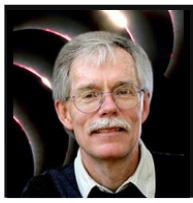
OREGON STAR PARTY NEWS

Oregon Star Party Newsletter— Volume 3, Issue 2 Late July 2017



MrEclipse.com

Fred Espenak

© Fred Espenak

How to Photograph a Solar Eclipse

Introduction

Photographing an eclipse of the Sun is fun and easy. However, you will need to use a special Solar Filter to protect your eyes and your camera.

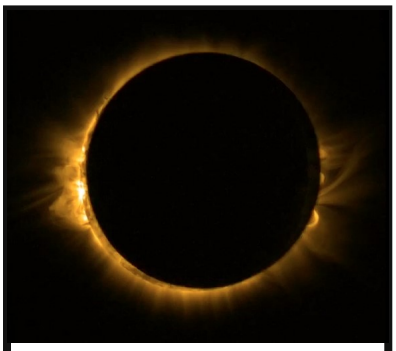
A solar eclipse occurs whenever the Moon's shadow falls on the Earth. This can only happen during New Moon when the Moon passes between the Sun and Earth. Although there is a New Moon every 29 1/2 days, there are usually only 2 or 3 solar eclipses each year. That's because the Moon's orbit is tipped 5 degrees to Earth's so the Moon's shadow misses Earth during most New Moons. (see: Solar Eclipses For Beginners)

Watching and photographing an eclipse of the Sun is a relaxing activity since it progresses at a leisurely pace. The eclipse begins as a small notch slowly appears along one edge of the Sun. During the next hour, the Moon gradually covers more and more of the Sun's bright disk. If the eclipse is a total one, the last remaining minutes of the partial phases can be quite dramatic and beautiful. The crescent of the Sun grows thinner as the Moon's shadow approaches. The abrupt darkness of totality is stunning and quite unlike you've ever seen. And the incredible solar corona is simply the most awe-inspiring naked-eye sight in all of nature. Certainly the most a remarkable sight.

Cameras

Over the past decade or so, digital cameras have completely replace film cameras in virtually all aspects of photography. Solar eclipses can be captured easily with all types of digital cameras. The simpler Point and Shoot cameras have a non-interchangeable lens with a single focal length. Better models are equipped with a 3x or larger zoom lens. The most versatile (and expensive) camera is the DSLR (digital single lens reflex). These cameras allow you to replace the kit lens with any number of other lenses from wide angle to super telephoto. You can even connect a DSLR directly to a telescope so that the Sun fills the entire frame. No matter what kind of camera you own, one or more of the following techniques can be used be used to shoot a solar eclipse.

Photograph a Solar Eclipse - Continued on page 2



Eclipse Times

First Contact	9:07:17.9 am
Second Contact	10:21:05.1 am
Max Eclipse	10:21:46.9 am
Third Contact	10:22:28.8 am
Fourth Contact	11:42:50.1 am

In This Issue

Photograph a Solar Eclipse - Continued from page 1

Lenses and Image Sizes

A solar eclipse may be safely photographed provided that certain precautions are followed. Almost any kind of camera can be used to capture this rare event; however, a lens with a fairly long focal length is recommended to produce as large an image of the Sun as possible. A standard 18mm lens on a DSLR yields a minuscule image of the Sun, while a 200mm telephoto or zoom produces an image four times larger (see: Field of View Table). A better choice would be one of the small, compact catadioptic or mirror lenses that have become widely available in the past decades. The focal length of 500mm is most common among such mirror lenses and yields a great image scale for capturing solar eclipses .

The sensor size of most DSLRs falls into on of two categories. The Full Frame Sensor (measuring 24 x 36 mm) is used in professional or upper end DSLR cameras. The less expensive Crop Sensor (measuring 16 x 24 mm [Nikon] or 15 x 22 mm [Canon]) is used in the less expensive consumer DSLRs. Either category can take excellent eclipse images, but the sensor size plays a determining roll on the apparent size of the Sun as seen with various focal length lenses.

