

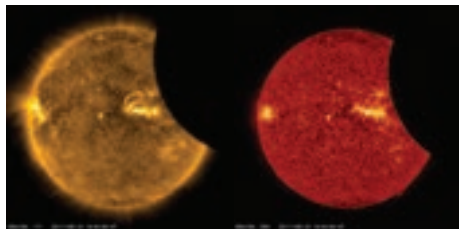


Experience the Total Solar Eclipse

Monday, April 8, 2024



WHY DOES NASA STUDY ECLIPSES?



Credit: NASA/SDO

Eclipses aren't just beautiful—they're great for science. For over a century, solar eclipses helped scientists decipher the Sun's structure and explosive events, find evidence for the theory of general relativity, and discover helium. Today eclipses help NASA predict the structure of the Sun and its impact on Earth. Total eclipses are a unique opportunity to study the Sun because they allow scientists to see a part of the Sun's atmosphere — known as the corona — that is key to answering fundamental questions about how heat and energy are transferred from the Sun out into the solar wind, the constant stream of particles that the Sun scatters into the solar system.

WHAT IS A TOTAL SOLAR ECLIPSE?

For a **total solar eclipse** to take place, the Sun, Moon, and Earth must be in a direct line. The people who see the total eclipse are in the center of the Moon's shadow when it hits Earth. The sky will darken, as if it were twilight. Weather permitting, people in the path of a total solar eclipse can see the Sun's corona, the outer atmosphere of the Sun. A total solar eclipse is the only type of solar eclipse where viewers can watch without their eclipse glasses — and they can only remove them when the Moon is completely blocking the Sun.

A **partial eclipse** happens when the Sun, Moon, and Earth are not exactly lined up. Only a part of the Sun will appear to be covered. During a total or annular solar eclipse, people outside the Moon's inner shadow see a partial solar eclipse.



Credit: AAS

SAFETY

Except during the total phase of a total solar eclipse, do not look at the Sun without special eye protection. **BEFORE EACH USE:** Check the front and back of each lens for damage such as scratches, pinholes, or separation from the frame. **DO NOT USE IF DAMAGED!** Cut glasses into small pieces and discard. **DO NOT** attempt to clean or disinfect eclipse glasses except with a soft, dry, nonabrasive tissue or cloth.



You can see the Sun and an eclipse with special eclipse or solar viewing glasses. **NEVER** look directly at the uneclipsed or partially eclipsed Sun without appropriate eye wear. Sunglasses are not safe to view an eclipse. For more information, visit: go.nasa.gov/EclipseEyeSafety

ECLIPSES THROUGH THE EYES OF NASA

On April 8, 2024, a total solar eclipse will cross North America creating a path of totality.



Credit: Michala Garrison and the Scientific Visualization Studio (SVS), in collaboration with the NASA Heliophysics Education Activation Team (NASA HEAT), part of NASA's Science Activation portfolio. Eclipse calculations by Ernie Wright, NASA Goddard Space Flight Center.

To find out where to watch, how to watch, and eclipse duration in your area, explore go.nasa.gov/Eclipse2024

PREDICT THE CORONA

Long before there were cameras or telescopes, eclipse watchers recorded what they saw in the sky in words, drawings, and paintings. Now NASA scientists use instruments like coronagraphs to study eclipses to make new discoveries about the Sun, Earth, and our space environment. You can have fun creating your own picture of a solar eclipse with chalk, paper, and scissors! You can do this activity before an eclipse to predict what you'll see, or after to record what you saw.

First, trace a large circle template on stiff paper.



Carefully cut out the circle.



Place the template on dark paper and hold or tape it down. Draw a thick circle or lines with chalk around the template a few times – it doesn't need to be neat!



Holding the template in place, smudge the chalk away from the center of the circle using a finger to create the corona of the Sun.



When you are done smudging, remove the circle template and add words, pictures, or fun designs.



You've made total solar eclipse art!



The whole family can get involved in learning about eclipses! Morgan (age 11) and Chelsea (age 8) drew these dazzling coronas.

Compare your coronagraph art to that of early to modern scientists. Which does yours most closely resemble?



Left: Drawing of the 1860 solar eclipse. Credit: G. Tempel
Center: A coronagraph simulates a solar eclipse, blocking the Sun to reveal its outer atmosphere. Credit: NASA/ESA SOHO
Right: Ancient rock art in Chaco Canyon may depict a total solar eclipse in 1097. Credit: National Park Service

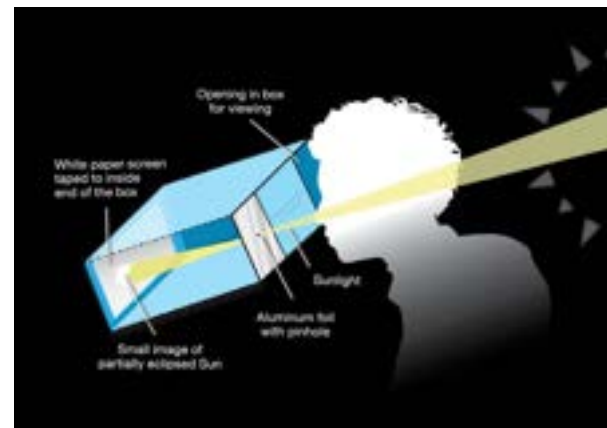
Download this activity and the Predict the Corona Cake Art extension at science.nasa.gov/learn/heat/resource/predict-the-corona-activities

EXPECTATION VS REALITY



The left image is a highly processed composite, assembled using a multitude of images. One may expect to see something like this; however, it is unrealistic for direct viewing. Credit: S. Habbel, M. Druckmüller, and P. Aniol. The right image is more representative of what you could expect to see if you were in the path of totality. Credit: NASA/Nat Gopalswamy. We suggest taking in this awe-inspiring moment without a device in front of you.

MAKE YOUR OWN ECLIPSE PROJECTOR



Credit: NASA

You can make this simple eclipse projector with almost any cardboard box, paper, tape, and foil. The longer the distance from the pinhole to screen, the larger the image of the Sun will be.



Credit: NASA HEAT/J. Patrick Haas

Pinhole projectors allowed early scientists to view the shapes of illuminated objects, like the Sun, by shining the light from the object through a very small hole, projecting the image of the object onto the ground, wall, or other flat surface. These are a great method for safe solar viewing. Be sure that when using, the Sun is always behind you. Explore the 2D paper cut and 3D printed versions of the total eclipse pinhole projectors and activity. **Find More:** nasa3d.arc.nasa.gov/detail/usa-eclipse-2024



Learn more about the Heliophysics Big Year:
October 2023 to December 2024

Find More: go.nasa.gov/HelioBigYear



Updated resources for eclipse safety, NASA science, and history.

Find More: go.nasa.gov/Eclipse2024