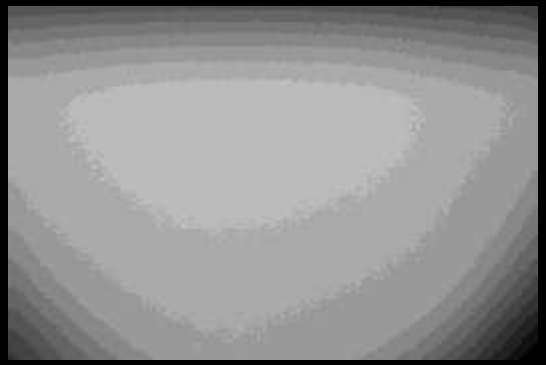
Basic Image Processing

Flat-Fields

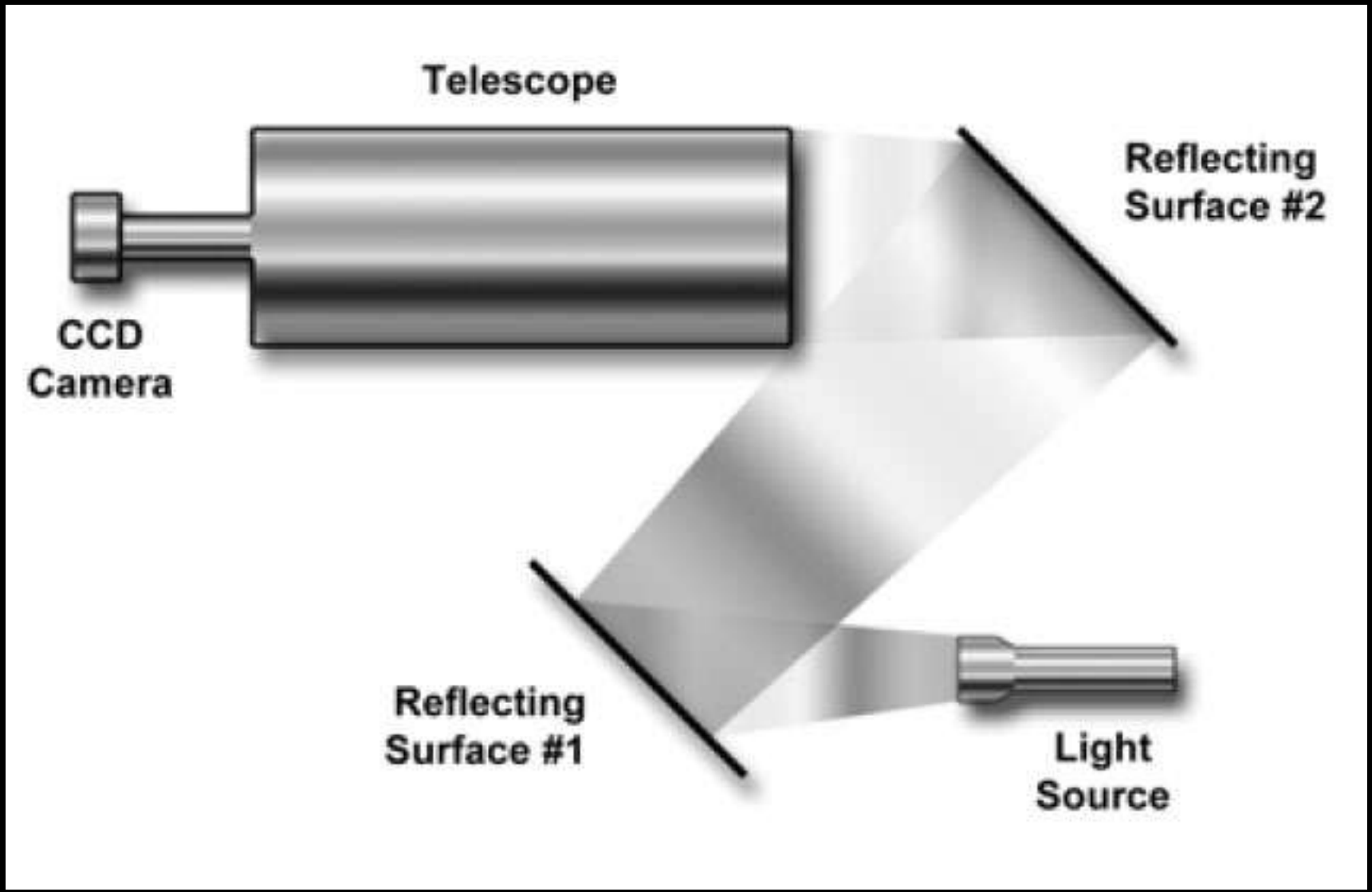


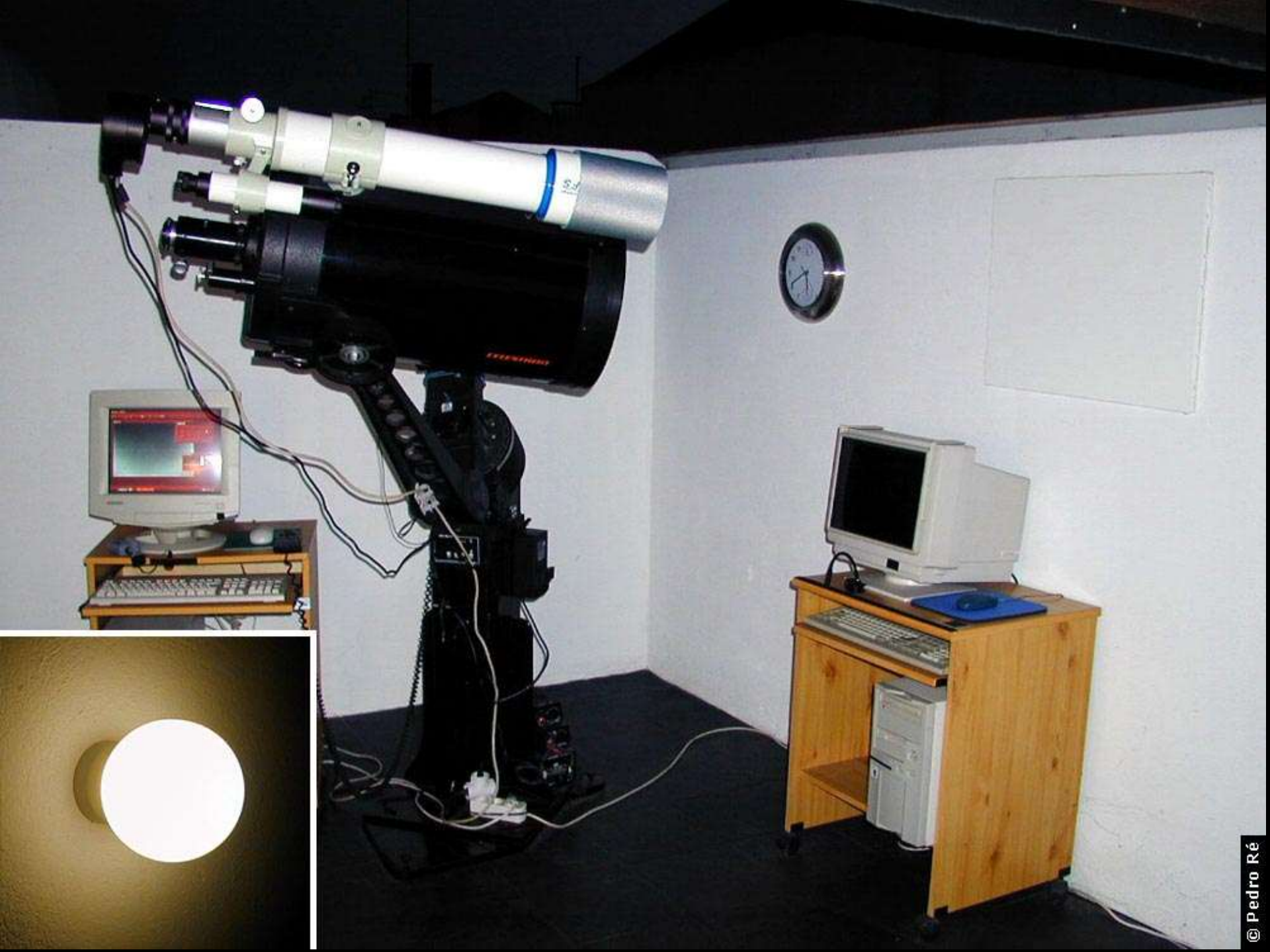
THE IDEA BEHIND A FLAT FIELD IS SIMPLE: without changing your focus position, take an image of an evenly illuminated surface so that you achieve approximately one-third to one-half the saturation level of the CCD chip.

Which type of FLAT?

- The TWO-SURFACE DIFFUSION FLAT, involves multiple reflections of a light source.
- The DOME FLAT, involves imaging the inside of an observatory or the wall of a nearby house/shed or other surfaces.
- The SKY FLAT or TWILIGHT FLAT, involves taking many images of the sky at twilight and averaging them.
- The T-SHIRT FLAT, involves putting a T-shirt or other white cloth over the front of your scope in daylight or twilight.
- The LIGHT BOX FLAT, involves a box with a light source and a diffuser, which is placed on the end of the telescope.