As a general rule of thumb, the relative size of the Sun's image appears 1.5 times larger in crop sensor DSLR compared to the image in a full sensor DSLR when using the same focal length lens. For example, a 500mm lens on a crop sensor DSLR produces the same relative image size as a 750mm lens on a full frame sensor DSLR. Another issue to consider is the lag time between digital frames required to write images to a DSLR's memory card. It is also advisable to turn off autofocus because it is not reliable under these conditions; focus the camera manually instead. Preparations must be made for adequate battery power and space on the memory card.

Field of View for Various DSLR Focal Lengths

Focal Length	Field of View (Full Frame)	Field of View (Crop Sensor)
14 mm	98° x 147°	65° x 98°
20 mm	69° x 103°	46° x 69°
28 mm	49° x 74°	33° x 49°
35 mm	39° x 59°	26° x 39°
50 mm	27° x 40°	18° x 28°
105 mm	13° x 19°	9° x 13°
200 mm	7° x 10°	5°x 7°
400 mm	3.4° x 5.1°	2.3° x 3.4°
500 mm	2.7° x 4.1°	1.8° x 2.8°
1000 mm	1.4° x 2.1°	0.9° x 1.4°
1500 mm	0.9° x 1.4°	0.6° x 0.9°
2000 mm	0.7° x 1.0°	0.5° x 0.7°

www.mreclipse.com/SEphoto/SEphoto.html
©2017 Fred Espenak

Kids vs Adults

Astronomy Quiz

Sunday, August 20
11:30 AM in the Activity Tent

Solar System Walkabout

Sunday, August 20 at 10 AM
Meet at the Youth Tent

A youth activity that demonstrates the relative size of our solar system. Be sure to wear good walking shoes.

Photograph a Solar Eclipse - Continued on page 3

Photograph a Solar Eclipse - Continued from page 2

If full disk photography of partial phases of the eclipse is planned, the focal length of the optics must not exceed 2500mm on a full frame DSLR (1700mm on a crop sensor DSLR). Longer focal lengths permit photography of only a magnified portion of the Sun's disk. In order to photograph the Sun's corona during totality, the focal length should be no longer than about 1500mm with a full frame DSLR (1000mm with crop sensor DSLR); however, a focal length of 1000mm (700mm crop sensor) requires less critical framing and can capture some of the longer coronal streamers. The figure below shows the apparent size of the Sun (or Moon) and the outer corona in both full frame and crop sensor formats for a range of lens focal lengths.

A solar filter must be used on the lens throughout the partial phases for both photography and safe viewing. Such filters are most easily obtained through manufacturers and dealers listed in Sky & Telescope and Astronomy magazines. These filters typically attenuate the Sun's visible and infrared energy by a factor of 100,000. The actual filter factor and choice of ISO speed, however, will play critical roles in determining the correct photographic exposure. Almost any ISO can be used because the Sun gives off abundant light. The easiest method for determining the correct exposure is accomplished by running a calibration test on the uneclipsed Sun. Shoot a roll of film of the mid-day Sun at a fixed aperture (f/8 to f/16) using every shutter speed from 1/1000s to 1/4s. After the film is developed, note the best exposures and use them to photograph all the partial phases. With a digital camera, the process is even easier. Just shoot a range of different exposures and use the camera's histogram display to evaluate the best exposure. The Sun's surface brightness remains constant throughout the eclipse, so no exposure compensation is needed except for the narrow crescent phases, which require two more stops due to solar limb darkening. Bracketing by several stops is also necessary if haze or clouds interfere on eclipse day.

