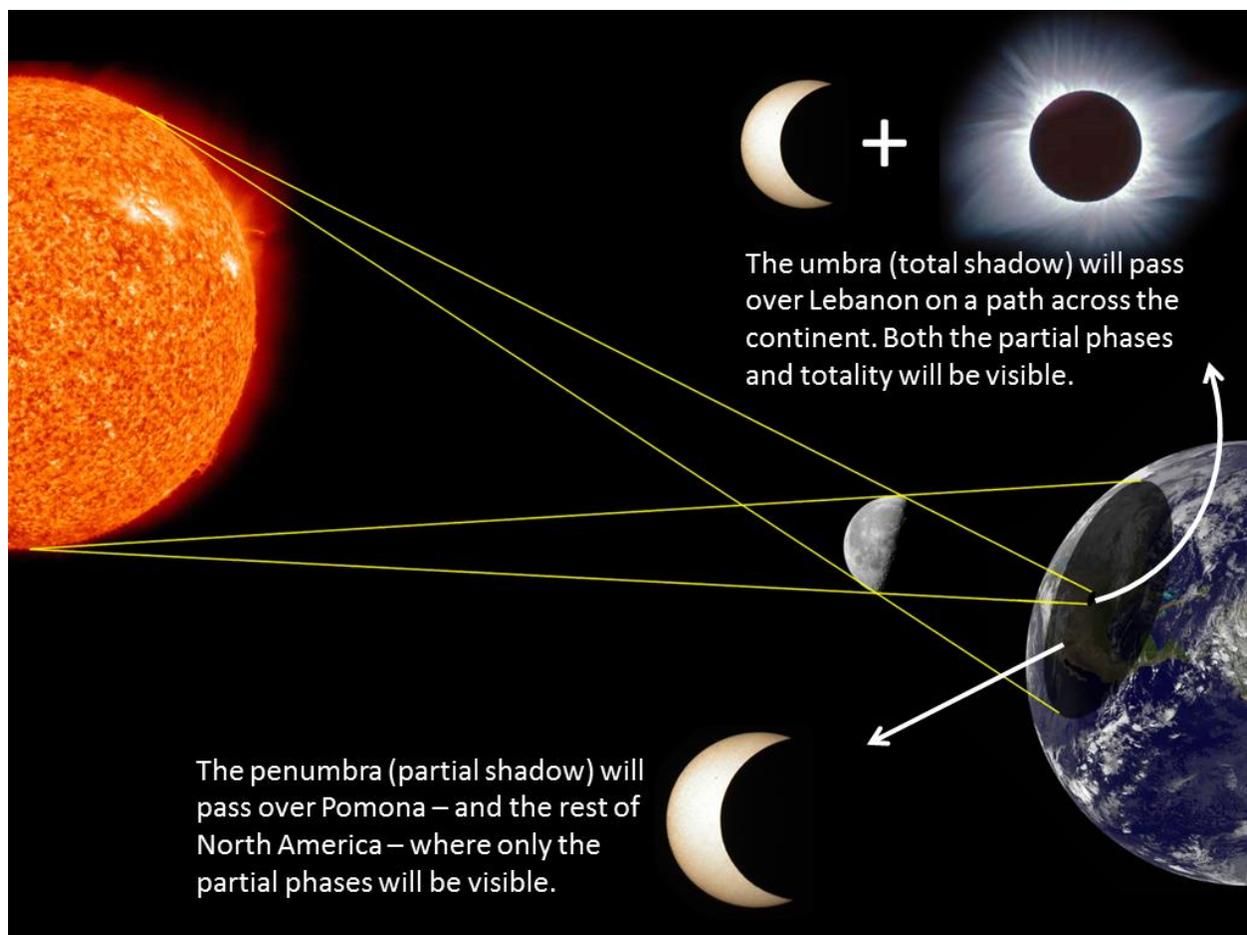


Safely Observing the Upcoming Solar Eclipse from Lebanon and Pomona

As you've probably heard, there will be an eclipse of the sun on Monday, August 21. At least part of the eclipse will be visible from both Lebanon and Pomona. This guide will tell you how to observe the eclipse safely from either campus, and what you can hope to see.