TWO-SURFACE DIFFUSION FLAT

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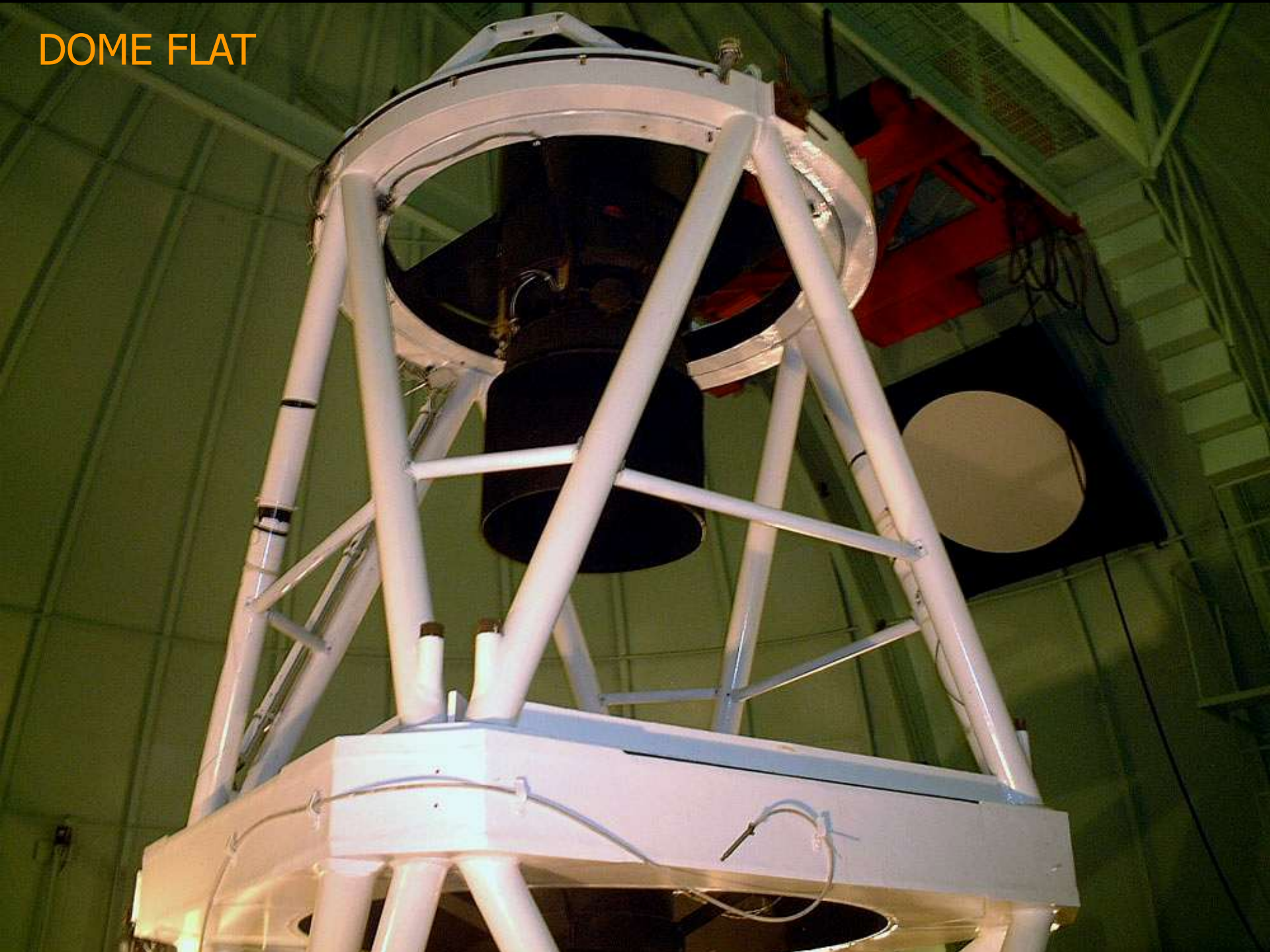
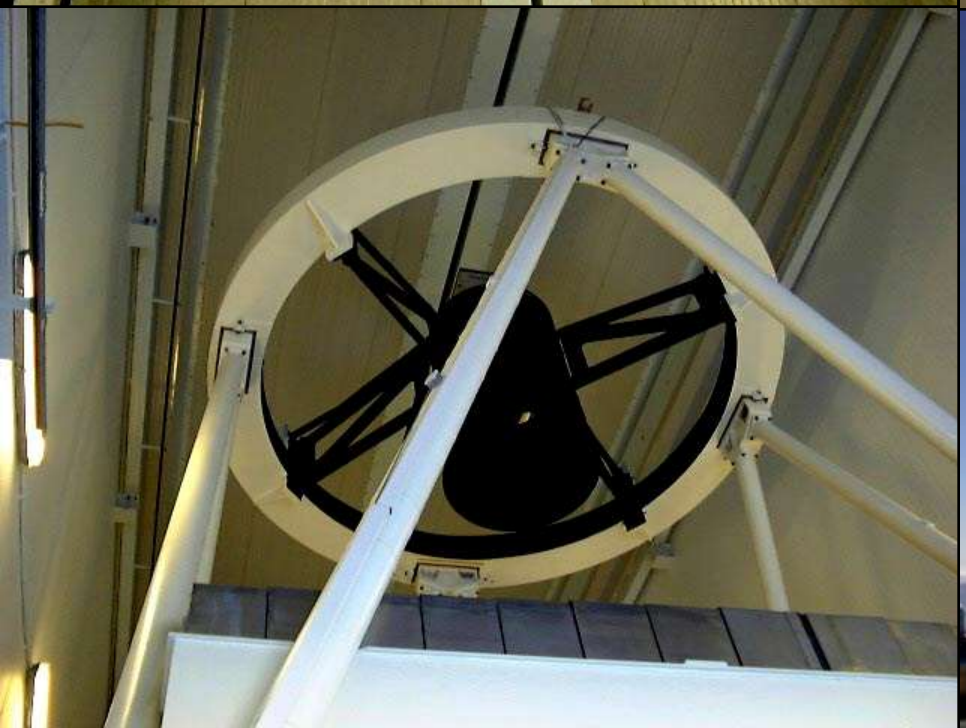
DOME FLAT