Certainly the most spectacular and awe-inspiring phase of the eclipse is totality. For a few brief minutes or seconds, the Sun's pearly white corona, red prominences, and chromosphere are visible. The great challenge is to obtain a set of photographs that captures these fleeting phenomena. The most important point to remember is that during the total phase, all solar filters must be removed. The corona has a surface brightness a million times fainter than the photosphere, so photographs of the corona are made without a filter. Furthermore, it is completely safe to view the totally eclipsed Sun directly with the naked eye. No filters are needed, and in fact, they would only hinder the view. The average brightness of the corona varies inversely with the distance from the Sun's limb. The inner corona is far brighter than the outer corona; thus, no single exposure can capture its full dynamic range. The best strategy is to choose one aperture or f/number and bracket the exposures over a range of shutter speeds (i.e., 1/1000s to 1s). Rehearsing this sequence is highly recommended because great excitement accompanies totality and there is little time to think.

Exposure times for various combinations of ISO speeds, apertures (f/number) and solar features (chromosphere, prominences, inner, middle, and outer corona) are summarized in the Solar Eclipse Exposure Guide (see page 4). This guide was developed from eclipse photographs made by the author, as well as from photographs published in Sky and Telescope. To use the guide, first select the ISO speed in the upper left column. Next, move to the right to the desired aperture or f/number for the chosen ISO. The shutter speeds in that column may be used as starting points for

COSMIC PICTURE

Einstein's Incredible Universe

IMAX film

The producers of the IMAX film, "Einstein's Incredible Universe," are considering sending a team to film the Oregon Star Party and TSE. They would like to know if any of the attendees has film/video experience and would be willing to work with them, particularly on time lapse photography, drone work or live action filming. For more information, please contact sophie@cosmicpicture.com.

T-shirt and Sweatshirt Sale

Sunday, August 20 at 10:30 AM
Registration Tent

Photograph a Solar Eclipse - Continued on page 4

Solar Eclipse Exposure Guide

ISO	*f*/Number								
25	**1.4**	**2**	**2.8**	**4**	**5.6**	**8**	**11**	**16**	**22**
50	**2**	**2.8**	**4**	**5.6**	**8**	**11**	**16**	**22**	**32**
100	**2.8**	**4**	**5.6**	**8**	**11**	**16**	**22**	**32**	**44**
200	**4**	**5.6**	**8**	**11**	**16**	**22**	**32**	**44**	**64**
400	**5.6**	**8**	**11**	**16**	**22**	**32**	**44**	**64**	**88**
800	**8**	**11**	**16**	**22**	**32**	**44**	**64**	**88**	**128**
1600	**11**	**16**	**22**	**32**	**44**	**64**	**88**	**128**	**176**

Eclipse Feature	Q	Shutter Speed								
Partial[1] - 4.0 ND	**11**	—	—	—	1/4000	1/2000	1/1000	1/500	1/250	1/125
Partial[1] - 5.0 ND	**8**	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15
Baily's Beads[2]	**11**	—	—	—	1/4000	1/2000	1/1000	1/500	1/250	1/125
Chromosphere	**10**	—	—	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60
Prominences	**9**	—	1/4000	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30
Corona - 0.1 Rs	**7**	1/2000	1/1000	1/500	1/250	1/125	1/60	1/30	1/15	1/8
Corona - 0.2 Rs[3]	**5**	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2
Corona - 0.5 Rs	**3**	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1 sec	2 sec
Corona - 1.0 Rs	**1**	1/30	1/15	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec
Corona - 2.0 Rs	**0**	1/15	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec	15 sec
Corona - 4.0 Rs	**-1**	1/8	1/4	1/2	1 sec	2 sec	4 sec	8 sec	15 sec	30 sec
Corona - 8.0 Rs	**-3**	1/2	1 sec	2 sec	4 sec	8 sec	15 sec	30 sec	1 min	2 min

Instructions

Choose the ISO speed in the upper left column. Next, select the f/number of the lens or telescope (on same line as ISO). Finally, drop straight down to the bottom table to get the correct exposure for each feature of the solar eclipse.

Note that the brightness of the corona varies dramatically with distance from the Sun's edge. All exposure values in this guide are estimates. For best results, use them only as a guide and bracket your exposures.