How the Eclipse Will Happen

A solar eclipse occurs when the moon passes directly between the sun and the Earth. The moon goes past the sun on every orbit (so, once every lunar month). But the moon's orbit around the Earth is slightly tilted relative to Earth's orbit around the sun, so the moon only passes *directly* between the sun and Earth a handful of times each year. When this happens, the shadow of the moon falls on the Earth, and people in the zone of shadow have the chance to see an eclipse.



The moon's shadow has two parts. The deep shadow is the **umbra**, where the moon completely blocks the light of the sun. Surrounding the umbra is the much larger **penumbra**, where the moon only partially blocks out the sun. As long as the sky isn't clouded out, everyone in the penumbra has the chance to see a partial eclipse. Only people in the umbra have a chance to experience **totality**, when the moon

completely blocks out the sun. During totality, the sky grows dark, stars come out, and the sun's outer atmosphere or corona is visible.

On Monday, August 21, the moon's orbit motion will carry it directly between sun and Earth. The shadow cast by the moon will first land in the Pacific Ocean, then cross the United States from west to east, and end in the Atlantic Ocean. The moon's umbra will travel along a path of totality, about 70 miles wide, from Oregon to South Carolina. The broader penumbra will cover all of North America and part of northern South America.

Lebanon, Oregon, is on the path of totality. As long as it's not cloudy, the entire eclipse will be visible, including both the partial phases, when the moon is partially blocking the sun, and totality, when the moon completely blocks the sun. In Pomona only partial phases will be visible—at most, the moon will cover about 2/3 of the sun's disk.

What to See from Each Campus

Both campuses will experience a partial eclipse, and Lebanon will also experience a total eclipse at the midpoint of the partial eclipse.

In Lebanon, the partial eclipse will last more than two hours, starting at 9:05 AM and ending at 11:38 AM. The total eclipse will only last for two minutes, from 10:17 to 10:19. In Pomona, the partial eclipse will run from 9:06 to 11:46.

In Pomona, the sky will not get noticeably darker. It will seem like an ordinary day, and probably a very sunny one. To tell that an eclipse is happening, people in Pomona will have to either look at the sun using special equipment (see below), or project an image of the sun. The same will be true in Lebanon for all but a handful of minutes on either side of totality.

In Lebanon, in the last few minutes before totality, the air temperature will drop, possibly by 10 degrees or more. Just before totality, observers up on top of a hill or building may see the moon's shadow racing across the landscape from the west, traveling at well over 1000 miles per hour. At the same time, the last light of the sun will be shining through valleys on the edge of the moon, creating a line of bright sparks on the edge of the moon. This line of lights is called Baily's Beads, in honor of the English astronomer Francis Baily, who first explained the phenomenon in 1836. The very last light of the sun will produce the diamond ring effect, with the final sunbeam appearing as a diamond on the edge of the backlit moon.

