ASTR130: Astro-Photography Lab

Orientation Session
Spring 2009

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I. Objectives

1.Explain Lab Requirements

2.Explain Available Equipment and Check-Out Procedures

3.Learn and Experiment with Cameras

4. Examples

II. Lab Requirements

1. Standard Lab Write-Up.
2. Data Table for **all** photos taken.
3. Photos to meet the following requirements*:
    1. *Fixed Camera Method.*
        1. Star Trail of 20 minutes or Longer.
        2. Short Exposure Night Scene with Astronomical Object.
        3. Short Exposure Constellation
    2. *Piggyback Method.*
    3. *Telescope Mounted Method.*
    4. *A creative piece of your own.*

***You must use the fish-eye for at least one of these photos!**

III. Equipment

- 4 DSLR Cameras with 50 mm (f/1.8) Lenses and wireless remotes and 2 gigabytes of media storage.
- 4+ Tripods
- 2 Piggyback Mounts
  - *Allows you to use the telescope to track an object.*
- 2 T-Adapters
  - *Allows you to use the telescope to collect more light and track an object.*
- 2 Fish-Eye Lenses (10 mm; f/2.8)
  - *Very wide field of view.*

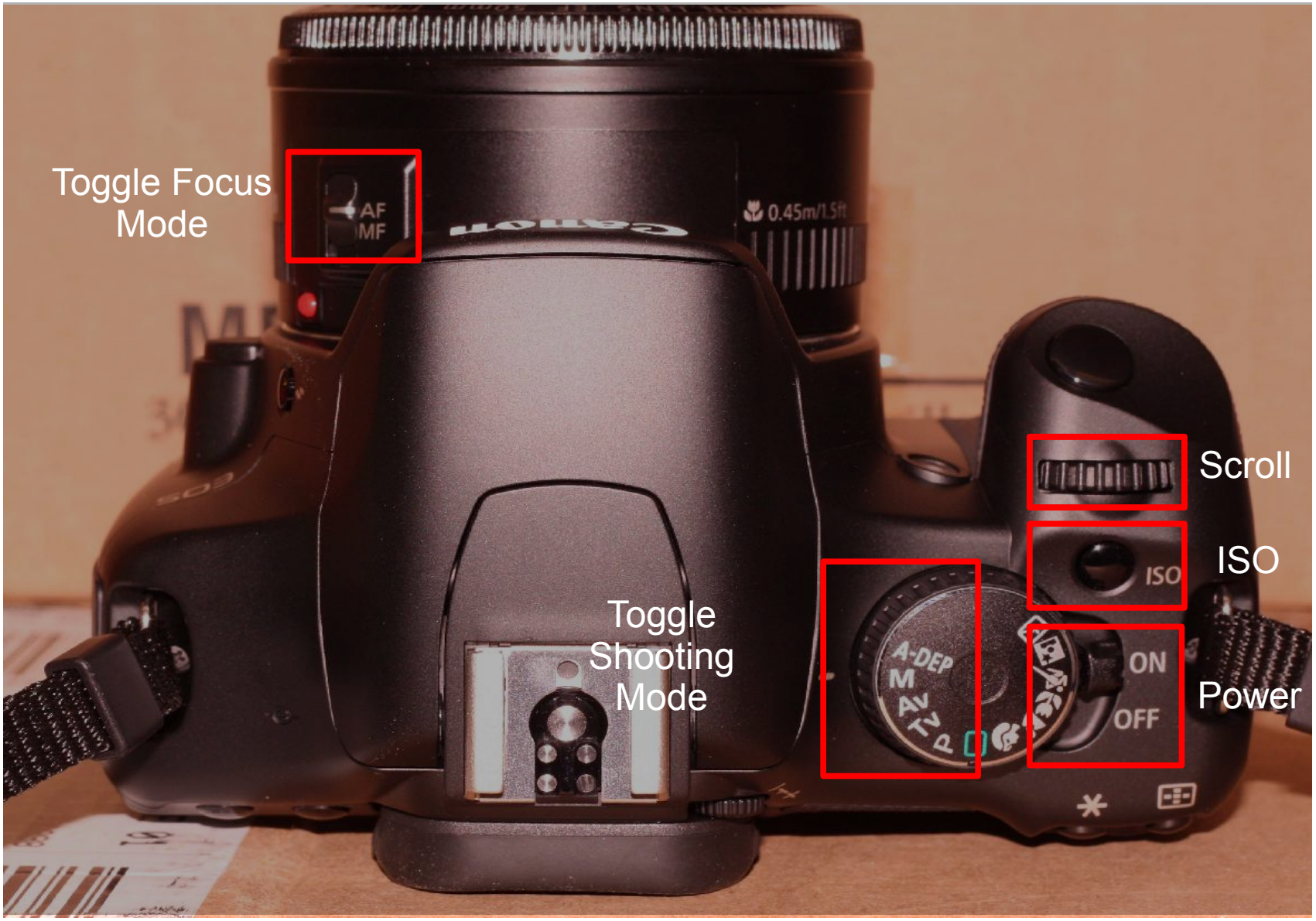
III. Equipment

- A Standard Camera Case will contain the following:
  - The DSLR Camera Body
  - 50 mm lens
  - Wireless remote
  - USB connecting cable
- All other equipment must be checked out independently!
- You will sign out this equipment just signing out the telescope.