Exposure Formula: $t = f^2 / (I \times 2^Q)$

where: t = exposure time (sec)
f = *f*/number or focal ratio
I = ISO film speed
Q = brightness exponent

Abbreviations: ND = Neutral Density Filter.
Rs = Solar Radii.

Notes: [1] Exposures for partial phases are also good for annular eclipses.
[2] Baily's Beads are extremely bright and change rapidly.
[3] This exposure also recommended for the *Diamond Ring* effect.

www.mreclipse.com/SEphoto/SEphoto.html ***©2008 Fred Espenak***

Photograph a Solar Eclipse - Continued from page 4

photographing various features and phenomena tabulated in the 'Subject' column at the far left. For example, to photograph prominences using ISO 400 at f/16, the table recommends an exposure of 1/1000. Alternatively, the recommended shutter speed can be calculated using the 'Q' factors tabulated along with the exposure formula at the bottom of the table. Keep in mind that these exposures are based on a clear sky and a corona of average brightness. The exposures should be bracketed one or more stops to take into account the actual sky conditions and the variable nature of these phenomena.

It should be pointed out that the exposure table on page 4 is only a guideline for planning purposes. The brightness of the corona may vary from one eclipse to the next based on the relative point in the sunspot cycle as well as the current activity on the Sun during the eclipse. Because of the high dynamic range in the brightness encompassed by the corona, there is no one single exposure that is "correct." The best strategy is to bracket widely during totality to shoot a large range of exposures. I typically shoot at ISO 200, f/9 and will use shutter speeds ranging from 1/1000 down to 1 or more seconds.

Bio

Fred Espenak is a retired NASA astrophysicist, author, photographer and eclipse expert who has been invited to speak on eclipses in venues around the world. Targeted at a general public audience, Fred's talks capture his passion and excitement about eclipses and astronomy.

If you wish to follow Fred Espenak his website is at MrEclipse.com

Fire Rules

Fire safety is our #1 concern and everyone must adhere to the following:

- No campfires!!!
- Only propane or white gas camp stoves and propane BBQ's are allowed. All stoves must be set upon a sturdy table or tailgate. No open fires or charcoal briquettes are not allowed! We ask attendees to report any open fires to any OSP Staff Member.
- Due to the high fire danger this year, smoking (including E-cigarettes) is permitted only in an enclosed vehicle/trailer and on the gravel roads (FS 800 Rd and FS 802 Rd).
- Marijuana - Oregon Star Party takes place on federal forest land therefore marijuana is against the law as a misdemeanor offense.
- Forest Service Regulations require that you bring a shovel, an ax, and an extra five gallons of water dedicated for fire suppression.

Vendors and Door Prize Participants

Astronomical Society of the Pacific
www.astrosociety.org

Astronomy Magazine Kalmbach Publishing, Inc. www.astronomy.com

Aurora Precision www.aurorap.com

Binocliners, Bryan Reich

Celestron, www.celestron.com

Cosmic Fiber Arts, Madeleine Shultice

David Chandler Company, Inc.
www.davidchandler.com

Equatorial Platforms
www.equatorialplatforms.com

Explore Scientific, LLC
www.explorescientificusa.com

Five Star Optical Supply
www.quartzmirrorblanks.com

Hubble Optics, www.hubble-optics.com

Hulan Fleming Studios
www.hulanfleming.com

Knightware.biz, www.knightware.biz

Optical Structures, Inc.
www.opticalstructures.com

Oregon Star Party Committee
www.oregonstarparty.org

Oregon Wild.org, www.oregonwild.org

Orion Telescopes & Binoculars
www.telescope.com

Sky and Telescope Magazine
www.skyandtelescope.com

Solarwinds Studio Jewelry
www.solarwindstudios.net

Spectrum Telescope
www.spectrumtelescope.com

Sun River Nature Center and Observatory
www.oregonobservatory.org

Tele Vue, www.televue.com

Wa—chur-ed, www.wa-chur-ed.com

Willman-Bell, Inc., www.willbell.com

Zing Wings, Barry Lawrence

Things to Remember When Entering and Parking at Oregon Star Party!