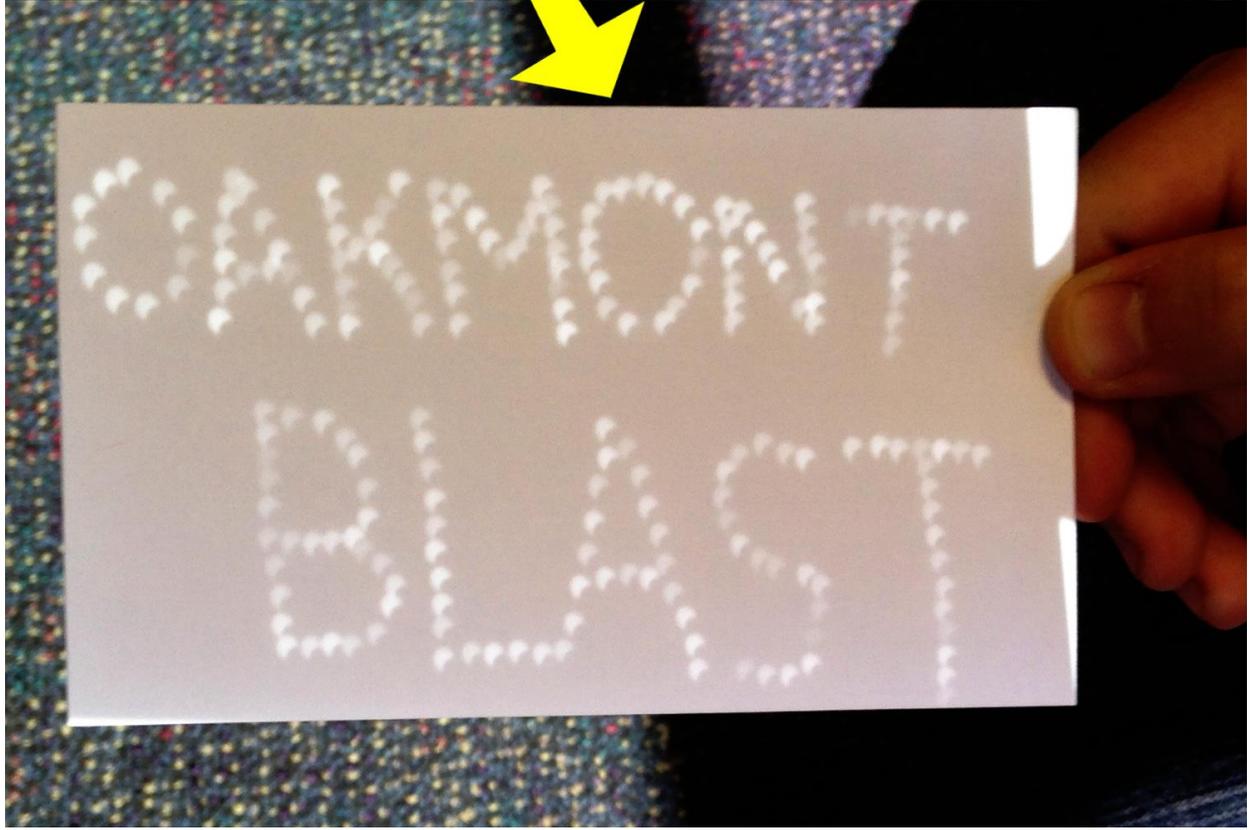
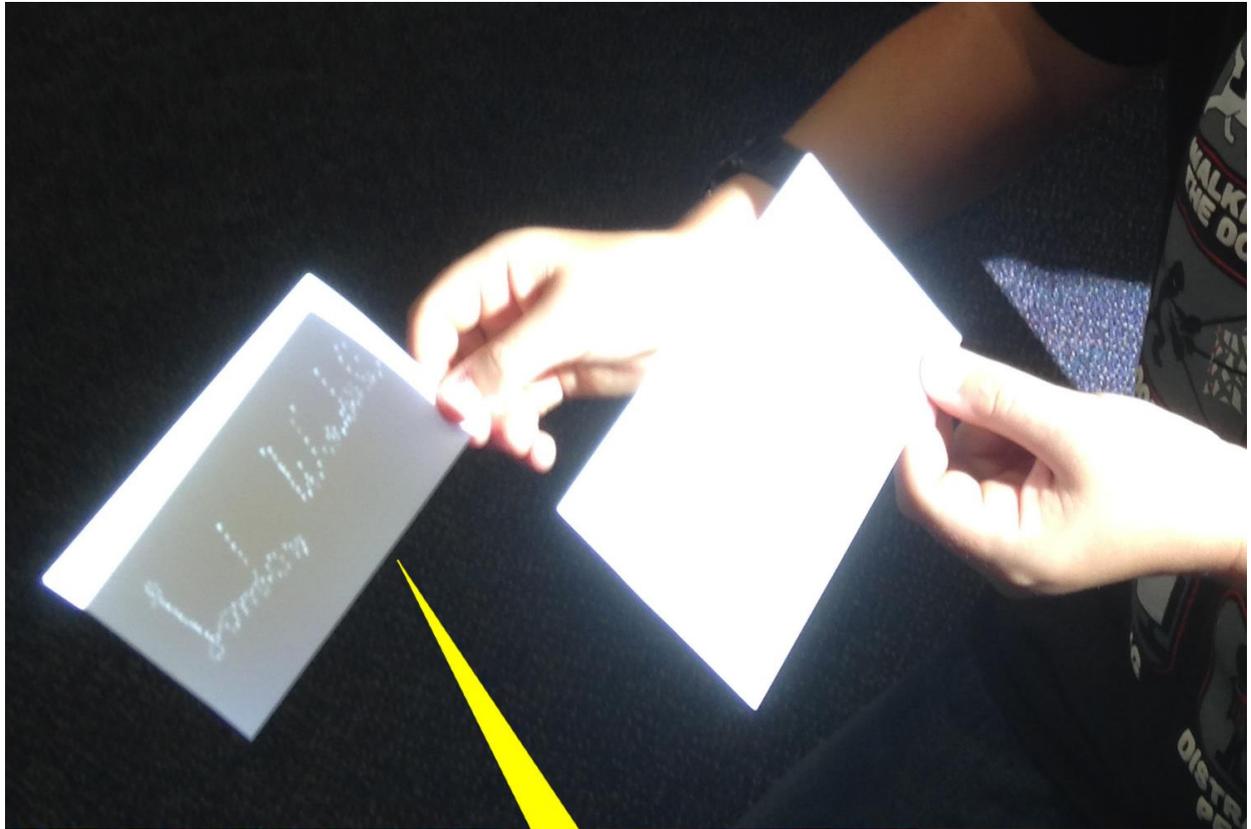
Once the moon completely covers the sun, the sky will grow dark and the stars and planets will come out. Look for the bright planet Venus almost directly overhead, and Mercury just a little below the sun and moon. The sun's corona will also appear, as filaments of pearly gray light radiating from behind the moon in all directions. Take a moment to look around at the horizon, too—from the path of totality, there will be a 360-degree sunset visible as you look outward to the edge of the moon's shadow.