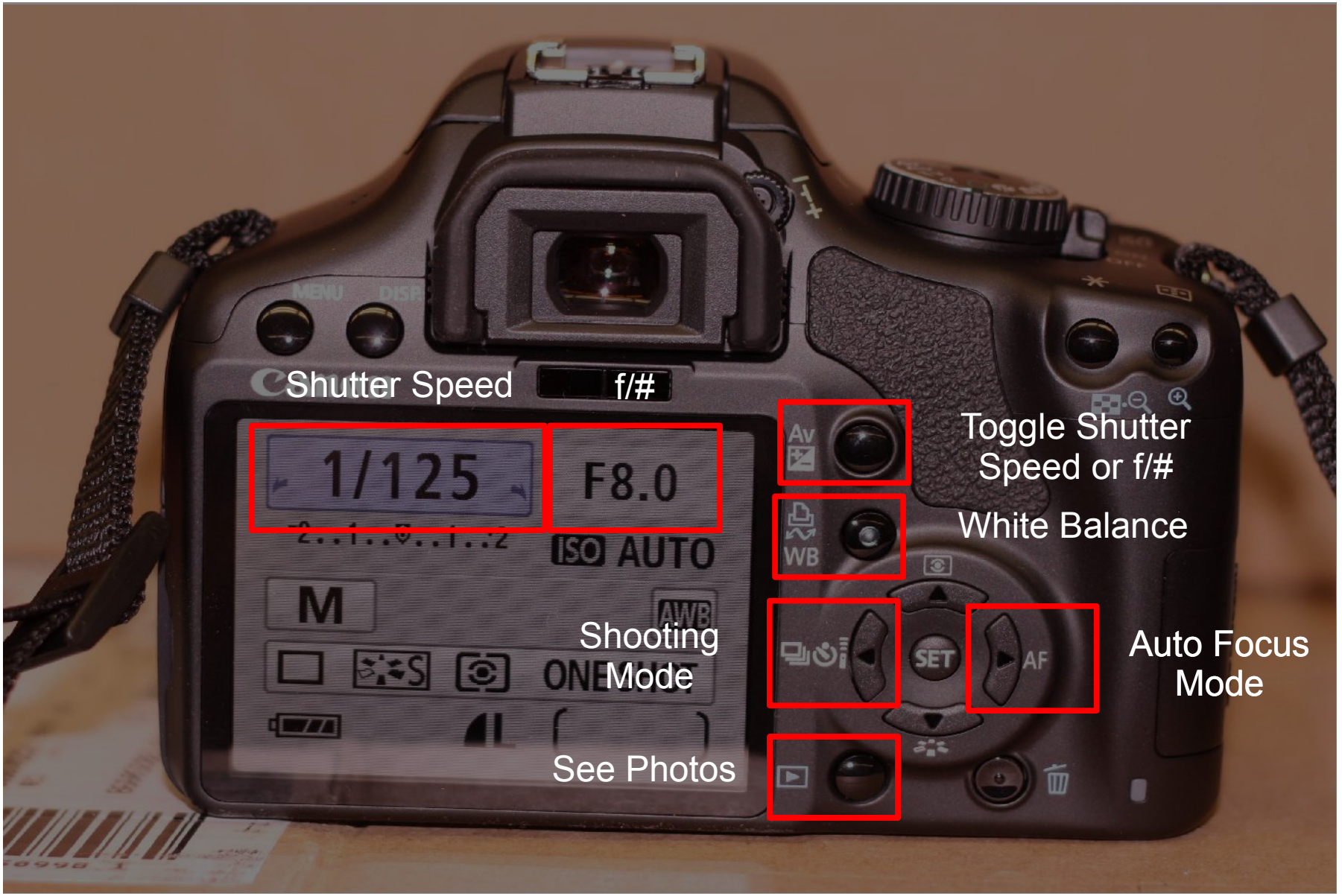
IV. Camera Use: Terms to Know

- ISO = Light Sensitivity
- Aperture = Opening of Camera
  - f/stops: Ratio of the diameter of the lens to the focal length.
    - Focal length is fixed, alter the diameter of the lens
- Exposure Time
  - Length of time the shutter is open
  - Displayed in seconds
- White Balance

