



# Observing Eclipses -- Safely!



The first thing to remember about observing an eclipse is safety.



The Sun can be viewed safely with the naked eye only during the few brief seconds or minutes of a total solar eclipse. Partial eclipses, annular eclipses, and the partial phases of total eclipses are never safe to watch without taking special precautions. Even when 99% of the Sun's surface is obscured during the partial phases of a total eclipse, the remaining photospheric crescent is intensely bright and cannot be viewed safely without eye protection. Do not attempt to observe the partial or annular phases of any eclipse with the naked eye. Failure to use appropriate filtration may result in permanent eye damage or blindness!



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It is **never** safe to look directly at the Sun except during a total eclipse; a partial eclipse, even when the Sun is mostly covered, can still cause permanent eye damage, even though you might not feel any discomfort. Looking at the Sun through any kind of optical aid (binoculars, a telescope, or even a camera's viewfinder) is **extremely** dangerous, and can cause permanent blindness.

Sunglasses do not provide adequate protection, as they do not block the wavelengths of light which are likely to damage your eyes, or reduce the intensity of the visible light sufficiently. Various other ad-hoc solar filters, such as welder's goggles or using fully exposed and developed black-and-white negatives, are sometimes discussed, but unless you know **exactly** what you are doing, can be extremely dangerous, and so can't be recommended.

Properly designed solar filters, made and certified to appropriate national safety standards, can be used. A commonly available type uses aluminized mylar, in a dual sandwich with the aluminium on the inside. (This means that you're actually looking through a double layer of metal.) Always check before using them that they are not damaged in any way.

I've heard some daft ideas for eclipse viewing, such as looking through a sheet of Perspex, or in a reflection in a bucket of water. I have no idea where these come from, but these are **not** safe! If you can see the Sun clearly and brightly, whether directly, in a reflection, or via Perspex, then it's dangerous.

Finally, the Sun during totality is a beautiful and spectacular sight; but don't be caught out by the end of the total period! Find out how long the total eclipse is going to be where **you** are, bearing in mind that a difference of a few miles can make a huge difference, and be prepared to look away at the first signs of the

returning Sun.

Read Fred Espenak's guide to Eye Safety During Solar Eclipses.

**NEVER attempt to look at the Sun through a telescope, camera, binoculars, or anything else!**

## **Safe Methods for Solar Viewing**

The recommended safe methods for viewing the Sun have one thing in common: they involve projecting the Sun's light onto some surface, so that the Sun is viewed *indirectly*. Be careful when setting these types of experiment up; the temptation to look through the setup to get it lined up must be resisted!

The simplest method is a pinhole camera. Make a small hole in a sheet of card, and hold it about a metre from another sheet of card; the Sun's light will be "projected" through the pinhole and form an inverted image on the second sheet of card, which you can then look at safely. Don't look through the pinhole! You can adjust the size of the image by adjusting the separation of the cards.

Similarly, you can project an image of the Sun using a telescope, or one side of a pair of binoculars. Place a sheet of cardboard around the objective of the telescope or binoculars, to act as a shade for a second sheet positioned behind the eyepiece, about a foot away. The whole thing should be adjusted by trial and error; you can adjust the focus by means of the focusing knob, and by moving the screen. Again, do **not** look through the binoculars/telescope!

## **Eclipse Viewing Links**

Fred Espenak has a number of valuable pages on Solar Eclipse Observing and Photography, including:

Eye Safety During Solar Eclipses

First and foremost: an essential guide to safety while viewing an eclipse.

Videotaping Solar Eclipses

Slightly dated (1991! :-)) but superb and detailed guide for camcorder users.

The Wendy Carlos Total Solar Eclipse Page

Very nice eclipse page by Wendy Carlos. Lots of fascinating eclipse photographs.

Solar Eclipse Photography

Still photography guide, complete with an exposure table.

## Eclipse Viewing Products

Please note that I haven't tried any of these products, and can't vouch for the safety or suitability of any of them. These links are provided for information only; please ensure that any device you use for viewing the Sun has appropriate safety certifications. Buyer beware!

### Light Line Solar Projector

"Image projection is highly recommended by leading astronomers as the only intrinsically safe way of observing the sun.

Unlike ordinary telescopes, which can also project the Sun's image, the Light Line Solar Projector has no eye piece - making it impossible for the uninformed to injure themselves by looking through the telescope towards the Sun."

### Solasafe

"We produce and market British-made hand-held solar eclipse viewers which have recently received their European CE Certificate from BSI. We also have a special offer for schools and colleges where they can obtain supplies of our viewers at cost price."

### eclipse99.co.uk

"We are a company from Devon supplying train travel, solar viewing specs and accommodation in Cornwall for the 1999 eclipse."

### wiggle

"wiggle is full of great deals and cool stuff" -- including CE approved eclipse viewers



### Eclipse99 Limited

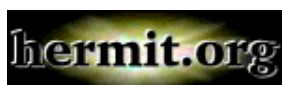
"Eclipse99 Limited is committed to supplying the means for viewing and photography of solar eclipses. These pages provide information about the eclipse, and how to view it safely."

### M4 International

"A European producer of all styles of Eclipse viewers."


### Rainbow Symphony, Inc.

"Rainbow Symphony, Inc., a recognized leader in the production of quality paper eye wear and specialty optical products, with a line of solar viewing devices."



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