The Upcoming Total Lunar Eclipse of March 14th, 2025

ALPO Members, please get out on March 13-14, 2025 and take some images of the upcoming total lunar eclipse and share them with us here at ALPO on the Eclipse Gallery Page. Please submit your images and observations and share what you witnessed with the entire ALPO community.

When you are ready to report on your eclipse activities and/or post images to the ALPO Eclipse Gallery or blog, please use the eclipse@alpo-astronomy.org address. Please be sure to follow the guidelines when sending your photos so that they meet the threshold of being sufficiently documented to be of value for subsequent research and evaluation. Please see my notes on annotating the images below.

In addition to your reports & images being posted on the Eclipse Blog and in the Eclipse Gallery, some items will be selected to be published in the quarterly on-line and print publication, the **Journal of the Association of Lunar & Planetary Observers** ("JALPO").

Everyone is asked to submit their images, sketches, drawings and written reports of any observed eclipses — solar, lunar, annular, total or partial — as soon as possible after the event to the ALPO Eclipse Section Acting Coordinator via the eclipse@alpo-astronomy.org email address for use in his report to the ALPO membership in an upcoming Journal of the ALPO.

In order to make his report as scientifically valid as possible, please include as much observational data as possible including:

- Your name and exact observing location
- Exact date and time of the observation/image exposure
- Exposure timing details
- Estimate of the lunar or solar altitude above your horizon and azimuth (direction)
- Brand and model of the equipment (telescope, mount, eyepiece, camera, mobile phone camera brand and model)
- General weather conditions (ambient temperature, sky conditions, etc.)
- Your own commentary about what you observed

Please find some information about the eclipse below.

What is a lunar eclipse?

A lunar eclipse is an astronomical event that occurs when the Earth's shadow moves across the face of the Moon, causing the Moon to be darkened. Such an alignment occurs during an eclipse season, approximately every six months, during the full moon phase, when the Moon's orbital plane is closest to the plane of the Earth's orbit. This can occur only when the Sun, Earth, and Moon are exactly or very closely aligned with Earth between the other two, which can happen only on the night of a full moon when the Moon is near either lunar node.

When the Moon is totally eclipsed by the Earth, it takes on a reddish color that is caused by the planet Earth completely blocking direct sunlight from reaching the Moon's surface, as the only light that is reflected from the lunar surface is what has been refracted by the Earth's atmosphere. This light appears reddish due to the Rayleigh scattering of blue light, the same reason sunrises and sunsets are more orange & red than during the day. So, lunar eclipses are sometimes called "Blood Moons" because of this phenomenon. I was fortunate to view the Total Lunar Eclipse of 2023 from Rio Frio, Texas. It was extremely dark and at mid totality it was difficult to see the Moon with naked eyes. Stars within a few degrees of the Moon were showing up in my images. The Moon actually looked

purplish instead of the rusty red color I've become accustomed to seeing. Other eclipses I've observed were much brighter and I could see the reference to a Blood Moon.

Another significant fact relating to a total lunar eclipse is that anybody and everybody on the dark side of Earth with clear sky can view a TLE. Unlike a total solar eclipse where you must be in a very narrow path to observe totality. For example, the last total solar eclipse in 2024 allowed a very narrow path of people to see it as it passed across the USA. This Lunar eclipse will allow EVERYBODY in the USA to see totality.

The Total Lunar Eclipse of March 14th, 2025

The Moon will pass into Earth's shadow on the night of March 13 or early in the morning of March 14, depending on your time zone. The Saros cycle of the March 14, 2025 lunar eclipse is number 123. This total lunar eclipse will be the first of an almost tetrad, with the others being on September 8, 2025 (total); March 3, 2026 (total); and August 28, 2026 (partial). The total phase of a lunar eclipse can last up to nearly two hours, while a total solar eclipse lasts only a few minutes at any given place, because the Moon's shadow is smaller. The March 2025 total lunar eclipse will take place across several time zones. The eclipse will be completely visible over North and South America, seen rising over Australia and northeast Asia and setting over Africa and Europe.

What can I expect to observe at my location and at what times?

Penumbral eclipse begins
(8:57pm PDT, 11:57pm EDT, 03:57 UTC)
The Moon enters the Earth's penumbra, the outer part of the shadow. The Moon begins to dim, but the effect is quite subtle.

Partial eclipse begins
(10:09pm PDT, 1:09am EDT, 05:09 UTC)
The Moon begins to enter Earth's umbra and the partial eclipse begins. To the naked eye, as the Moon moves into the umbra, it looks like a bite is being taken out of the lunar disk. The part of the Moon inside the umbra appears very dark.

Totality begins
(11:26pm PDT, 2:26am EDT, 06:26 UTC)
The entire Moon is now in the Earth's umbra. The Moon is tinted a coppery red. Try binoculars or a telescope for a better view. If you want to take a photo, use a camera on a tripod with exposures of at least several seconds.

Totality ends
(12:31am PDT, 3:31am EDT, 07:31 UTC)
As the Moon exits Earth's umbra, the red color fades. It looks as if a bite is being taken out of the opposite side of the lunar disk from before.

Partial eclipse ends
(1:47am PDT, 4:47am EDT, 08:47 UTC)
The whole Moon is in Earth's penumbra, but again, the dimming is subtle.