IV. Camera Use

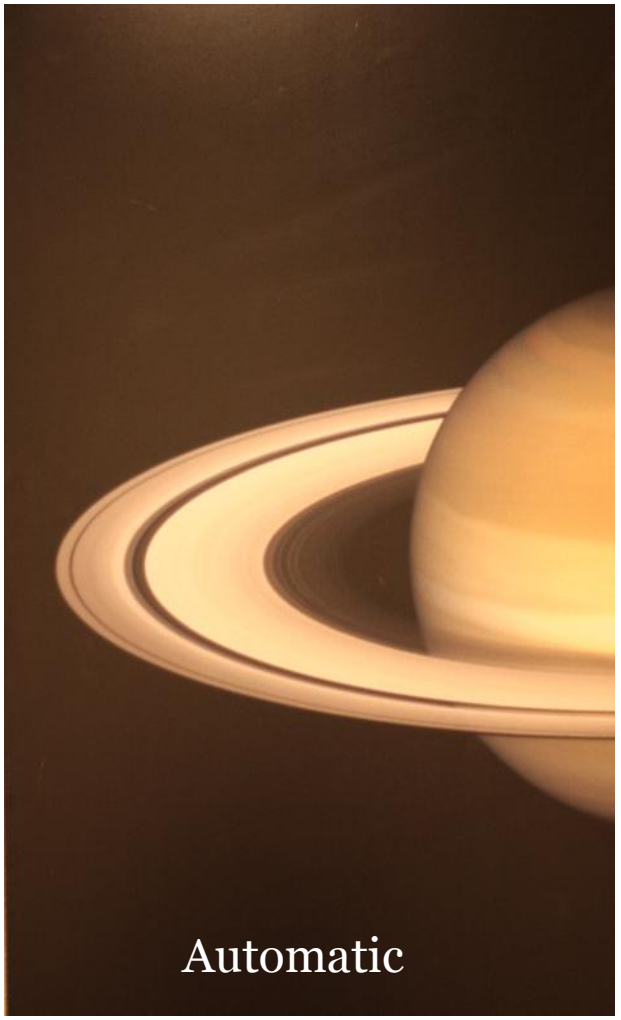


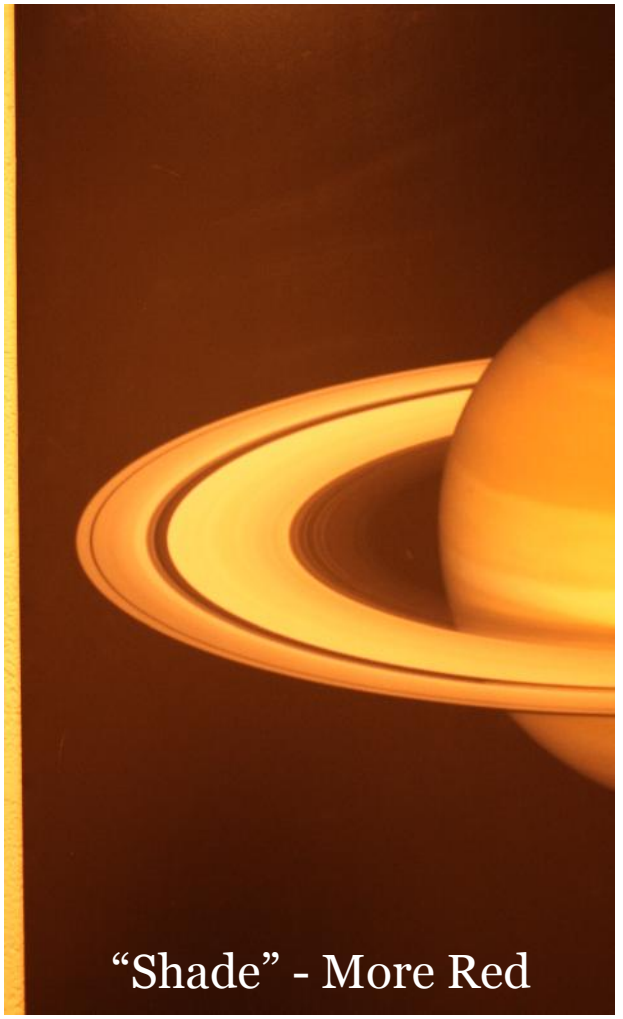
IV. Camera Use

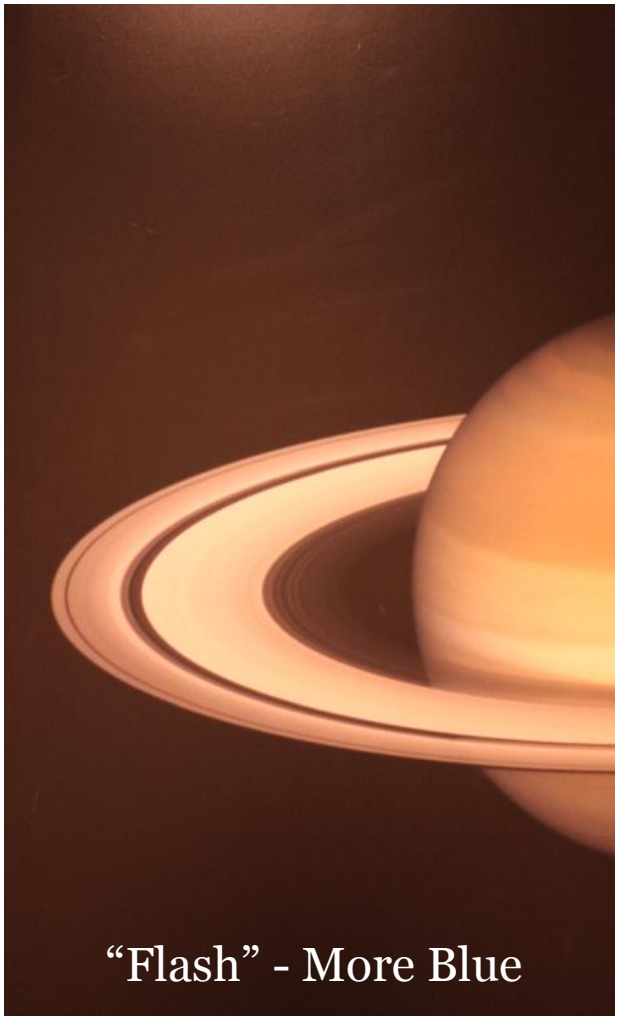