We will be making a few changes for 2017 (our 30th year) so please use these suggestions to help you get started.

We will have no on-site registration. So if you're planning to come (not being registered) and expecting to get in? Think again. You will be asked to go somewhere else. Also, if you are registered and bring other people who are not registered, the non-registered people will not be granted into star party. Due to a lack of parking visitations will not be allowed this year.

When attendees arrive at the entry gate they will be checked against our registration list for entry into the star party. Camping maps will be available to direct participants on where to camp. Participants will be instructed to follow the instructions of the parking attendant for each area.

First find a spot to camp, following the usual rules. RVs and rigs with camping trailers are allowed to camp on the graveled roadway of the 800 and 802 roads. Tents, truck campers, van conversions (under 20') and tent trailers may camp on the 802 road spurs (Dirt). All rigs and vehicles may camp no more than 100 ft. from the center of the road. Those camping in tents may camp in the trees. Tree campers are allowed to drive into the trees and park their car for the duration of their stay and then drive out when the star party ends (Once in, Once Out).

This year we are encouraging double parking (even if you are separate groups). Just make sure all vehicles and RVs are within 100 ft. of the center of the road way.

Due to the increased attendance space is extremely limited. The parking staff will determine the amount of space for each site. In others words get close together. **Saving space between camping areas is not allowed during the star party.** Please keep your campsite footprint as small as possible.

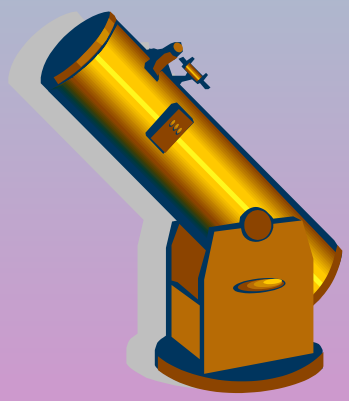
NO CAMPING IN FLAGGED AREAS.

After you've gotten established please go to the Registration Tent (open from 2 to 6 PM Thursday thru Sunday) and pick up your pre-registration packet.

Committee members will be spot checking vehicles to ensure that all attendees have registered. Please be sure to have your parking permit (printed on hot pink paper) displayed on your car's dashboard.

Wristbands

The star party will also be handing out rubber wristbands as a means to identify people who have registered for the star party. Make sure to keep the wristband on your person at all times. It is your ticket.



Bernie's Telescope Park

Youth Mentoring

9:30 PM Fri., Sat., and Sun.

Youth and Adult Mentoring

10:30 PM Fri., Sat., and Sun.

Telescope Park Open to All

11:30 PM Fri., Sat., Sun. and Mon.

Slot sign up is available at the start of the star party in the Information Tent.

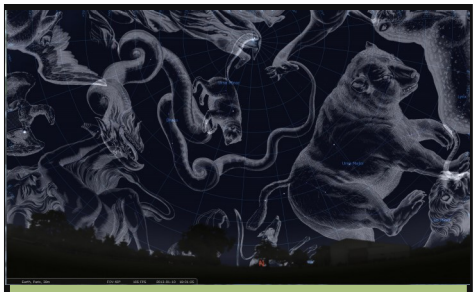
Kids will be paired up with and guided by a knowledgeable adult at each telescope.

Saros

The saros is a period of approximately 223 synodic months (approximately 6585.3211 days, or 18 years, 11 days, 8 hours), that can be used to predict eclipses of the Sun and Moon. One saros period after an eclipse, the Sun, Earth, and Moon return to approximately the same relative geometry, a near straight line, and a nearly identical eclipse will occur, in what is referred to as an eclipse cycle. Wikipedia - https://en.wikipedia.org/wiki/Saros_(astronomy)

