber-for-the-trees-and-sky/

A work of art by Chris Drury: Cloud Chamber for the Trees and Sky

This structure functions as a camera obscura, or pinhole camera. As light passes through the hole in the roof, it creates an upside-down reflection of the sky and clouds on the ground beneath the viewer. It is a peaceful, dreamlike space where viewers can observe the natural world around them. ALSO SEE: https://www.atlasobscura.com/places/cloud-chamber-for-the-trees-and-sky

APPENDIX E3

Favorite Pinhole-Related Resources

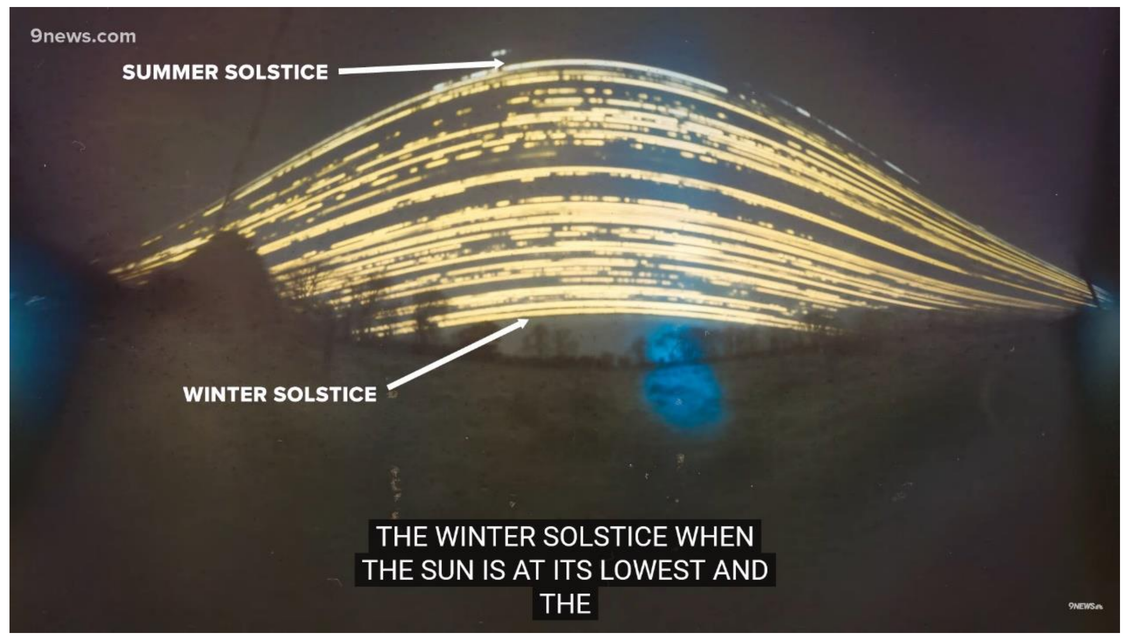
3. Solargraphy: Long exposure pinhole photography

Outreach for the **NASA** PUNCH mission

Solargraphy combines art, astronomy, and photography. It uses a lens-less pinhole camera to record the paths of the Sun, making its movements marvelously visible in landscapes.

Solargraphs are pinhole photographs often made with a long exposure time. The solargraph (right below) was created over six months of time. Can you tell which paths are on the days of greatest daylight? The days of least daylight? Cloudy days?

https://www.youtube.com/watch?v=ddTV4ScvJRA



https://www.9news.com/article/weather/weather-colorado/home-made-camera-captures-long-exposure-of-the-sun-angle/73-a64dbc8c-bd9f-4813-9752-adfa78eb7f7b