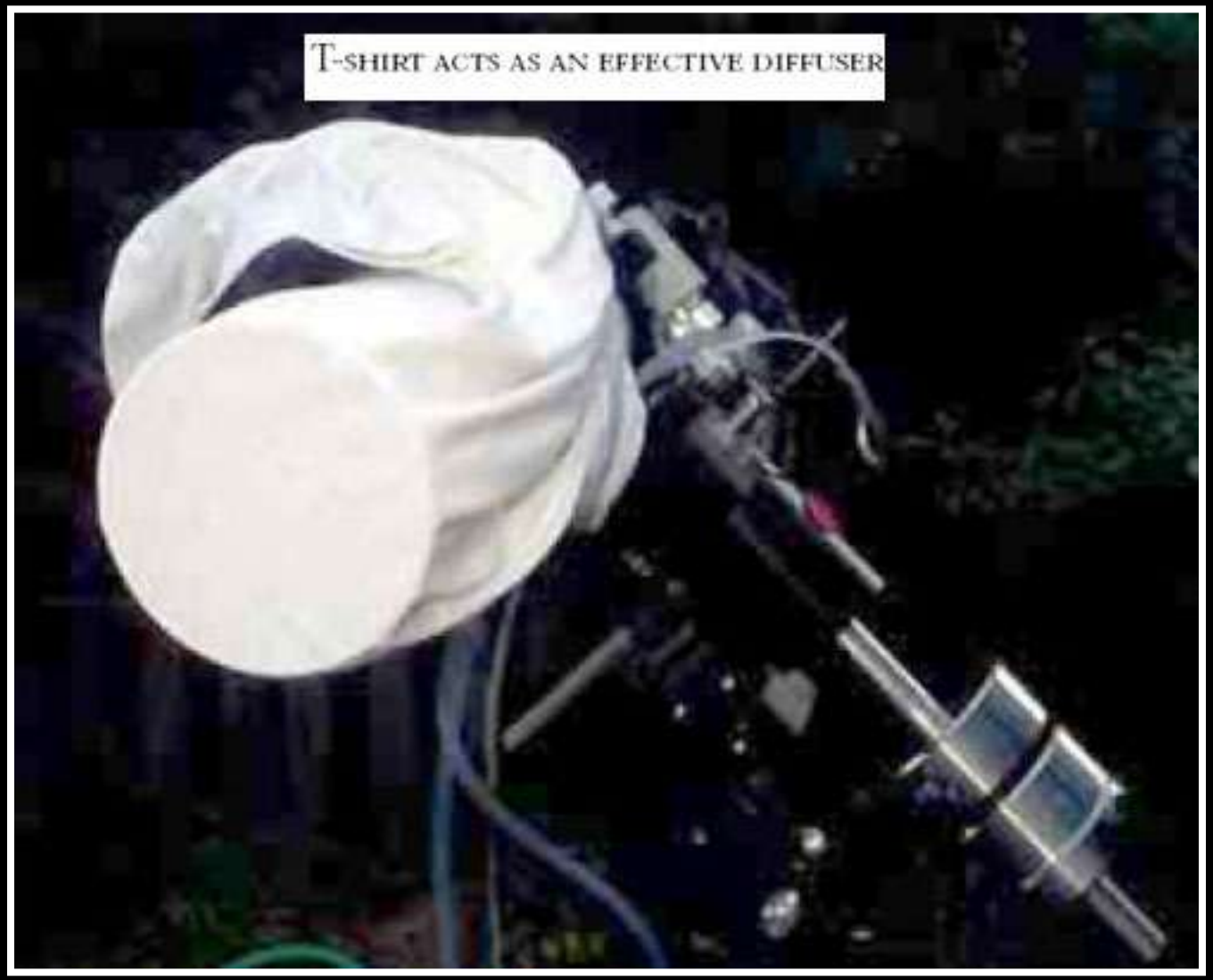
DOME FLAT






SKY FLAT

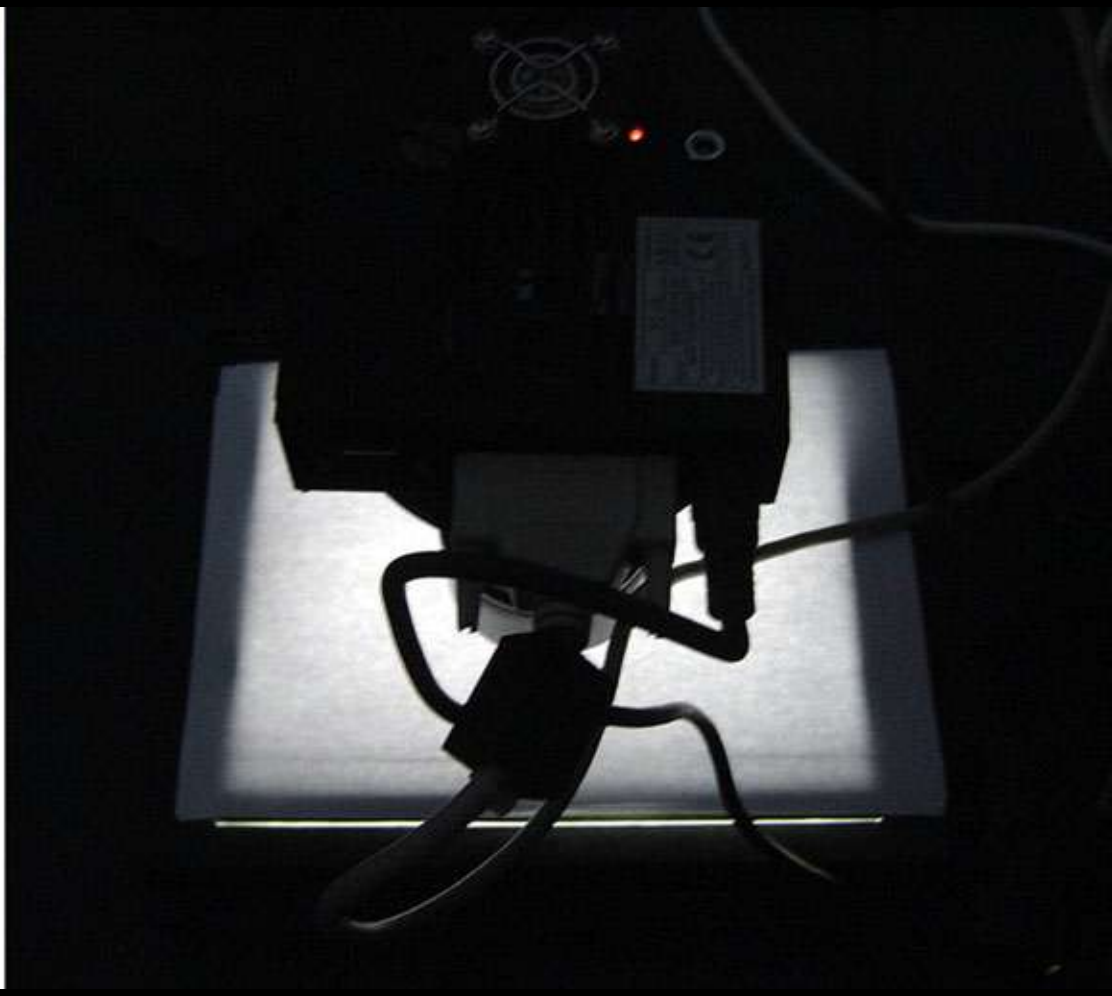
T-SHIRT FLAT



T-SHIRT FLAT

LIGHT BOX FLAT

LIGHT BOX FLAT



LIGHT BOX FLAT

LIGHT BOX FLAT

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ELECTRO-LUMINESCENT PANEL

ELECTRO-LUMINESCENT PANEL

ELECTRO-LUMINESCENT PANEL

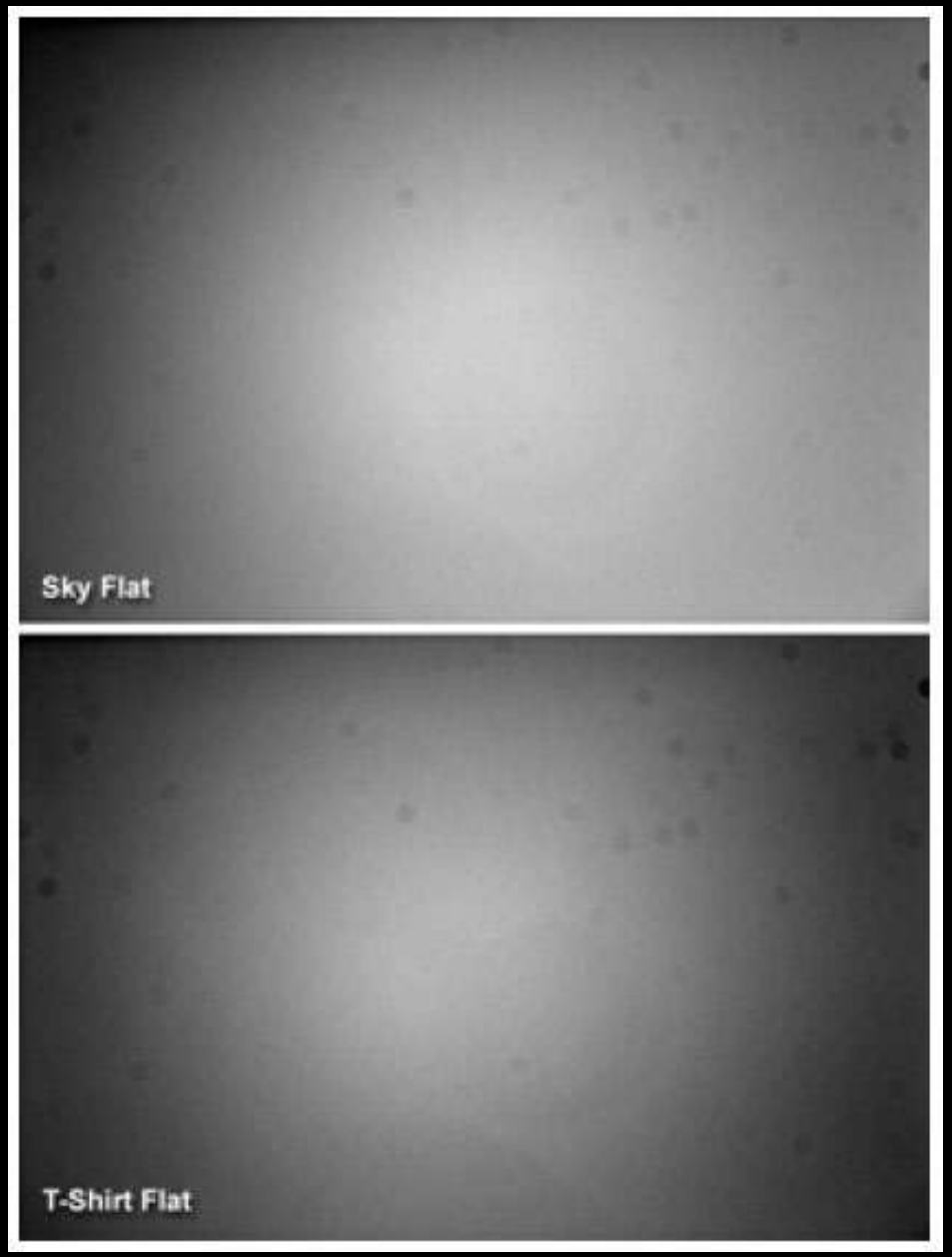
Gerd Neumann jr. Flat Field Foil


Gerd Neumann jr. Flat Field Foil

Gerd Neumann jr. Flat Field Foil

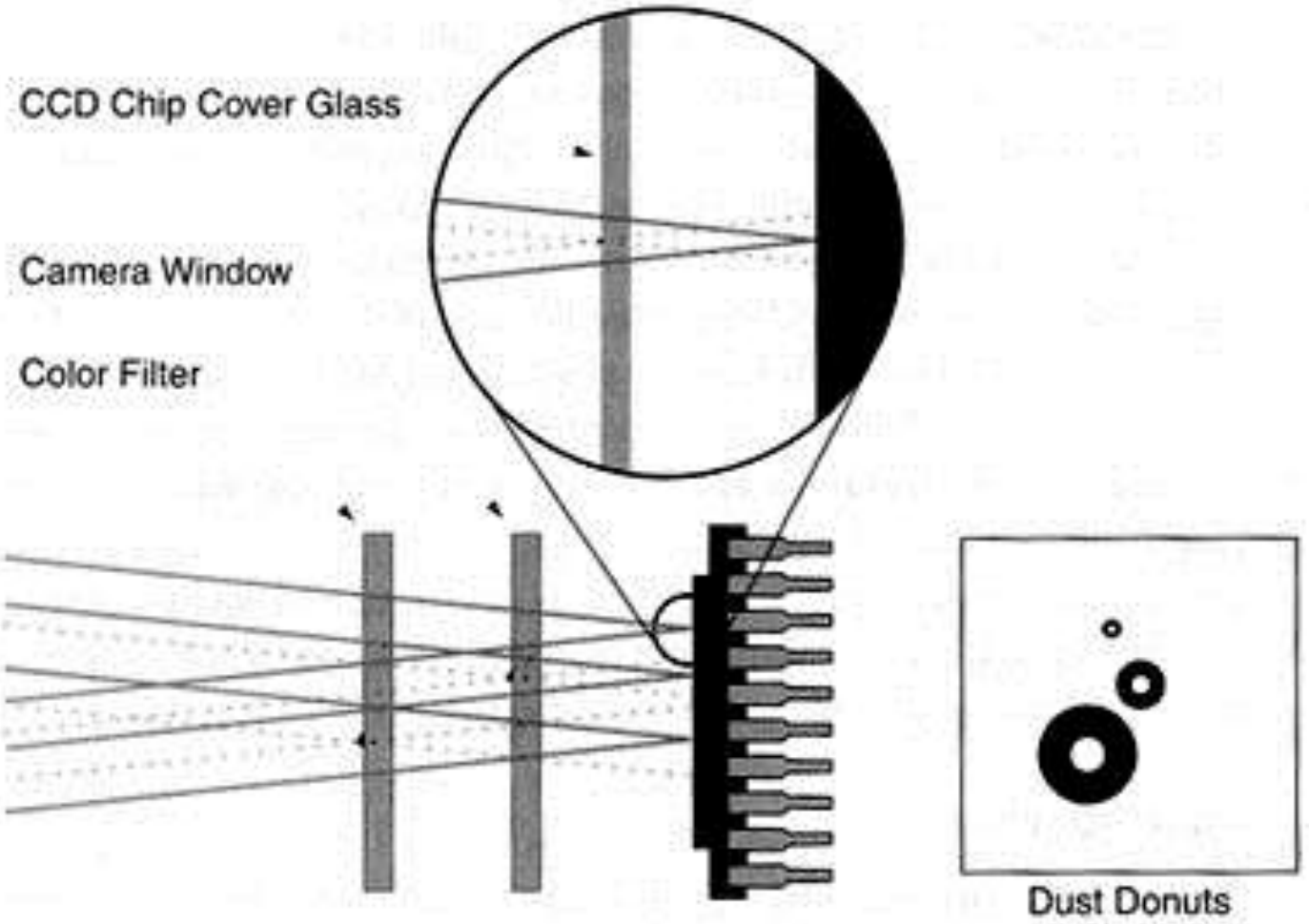
Flat Problems

- Uneven illumination
- Direct illumination of diffuser
  - Moonlight on diffuser
  - Sunlight on diffuser
  - Light from your white T-shirt reflecting on diffuser – etc.
- Off-axis light
  - Bright spots on diffuser
  - Back illumination (light entering at back of scope or through camera)
  - Internal reflections from ambient light sources

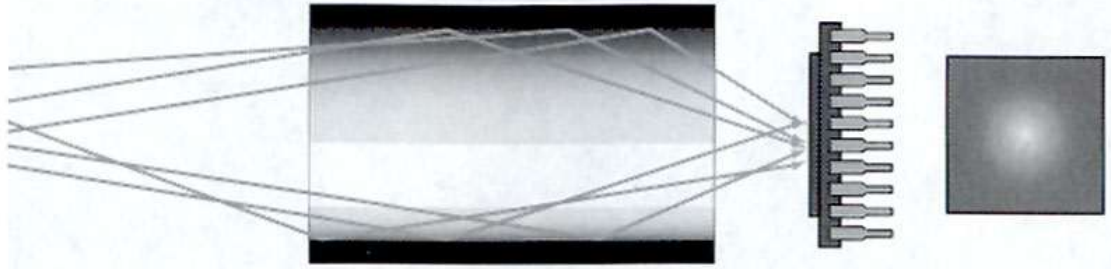


- Sky flats accurate
- Diffuser flats easy
- Sky flats through a diffuser give you best of both approaches

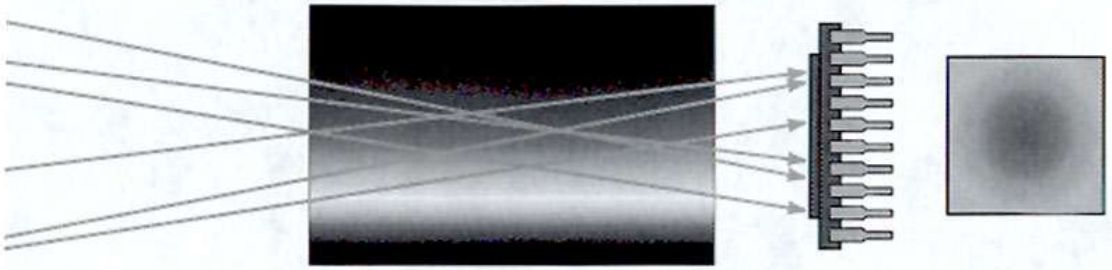
Donut size (pixels) * Pixel Size (microns) * Focal Ratio
= distance of Donut to CCD surface (microns)



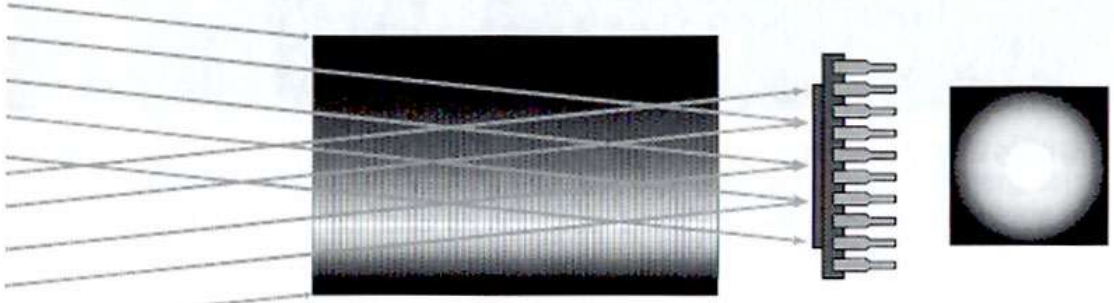
Dust donuts are shadows of dust, dirt, or dandruff on color filters, on the camera window, or on the CCD's cover glass. The closer the source of the shadow to the CCD, or the narrower the cone of light converging to focus, the smaller and darker dust shadows are.



Cylinder Reflection
(Hot Spots)



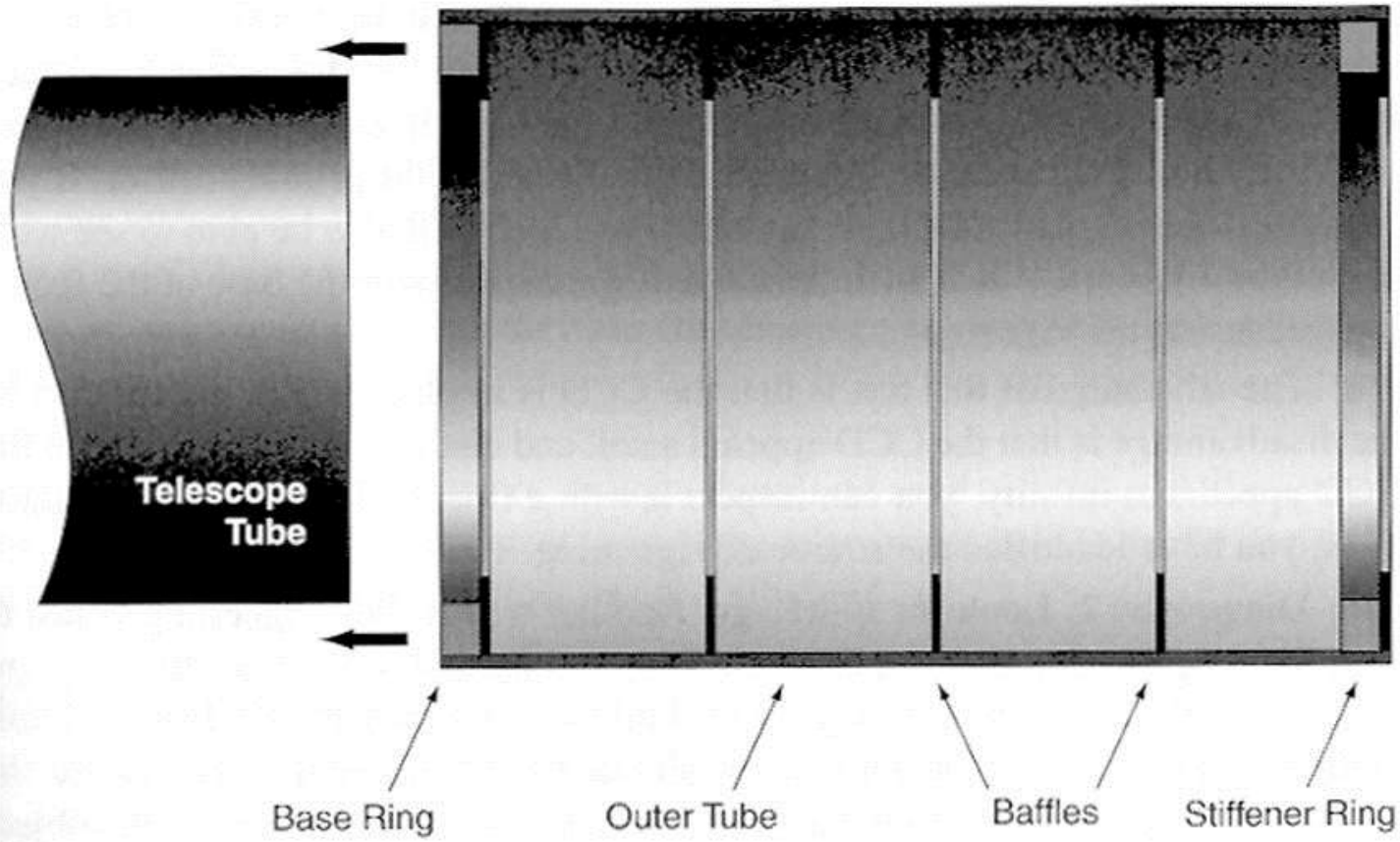
Field Flooding



Vignetting

Hot spots result from cylinder reflections in the camera body or focuser tube. Field flooding results from light sneaking past the optics, or bouncing off the diagonal and tube walls. Vignetting results when some element in the optical system is too small to pass light going to the edges of the frame.

High-Efficiency Telescope Light Baffle



Any telescope used for CCD imaging—Newtonian or SCT—will benefit from a lightweight "super-baffle" that slips over the end of the tube. Shown here for an 8-inch telescope with a 10-inch diameter tube, the outer tube of this baffle is 12 inches in diameter and 18 inches long, with five thin Kydex plastic baffles of 9-inch inside diameter. The base ring should make a tight fit with the tube of the telescope.

House Cleaning

C16
C24
C19
C18
C20
C21
R28
R24
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MAXIM
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0038
R50

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IOptic™

IOptic™ liquid can be used to clean Digital SLR Sensors, lenses, viewfinders, scanners, lcd screens and just about any other optical surface.

Your IOptic™ bottle is sealed and you will need to remove the white portion of the cap and snip off the very end with a sharp knife or scissors. Make sure that you snip as close to the end as possible in order to create a small hole at the end of the tube.

With ALL optics, it is advisable to use a blower/blowerbrush first to blow away and large or sharp particles.

For use on lenses, scanners and most other optics with a cloth, drop a few drops of the IOptic™ liquid onto the cloth and wipe the optical surface gently. Do not drop or pour IOptic liquid directly onto the surface you are cleaning.

Once you have wiped with IOptic™, use a dry part of the cloth to gently dry away and IOptic™ liquid that remains. You will now have a perfectly clean optic.

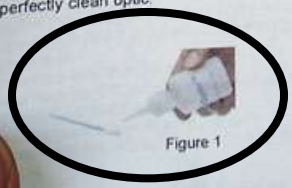


Figure 1

FOR SENSOR CLEANING with DSLRClean™

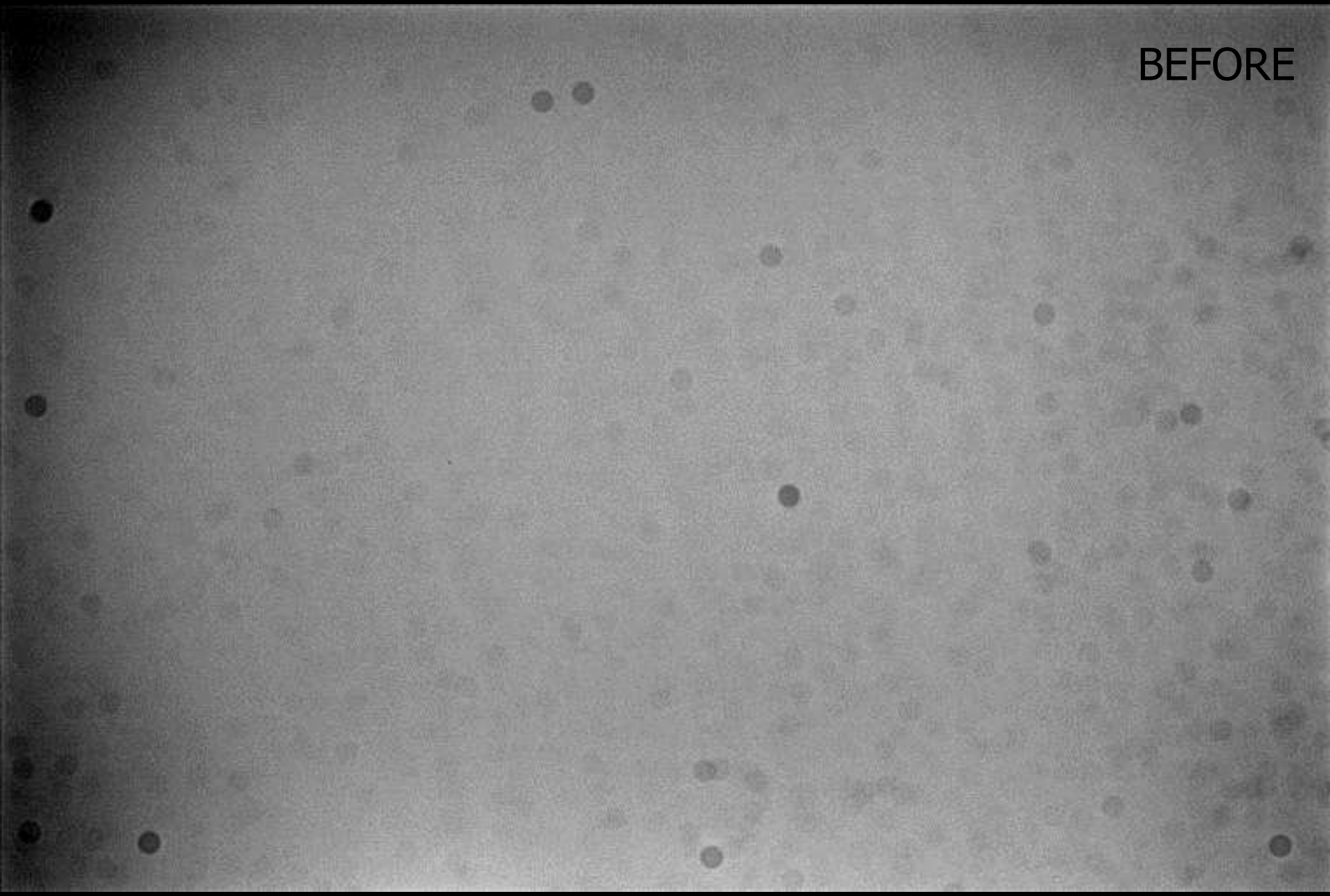
1. Set your digital camera to sensor clean mode (some times called mirror lock-up) to enable access to the sensor chamber.
2. Place a single drop of IOptic™ liquid on the tip of the DSLRCleanTM stick as in Figure 4.
3. Insert the DSLRClean™ stick so that the tip touches the sensor-glass surface.
4. Apply light pressure to the stick until the tip bends to a right angle and forms a shoe on the sensor-glass. (Figure 1)
5. Move the DSLRClean™ Stick around the sensor-glass as shown in Figure 2 for small sensor and Figure 3 for large sensors.
6. Remove the stick from the chamber.
7. Take a fresh dry DSLRClean™ stick and repeat steps 4, 5 and 6 to dry off any remaining liquid.
8. Reset the camera to normal operating mode and dispose of the used DSLRClean™ sticks as they are not reusable.

Small sensors

Figure 2

Large sensors

IMS Ltd
82-84 Queens Road
Clifton, Bristol
BS8 1QU
t. 0845 370 1771
f. 0845 370 1772


BEFORE

AFTER