Penumbral eclipse ends
(3:00am PDT, 6:00am EDT, 10:00 UTC) The eclipse is over.

How can I best observe the eclipse?

You don’t need any special equipment to observe a lunar eclipse, although binoculars or a telescope will enhance the view. A dark environment away from bright lights makes for the best viewing conditions. A comfortable reclining chair is nice to have and a quilt of sleeping bag will help keep you warm. Mid March can be quite cold in many locations across the path of totality. Warm beverages might also be helpful. You will want to stay hydrated if you plan to attend the duration of the eclipse which will last about 6 hours.

Why does the Moon turn red during a lunar eclipse?

The same phenomenon that makes our sky blue and our sunsets red causes the Moon to turn reddish-orange during a lunar eclipse. Sunlight appears white, but it actually contains a rainbow of components—and different colors of light have different physical properties. Blue light scatters relatively easily as it passes through Earth’s atmosphere. Reddish light, on the other hand, travels more directly through the air. When the Sun is high on a clear day, we see blue light scattered throughout the sky overhead. At sunrise and sunset, when the Sun is near the horizon, incoming sunlight travels a longer, low-angle path through Earth’s atmosphere to observers on the ground. The bluer part of the sunlight scatters away in the distance (where it’s still daytime), and only the yellow-to-red part of the spectrum reaches our eyes. During a lunar eclipse, the Moon appears red or orange because any sunlight that’s not blocked by our planet is filtered through a thick slice of Earth’s atmosphere on its way to the lunar surface. It’s as if all the world’s sunrises and sunsets are projected onto the Moon. So, during a total lunar eclipse, the Moon is reddened by sunlight filtered through Earth’s atmosphere.

What else can I observe in the night sky on the night of the eclipse?

Look to the western sky on the night of the eclipse for a glimpse of the constellation of Orion and the planets Jupiter and Mars setting in the west. To the East, Bootes and Hercules will be rising. To the north you can find both Dippers, the Big Dipper on top and the Little Dipper below.

The Moon will be situated in the constellation Leo, under the lion’s hind paw, at the beginning of the eclipse and moving into the constellation Virgo. As the eclipse progresses and the Earth’s shadow dims the Moon’s brightness, constellations will become easier to spot. And it’s always a good idea to try to capture some constellation shots with a wide angle lens or your smartphone during totality when the moon is at it’s dimmest. Place your phone or DSLR on a tripod and take some shots. Experiment with exposures lasting from a few to several several seconds.

What is Meteor Flash and how can I improve my chances of seeing one?

A meteor flash occurs when a meteor strikes the surface of the Moon. Normally the Moon is so bright that when a meteor impacts the lunar surface the flash is simply lost in the glare. During totality, the moon’s brightness is significantly dimmed to the point that any bright flash can overcome the dim light and become visible to us here on Earth.

During a total eclipse on January 21St, 2019 a bright flash was seen near the south east limb of the Moon at 04:41 UTC. I was imaging the eclipse but didn’t see anything. When I read about the flash the next day I went back and found my image using the timestamps in the metadata and found that I had actually captured the flash. How exciting!!! To improve your chances of capturing a meteor flash, I’d recommend capturing serial frames or some sort of lossless video with your astrocamera. Some of the newer DSLR’s are capable of capturing high resolution lossless video, too. I just got lucky capturing the flash shooting single raw images.

What is the Danjon Scale?

The Danjon scale is a five-point scale useful for measuring the appearance and luminosity of the Moon during a total lunar eclipse. It was proposed by André-Louis Danjon in 1921, when postulating that the brightness of a lunar eclipse was related to the solar cycle. An eclipse's rating on the scale is traditionally denoted by the letter L.

The Danjon scale is described in the following table:

L value	Description
0	Very dark eclipse. Moon almost invisible, especially at greatest eclipse.
1	Dark eclipse, grey or brownish in coloration. Details distinguishable only with difficulty.
2	Deep red or rust-colored eclipse. Very dark central shadow, while outer edge of umbra is relatively bright.
3	Brick-red eclipse. Umbral shadow usually has a bright or yellow rim.
4	Very bright, copper-red or orange eclipse. Umbral shadow has a bluish, very bright rim.

Determining the value of L
Determination of the value of L for an eclipse is best done near mid-totality with the naked eye. The scale is subjective, and different observers may determine different values. In addition, different parts of the Moon may have different L values, depending on their distance from the center of the Earth's umbra.

Factors affecting the value of L
Many factors can affect the appearance of the Moon during a lunar eclipse. The Moon's path through the Earth's umbra is important, but so too are the current conditions of the Earth's atmosphere. While the Earth's shadow blocks any direct light from striking the Moon during a lunar eclipse, some light is refracted through the Earth's atmosphere giving the Moon a red hue.

How do I take pictures of the eclipse?

Using a smartphone. Place it on a tripod or place it in a position where it will not be moved while taking an exposure. Fire the camera with a remote device or with an app.

Using a DSLR. Use about a 300-600mm lens. Use a tripod and a remote triggering device or set a timer so the shutter waits 3 seconds after you push the button to eliminate motion. During totality, exposures may get too long for still tripods. If you have a telescope piggyback the camera & lens to eliminate trailing.

If you have a telescope or spotting scope use an afocal adaptor to attch the camera to the eyepiece holder of the telescope. Focus carefully.

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