APPENDIX E4

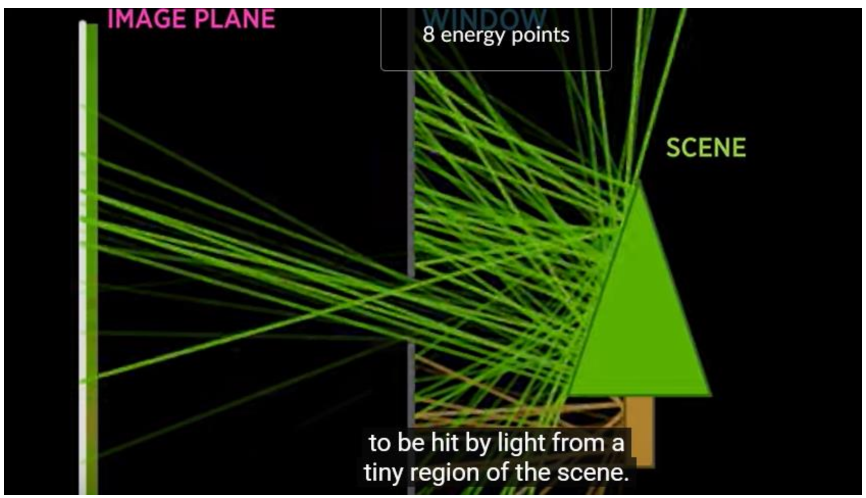
Favorite Pinhole-Related Resources

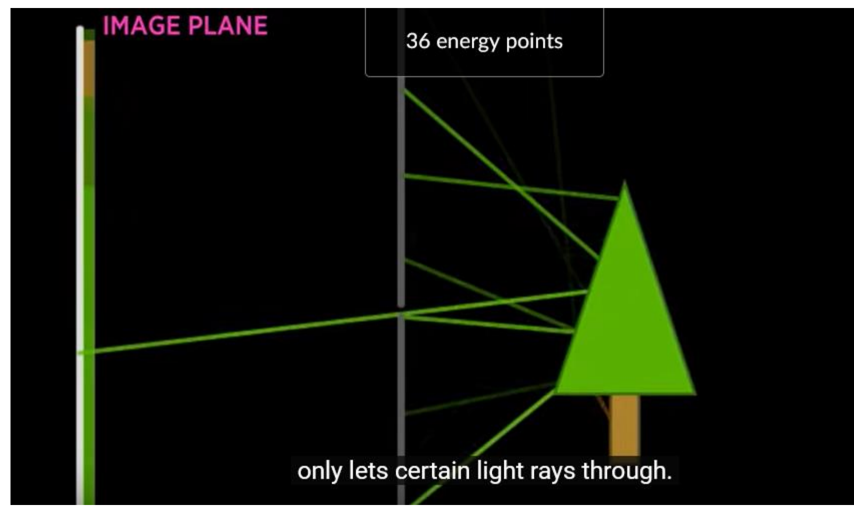
Outreach for the **NASA** PUNCH mission

4. Khan Academy Lesson about Virtual Cameras with helpful animations!

Course: Pixar in a Box > Unit 6.   Lesson 1: How virtual cameras work

https://www.khanacademy.org/computing/pixar/virtual-cameras/virtual-cameras-1/v/optics1-final