As totality comes to an end, all of the events that led up to it will be replayed in reverse. As the moon moves on in its orbit, its first light of the emerging sun will create a diamond ring effect, and then Baily's

Beads. The sky will brighten, the stars and planets will disappear, and the air temperature will rise back to normal. After that, the partial eclipse will proceed for another hour and twenty minutes, as the moon gradually “uncovers” the sun.

Safely Observing the Eclipse

During the partial phases, which will be visible from both campuses, it is not safe to look directly at the sun unless you are wearing eclipse glasses or looking through #14 welder’s glass. Nothing else will do! Stacking sunglasses, looking through exposed X-ray film, or using smoked glass are all unsafe—these materials may knock the visible light down to tolerable levels, but infrared and ultraviolet light can still pass through to damage your eyes.



Fortunately there are cheap and easy ways to observe the partial phases of the eclipse. Several places online still have eclipse glasses in stock, and I've seen them recently at Wal-Mart in the seasonal or garden section. I expect these to disappear in the days leading up to the eclipse, if they're not gone already. But if you miss out on getting eclipse glasses, fear not: making a pinhole projector to observe the eclipse is fun and easy. Any small opening can serve as a pinhole to project an image of the crescent sun during the partial phases. People have used colanders, crackers, fingers bent into a circle, and my personal favorite, punched cards. Get two index cards, and use a push-pin to poke out holes in one of the cards. You can make a little drawing, spell out words, or sign your name with punched holes. Then during the partial eclipse, hold the two cards a few inches apart, with the punched card toward the sun, and you'll see your drawing or message picked out in tiny crescent suns on the second card.



People on both campuses should look at the shadows of trees during the partial phases. The gaps between the leaves and branches serve as pinholes, projecting crescent suns in the light dapples that break up the tree's shadow.

In Lebanon it will be safe to observe totality without eclipse glasses. But be careful. As soon as the sun's light returns around the edge of the moon, it's time to get the glasses back on.

What about using binoculars or telescopes? If you have proper solar filters or a projection device like a sun funnel, go for it—it's a great way to see the eclipse yourself and to share it with others. If you'd like to know more about using optical instruments to view the eclipse, please see a more complete version of this guide [here](#).

Good luck, and clear skies!

Matt Wedel, PhD, of COMP and CPM is the president of the Pomona Valley Amateur Astronomers. He also serves as a Contributing Editor for Sky & Telescope magazine, where he writes the monthly Binocular Highlight column and contributes the occasional feature article. If you have questions about safely viewing the eclipse, please write to him at mwedel@westernu.edu.