Calibrating and errors on a telescope:

Remember disclaimer to say we have not calibrated our pictures:

(Tom’s pictures and graphs that take into account earth’s atmosphere, as it will effect absorption bands)

(Tom’s curves needs to be added as well)

Need to calibrate the filters of the telescope against something with a known spectrum. We couldn’t have done this as the filters of the telescope does not work. This is the reason why we are supposed to find spectra on line, but we have not found any. Need to calibrate it to take into account that the filters won’t let thru the exact same amount of intensity as each other and ultimately give us reflectivity. Won’t need to calculate total intensity hitting the moon (Tom’s formula).

Mention Tony’s pictures where dust on the lens can clearly be seen.

Dark frames not relevant as they are a problem in long exposure

<http://www.skyandtelescope.com/astronomy-resources/astrophotography-tips/the-abcs-of-ccd-imaging/>

haze, blocked by clouds, or affected by condensation on the optical elements

abortion in the atmosphere

#### Cosmic Rays(not really a problem as it is easy tell)

#### Night flat field images can be used to calibrate the scope, point to a dark space in sky, dome flat field, sky flat fild, twilight flat field.

#### Flat-field images should also be applied to your raw files to remove dust shadows and vignetting (uneven field illumination). Flat-field images are pictures of a blank, evenly illuminated target. - See more at: <http://www.skyandtelescope.com/astronomy-resources/astrophotography-tips/the-abcs-of-ccd-imaging/#sthash.See5LBcG.dpuf>

#### Flat-field frames are exposures made with your telescope pointed at a blank, evenly illuminated target. They should have an exposure duration that produces pixels with an average brightness value of one-third to one-half of the camera’s specified saturation level (this value is easily read by software). - See more at: http://www.skyandtelescope.com/astronomy-resources/astrophotography-tips/the-abcs-of-ccd-imaging/#sthash.See5LBcG.dpuf

Hot pixels appear as bright specksin an image. Every sensor has them, and they become especially problematic during image stacking. Some image-processing software can use a sensor’s defect map to eliminate bad pixels by filling them with an average value from the surrounding pixels. In this case, the result is better than a dark-frame calibration, as darks merely subtract the hot pixels, leaving a black pixel. - See more at: http://www.skyandtelescope.com/astronomy-resources/astrophotography-tips/the-abcs-of-ccd-imaging/#sthash.See5LBcG.dpuf

**Light pollution**

**Infrared telescopes**

Infrared telescopes look for infrared radiation, which human beings perceive as heat. These telescopes must be shielded from all other sources of heat in order to make accurate observations. Because the telescopes themselves emit heat, they are packed with coolants that keep their equipment as chilly as possible.

**Radio telescopes**

Radio telescopes look for radio waves. They can be used during the day, because the Sun emits radio waves only weakly.

However, radio telescopes encounter light pollution in the form of radio signals from electronics, motors, and transmitters. Signals from cell phones, garage door openers, wireless computer networks, and orbiting satellites can overwhelm the radio signals from space that astronomers are trying to detect.

Communities located near radio telescopes can help reduce radio light pollution by limiting the use of these devices near the telescopes.

**Light pollution affects  
many kinds of telescopes**

Light pollution happens when electromagnetic radiation from man-made sources interferes with our view of objects in the sky. For example, you won’t see many stars if you look up at the night sky from inside a city. This is because the electrical lights around you drown out the light from dimmer stars.

**Optical telescopes**

We only use optical telescopes, which view visible light, during the night. During the day, the Sun’s dazzling light, scattered by the Earth’s atmosphere, overwhelms the light of the stars.

A similar problem occurs when we try to view the night sky near a city. The glare of city lights drowns out all but the brightest stars. The best optical telescopes are located far away from the light pollution of cities, often on mountaintops.

People can cut down on visible light pollution by turning off unnecessary outdoor lights and using inexpensive shields to direct light toward the ground, not the sky.

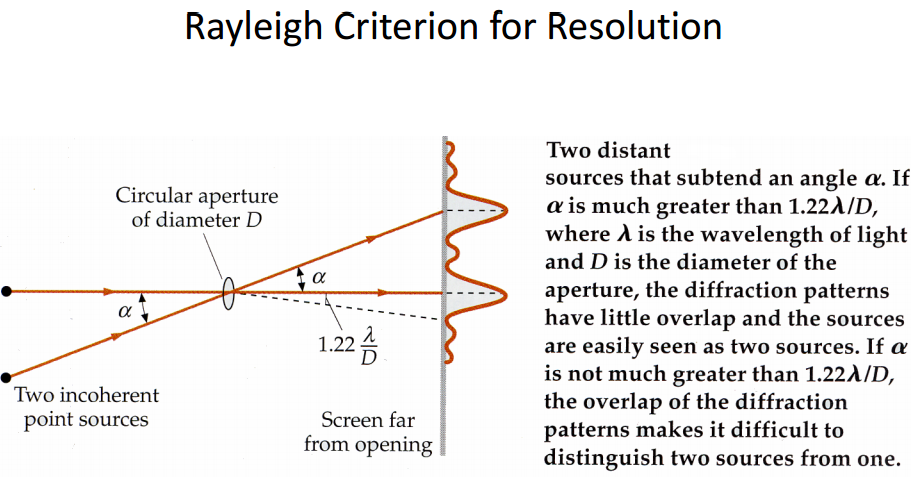
#### Dew on scope, Dust rings

We have dust rings clearly shown on scope

Image quality is affected by many factors some of which come from the environment. Seeing conditions, the Moon, light pollution, and clouds all affect the quality and accuracy of astronomical observations and images.

**Astronomical seeing** refers to the blurring and [twinkling](https://en.wikipedia.org/wiki/Scintillation_(astrophysics)) of astronomical objects such as stars caused by [turbulent mixing](https://en.wikipedia.org/wiki/Turbulence) in the Earth's atmosphere varying the optical [refractive index](https://en.wikipedia.org/wiki/Refractive_index). The *astronomical seeing* conditions on a given night at a given location describe how much the Earth's atmosphere perturbs the images of stars as seen through a telescope.

Optical resolution:



Vignette:

See if we can see examples of vignette in Tony’s pictures when putting them tougher like in example:

Example:





