EXPERIENCE THE SHADOW OF THE MOON!

On Monday, August 21, 2017 the shadow of the moon will pass across the U.S. making a line from Oregon to South Carolina. It is estimated that 50 million people will be able to witness “totality” for a few minutes as the moon completely blocks the sun. While Western New Yorkers will only be able to witness a partial eclipse, it will still be remarkable as about 75% of the sun will be obscured by the moon.

August 21, 2017 is going to be a BIG DEAL, and we want to help you experience it.

This guide was put together by several organizations in Western New York that do outreach programming for astronomy. We want you to be able to make the most of this spectacular event, whether that is travelling to witness totality, or viewing the partial eclipse from home. We will also be hosting opportunities to learn about and prepare for the eclipse beforehand at WNY’s planetariums.

WHAT IS A SOLAR ECLIPSE?

A solar eclipse happens when the moon, as seen by us on Earth, passes directly in front of the sun. Once each month, the moon makes a complete orbit (or revolution) around Earth. The changing angle of sunlight on the moon causes the waxing and waning of the moon’s phases. At new moon, it is not visible because the side facing Earth is not lit by the sun. Furthermore, it is lost in the glare of the sun as it passes between the sun and Earth. Due to the tilt of the moon’s orbit, it normally passes just above or below the sun. However, every 6 months the alignment is just right and the moon can pass directly in front of the sun!

Even though the sun is much larger than the moon, the two bodies are at just the right distances to make them appear to be about the same size in our sky. This means that the bright yellow disk of the sun, known as the photosphere, can be blocked during a total eclipse, revealing the sun’s atmosphere which is called the corona. When this happens, a beautiful ring of light appears, the stars are visible during the day time, birds stop chirping because they think it is night time, and people experience a few minutes of eerie “totality” darkness in the middle of the day.

![Partial, Annular, and Total Solar Eclipses](Exploratorium.edu)

Depending on the alignment of Earth, the moon, and the sun, as well as exactly how far the moon and sun are from Earth, a solar eclipse can be a partial eclipse, an annular eclipse, or a total eclipse. Additionally, during a total solar eclipse, viewers will see a partial solar eclipse if they are not along the “path of totality” but are still in part of the moon’s shadow.
MOON SHADOWS

There are two parts of the moon’s shadow. The area where all of the sun is blocked is called the “umbra” and the area where only part of the sun is blocked is called the “penumbra.” To experience the TOTAL SOLAR ECLIPSE you will need to be along a narrow line where the moon’s umbra sweeps across the Earth. If you are in the penumbra, you will only see a partial eclipse.

BUFFALO’S VIEW OF THE 2017 ECLIPSE

Because the moon’s umbra (lower left) will not pass over Buffalo, we will see a partial solar eclipse. Although we will not see the spectacle of a total eclipse this year, we will see the moon cover approximately 77% of the sun’s disk (lower right), which in itself is a rare and special event!
WHERE TO VIEW THE ECLIPSE LOCALLY

Because solar observing can be hazardous if not done properly, we have established several locations where you can observe with proper equipment and trained operators. We will have telescopes with special filters, projections of the sun and special “eclipse glasses” available for you.

The Buffalo Museum of Science
Buffalo State College’s Whitworth Ferguson Planetarium
Calvin E. Krueger Park in Wilson, NY
Central Branch of the Buffalo & Erie County Public Library
Penn Dixie Fossil Park & Nature Preserve in Blasdell, NY

Check out http://www.BuffaloEclipse.org for updates and maps!

Keep in mind that you can view the eclipse from just about anywhere with clear skies using the SAFE methods listed on the following pages.

WHEN TO VIEW THE ECLIPSE LOCALLY

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial eclipse begins</td>
<td>1:11 pm EDT</td>
<td>Sun Alt: 55 degrees</td>
</tr>
<tr>
<td>Max. partial eclipse</td>
<td>2:33:55 pm EDT</td>
<td>Sun Azimuth: 213 degrees</td>
</tr>
<tr>
<td>Partial eclipse ends</td>
<td>3:51 pm EDT</td>
<td>Duration: 2h 39m</td>
</tr>
</tbody>
</table>

At maximum, 77.4% of the sun’s disk will be covered by the moon.