IV. Camera Use: White Balance

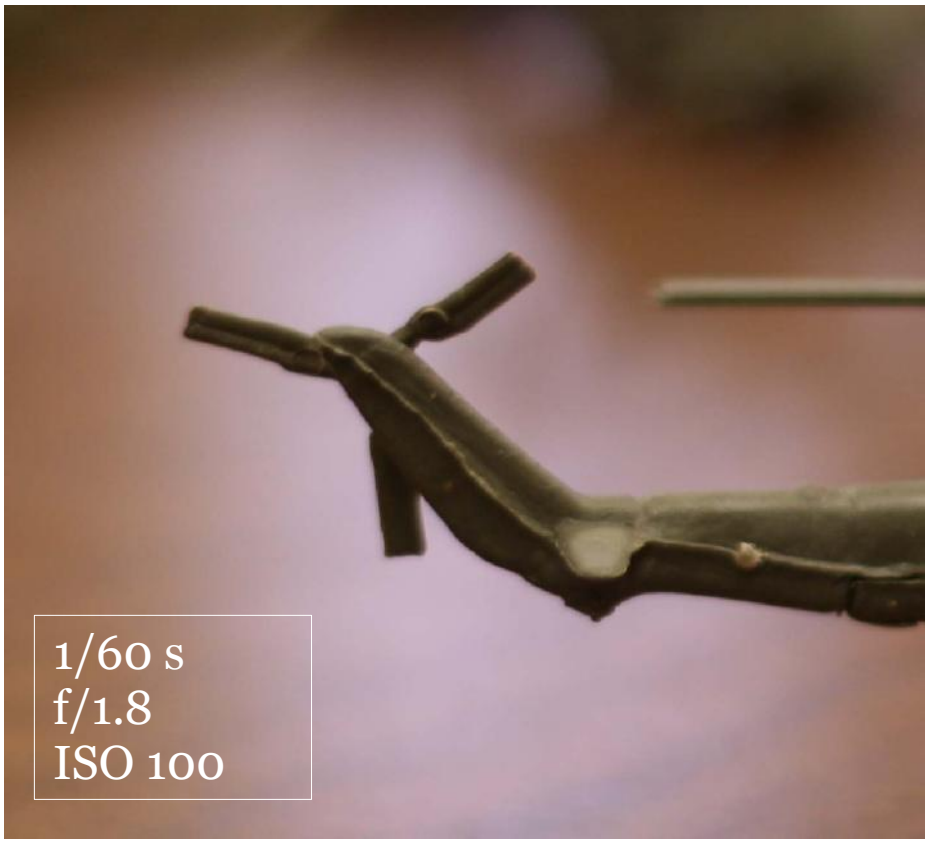
This sets what is "true white" in an image. You will