

12.409 Hands-On Astronomy, Spring 2002

Handout 12 / week of 2002 April 29

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Created S. Slivan
Revised A. Rivkin and J. Thomas-Osip

Solar Observing

1. This is the only inherently hazardous form of observing: be careful! (The Sun is mag. - 27)
2. In this class, we use full-aperture solar filters made of aluminized Mylar or glass, specifically designed for safe telescopic observation of the Sun.
 - a) Never look at Sun in an unfiltered telescope, finder scope, or binoculars, and don't trust a filter made of unknown material.
 - b) "Retina knows no pain"—Though intense visual light can cause discomfort and thus trigger the "look away" reflex, the IR and UV radiation causes damage without the observer knowing it because there are no pain receptors on the retina!
 - c) There must not be pinholes or breaks in the filter or its coating. You shouldn't be able to see anything (except the solar disk) through the filter. Hold the filter up to the sky and make sure there are no leaks—if any sky shows through the filter is unsafe, don't observe until you replace it!
 - d) **UNDER NO CIRCUMSTANCES SHOULD A FILTER BE USED AT THE EYEPIECE END OF BINOCULARS OR A TELESCOPE IN PLACE OF A FULL-APERTURE SOLAR FILTER!** Eyepiece "solar filters" are very dangerous due to the concentrated heat of the Sun near the focal plane. Unfortunately, such filters are commonly found, on low-quality department-store "Christmas Trash Scope" telescopes. If you stumble across one of these solar filters, do whoever owns it a favor: shatter it with a hammer and then throw it away.
3. The filter must be *secure* on the telescope, because if it comes off eye damage occurs in only $\frac{1}{1000}$ sec. Consider wind conditions as well as accidental bumping. If the security of the filter on the telescope is at all in question for any reason, tape the filter on with duct tape.
4. Keep the finder scope covered, or remove it completely, to avoid melting the crosshairs! Besides, children or unknowing adults might accidentally look through it.
5. Similarly, make sure you don't let unfiltered Sun melt things that mount on the rear cell (e.g. don't point the telescope at the sun until you've secured a reliable solar filter on the main aperture:
 - dust cap
 - CCD (burns right through the shutter and melts the detector chip)
 - eyepieces (melts the cement that holds the component lenses together)