TO WITNESS TOTALITY, YOU WILL NEED TO TRAVEL

The “path of totality” for the August 2017 event is a strip about 60-70 miles wide as illustrated on the map below. You’ll need to travel to a spot along this path in order to witness the total eclipse in 2017.
VIEWING AN ECLIPSE CAN BE DANGEROUS IF NOT DONE SAFELY

Why is direct viewing of a partial eclipse so DANGEROUS to my eyes?

Have you ever tried to look directly at the sun? Hopefully not but you may have accidentally glanced at it and noticed that IT HURTS! The iris of your eye is a muscle. When the sun is directly in view, it closes down by contracting as much as it can to protect your retina. Just like any other muscle, it hurts when it contracts as hard as possible. During a partial eclipse, less of the sun’s yellow disk is exposed so your natural defense mechanism of iris contraction is weaker, making it easier to look at the sun directly.

Don’t do it! If ANY PART of the yellow disk of the sun is exposed, it can burn your retina, possibly resulting in permanent damage and loss of sight. The only time you can look directly at the sun is during totality, and that will not happen at all in WNY during this eclipse.

How NOT to view the eclipse (or Don’t Do This!)

Directly

Through the clouds

Through mylar used for balloons, “space blankets”, or anything not made specifically for viewing the sun by an established, reputable supplier

Through eyepiece “sun filters” included with some small telescopes

Though ANY telescope or binoculars without a specially made solar filter
HOW TO VIEW THE ECLIPSE – SAFELY!

The following techniques can be used to view a solar eclipse safely, and they can also be used to view the sun at other times to view sunspots.

• Through solar eclipse viewers made by established, reputable suppliers

• Through #14 welders glass

• Through a telescope ONLY with a full-aperture solar filter made by an established, reputable supplier. Be sure to cover or remove any finder scope to prevent accidents.

  Don’t have a telescope and filter? Visit one of our viewing sites!

• Projection with binoculars or a telescope (below left). Be careful that no one looks through the telescope!!

• The Miller Mirror projection technique (below right). Cover a mirror with paper or an envelope that has a dime-sized hole in it. The sun’s image can be projected into a dark area or dark room. That projected image will be large enough and dim enough for pleasant and safe viewing. Don’t look at the mirror; look at the projected image.

• Pinhole projection – a classic technique that works but makes a very small image that is not particularly good for viewing. Instructions for make it yourself viewers:

  Cereal box viewer at hilarrowd.com/camp/projects/eclipse_viewer/eclipse_viewer.html

  Triangular shipping box viewer at www.exploratorium.edu/eclipse/how.html
RESOURCES FOR MORE INFORMATION

NASA’s website about the 2017 solar eclipse

“Mr. Eclipse” Fred Espenak’s website: www.mreclipse.com/MrEclipse.html

Google map with solar eclipse path by Fred Espenak

Eclipse maps for 2017 by Michael Zeiler

Eclipse2017.org (by Dan McGlaun, an eclipse enthusiast)
www.eclipse2017.org/eclipse2017_main.htm

Observing the Sun (Sky & Telescope)
www.skyandtelescope.com/astronomynews/observingnews/how-to-look-at-the-sun

Observing the Sun for Yourself (Stanford Solar Center) http://solar-center.stanford.edu/observe

Sky and Telescope’s 2017 Eclipse Page with Jay Anderson’s chart of best bets for good weather

The Great American Eclipse Site (by Michael Zeiler and Polly White) www.greatamericaneclipse.com


Active hyperlinks are available on BuffaloEclipse.org under Astronomy Resources

LEARN MUCH MORE ABOUT THE ECLIPSE AT A PLANETARIUM!
See individual web sites for program information

Lackawanna CSD Planetarium
www.lackawannaschools.org/domain/289

Maryvale CSD Planetarium
http://www.maryvaleufsd.org/middleschool.cfm?subpage=7

Whitworth Ferguson Planetarium at Buffalo State College
www.fergusonplanetarium.net

Williamsville Space Lab Planetarium
www.williamsvillek12.org/planetarium (Click on Public Shows)
MARK YOUR CALENDAR!

Buffalo Partial Solar Eclipse
August 21, 2017

Buffalo Total Solar Eclipse
April 8, 2024