1919 Observations

The observation of a total solar eclipse of May 29, 1919, helped to confirm Einstein's theory of general relativity. By comparing the apparent distance between stars in the constellation Taurus, with and without the Sun between them, Arthur Eddington stated that the theoretical predictions about gravitational lenses were confirmed.[72] The observation with the Sun between the stars was only possible during totality since the stars are then visible. Though Eddington's observations were near the experimental limits of accuracy at the time, work in the later half of the 20th century confirmed his results. Wikipedia - https://en.wikipedia.org/wiki/Tests_of_general_relativity#Deflection_of_light_by_the_Sun



Night Sky Tour

with Dave Powell

802 Road Loop

9:00 PM

Thurs., Fri., Sat., and Sun.,

We Need Volunteers

Oregon Star Party 2017 will be the 30th year of this fun week of great night skies, good company, and lots of activities. The planning committee has been hard at work, the speakers are lined up, new observing lists have been created, and more.

Quite simply, Oregon Star Party is in search of volunteers. Each year, nearly 100 volunteers make the star party happen by welcoming attendees in the Registration Tent, taking tickets at the Shower Tent, answering questions in the Info Tent, acting as youth or adult mentors, setting up and tearing down star party areas, and a host of other tasks. For a more thorough description of how you might be able to help (Check out the Volunteer Page).

Will you be joining us this year at Oregon Star Party? Are you interested in volunteering? Head over to the Volunteer page on the OSP website, browse the volunteer positions, and then signup. For every 2 hour shift worked, volunteers receive one Caldwell Buck. Want to know more? Visit the website!

If you have questions please feel free to contact the volunteer coordinator on the website or if your on site visit the Information Tent.

Thank you in advance for volunteering at Oregon Star Party. We look forward to seeing you there!

OSP Observing Lists

Are you looking to learn the night sky, new objects to observe, improve your observing skills, and/or get a thrill of finding a new object. Welcome to OSP Observing Lists!

Level 0 - Binoculars (Webpage) (List)

Although a telescope provides brighter and higher magnification views of deep-sky objects, binoculars offer several advantages. They provide a much wider field of view, which greatly enhances the views of many objects and can make locating objects easier. They are also much more portable and require much less set-up, if any at all. Even for those of us adept at using a telescope, binocular observing can be a lot of fun.

Level 1 - Beginner List (Webpage) (List)

The best way to enjoy the unique beauty of the dark skies at Oregon Star Party is to view bright deep sky objects, colorful double stars, and planets through a telescope. The objects listed are easily visible in telescopes of any size – perfect for those who are just getting started.

Level 2 - Intermediate List (Webpage) (List)

A list that will challenge you to further develop your skills in finding and detecting the object(s) in question. Most objects should be visible with an 8" scope. Go-to and image enhancers (photography) are permitted at OSP for the OSP award.

Level 3 - Advanced List (Webpage) (List) (Support Material)

A challenge that maybe 3 to 5 people complete. Please note that part of the challenge is researching each object to determine its location and difficulty. Some objects are exceptionally challenging, some not so much, but all require observing experience and advance preparation to enjoy.

Level 4—Astro Photography List (Webpage) (List)

Astrophotography is a specialized type of photography that entails recording images of astronomical objects and large areas of the night sky. The easiest way to capture the night sky is to use an ordinary DSLR camera with interchangeable lenses. Such equipment affords a wide field of view, making easy work of imaging constellations, meteors, the Milky Way, and much more. The list is a wonderful introduction to wide-field astrophotography.

Level 0 Pin

Level 1 Pin

Level 2 Pin

Level 3 Pin

Level 4 Pin

Contact Us

Website

Contact Us

Facebook

Cloudy Nights

Visit us on the web at www.oregonstarparty.org

Indian Trail Spring Location Data

Latitude 44^0 17' 55" N (44.2988^0 N)

Longitude 120^0 8' 30" N (120.1417^0 W)

Elevation 5020'
(1530m) at the Information Tent

GMT –7 hours
(Adjusted for DST in effect)

Approx. Magnetic Declination
14.68 Degrees

Oregon Star Party 2018

August 7 - August 12 2018