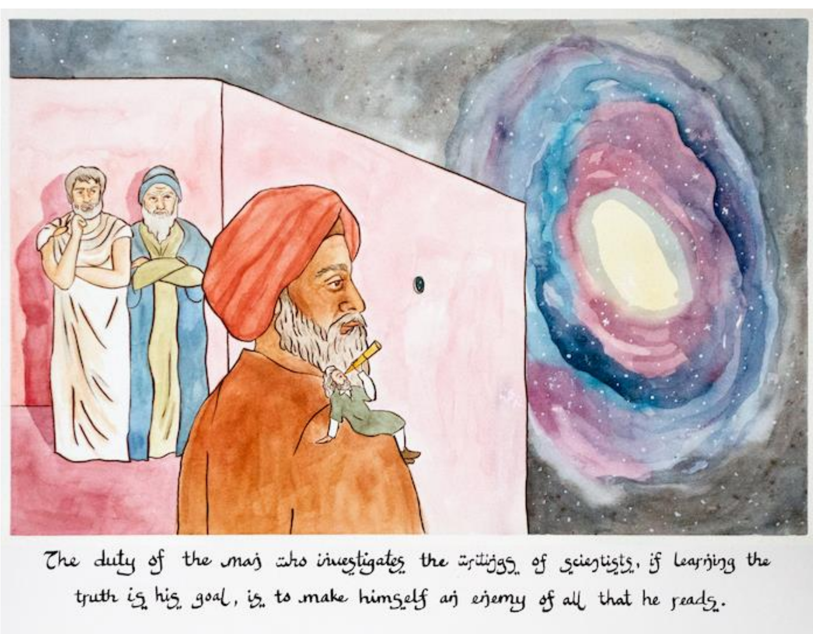
APPENDIX E5

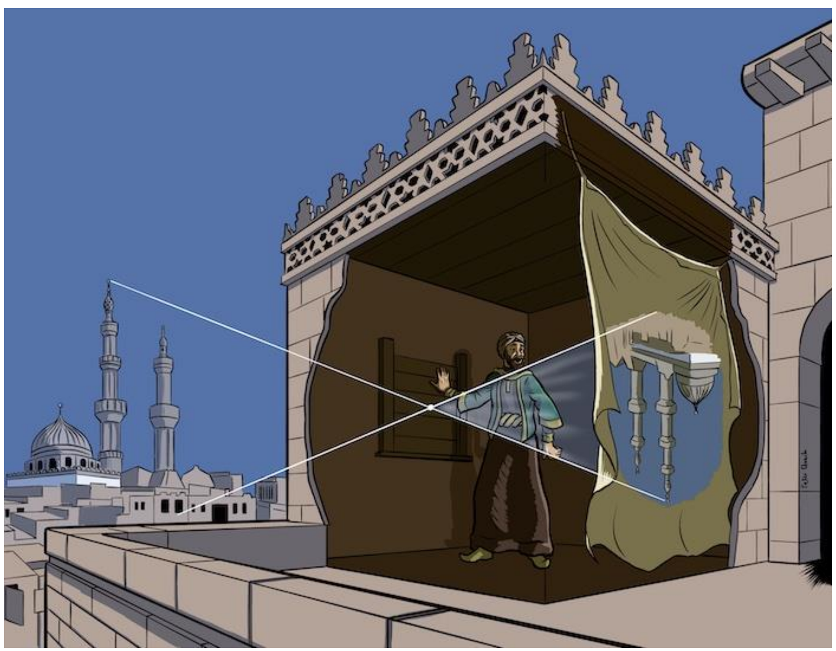
Favorite Pinhole-Related Resources

Outreach for the **NASA** PUNCH mission

4. Khan Academy Article about *Hasan Ibn al-Haytham*– Extraordinary!

500 years before the Scientific Revolution *Hasan Ibn al-Haytham* (a man who lived long ago in a region that we now call Iraq) revolutionized our understanding of how light moves through the Universe and how we see it. By observing the behavior of light in the camera obscura (right), he was able to understand that something similar must happen in our eyes. As light passes through the tiny opening in our eye—the pupil—it creates an upside-down projection on the back of our eye. Ibn al-Haytham was the first to argue that vision happens in the brain, not the eyes.





https://www.khanacademy.org/humanities/big-history-project/solar-system-and-earth/knowing-solar-system-earth/a/the-universe-through-a-pinhole-hasan-ibn-al-haytham

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ADDITIONAL INFORMATION

Link for Feedback

Valuable References

Credits & Acknowledgements

Links to PUNCH & PUNCH Outreach Products

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PLEASE GIVE US YOUR FEEDBACK

We take all feedback very seriously and are using it to keep improving our projector and this presentation.

Outreach for the **NASA** PUNCH mission

Please scan the QR code or go to this URL to give us feedback

https://tinyurl.com/PinholeFeedback

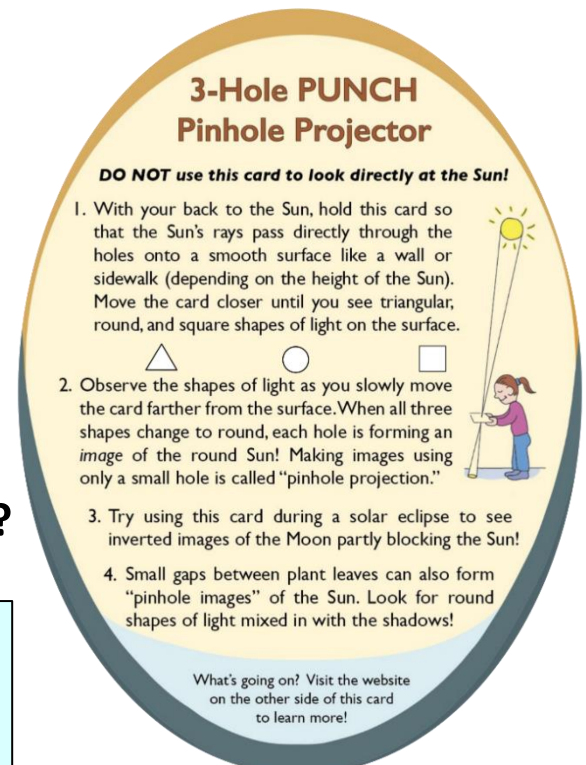
FRONT

Insights gained?

Remaining questions?

Ideas for improvements?

MARK 3 Version
Final Release for use up to and including the Annular Eclipse on 14 Oct 2023



BACK

Valuable References

1. Lenses and Pinholes: What Does "In Focus" Mean?

A brief and clear explanation about what it means to be "in focus":
https://www.physicsforums.com/insights/lenses-pinholes-focus-mean/

2. How a Pinhole Camera Works (Part 1)

Excellent diagrams:
https://www.scratchapixel.com/lessons/3d-basic-rendering/3d-viewing-pinhole-camera

3. Real image: Collection of focus points made by converging light rays

We love the simple but insightful stick-figure:
https://www.wikiwand.com/en/Real_image

4. Your Eyes See Upside Down and Reversed

Lucid explanation by an eye doctor (MD) relating human eye to a pinhole camera:
https://bceye.com/retinal-image-inverted-reversed/

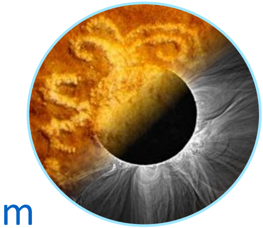
5. Camera Obscura

The history of this wondrous effect, including reference to a possible paleo-camera:
https://en.wikipedia.org/wiki/Camera_obscura http://paleo-camera.com/archeo-optics/

6. Making, Measuring and Testing the "Optimal" Pinhole

A thorough and playful journey through the technical details of pinhole photography:
https://www.35mmc.com/26/10/2020/making-measuring-and-testing-the-optimal-pinhole-pinhole-adventures-part-3-by-sroyon/

Credits & Acknowledgements



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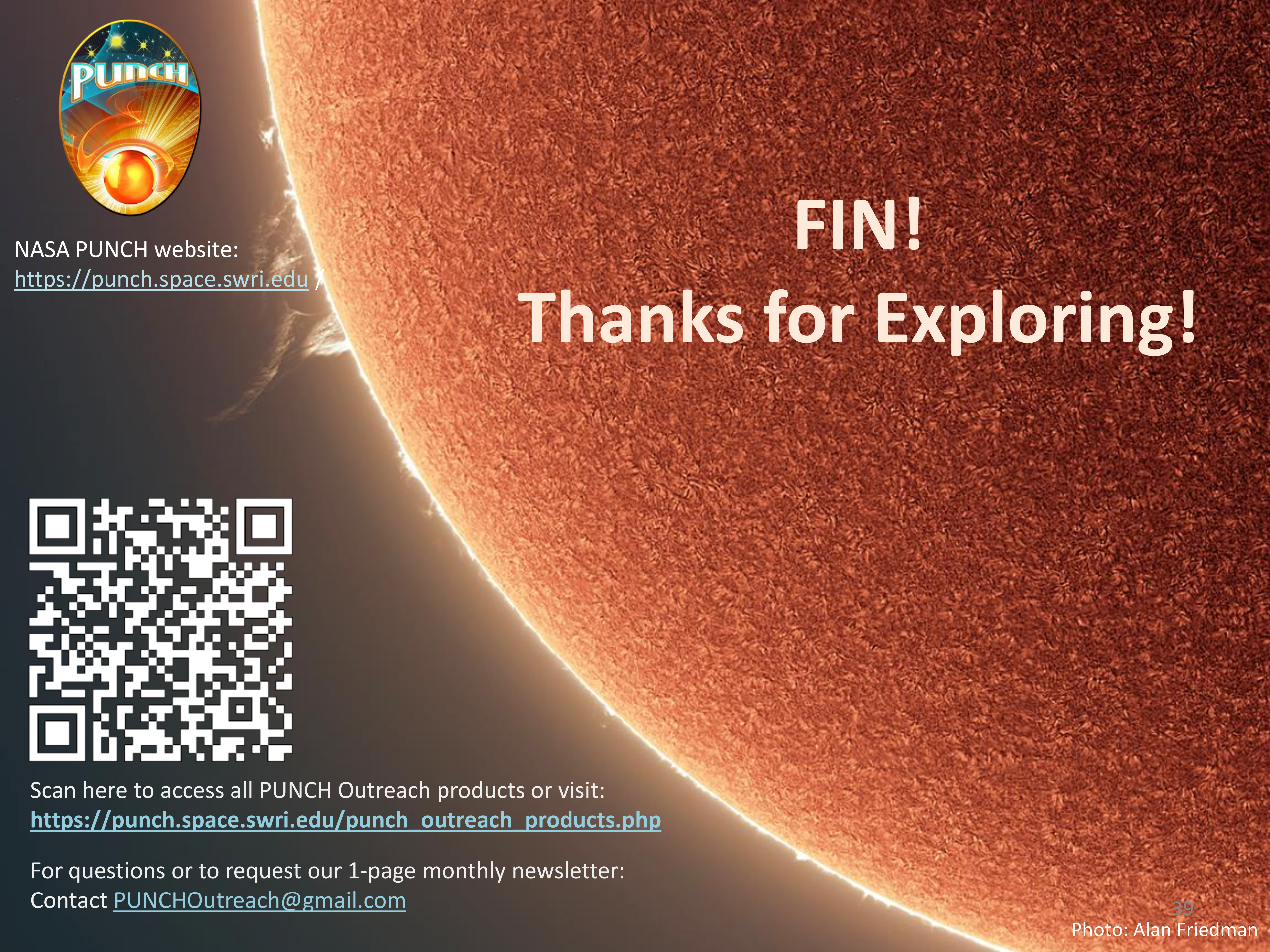
Gilly Gilbert (PUNCH Associate Investigator, field tester)
Countless others (who participated in field testing events and gave us their feedback)

Thank you also to our web developer Don Kolinski for posting and updating our work on the PUNCH website.



NASA PUNCH website:
https://punch.space.swri.edu /

FIN!
Thanks for Exploring!

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