need to experiment and determine what is best for your imaging needs.

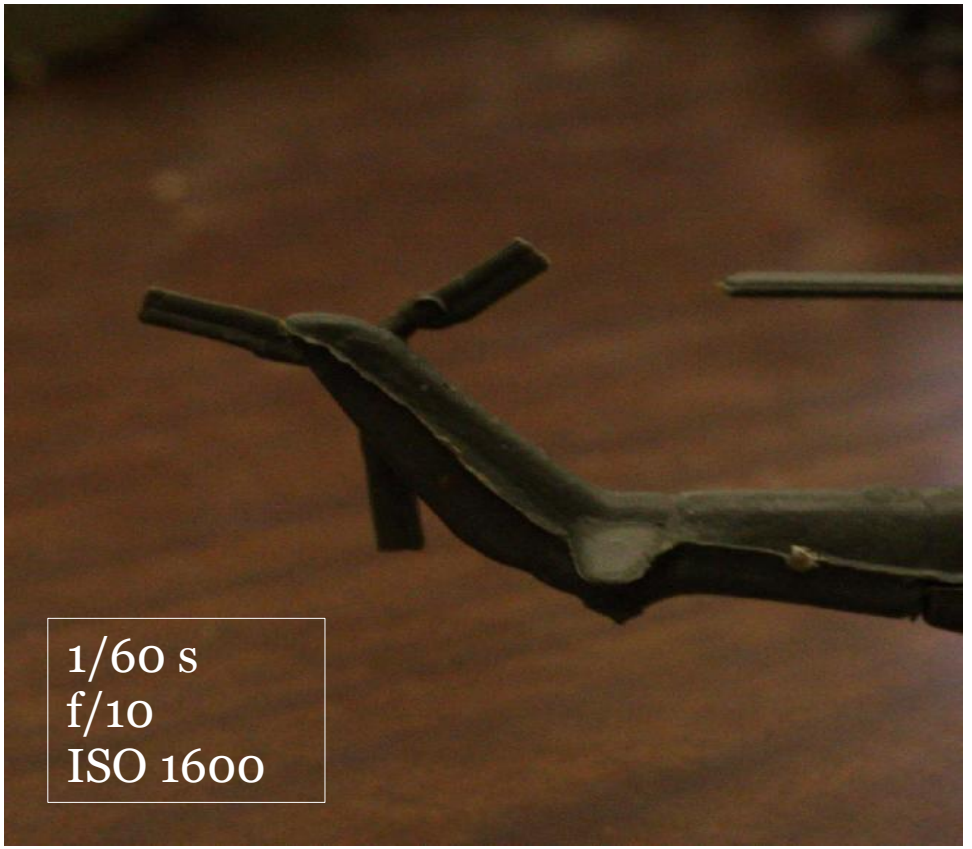






IV. Camera Use: ISO





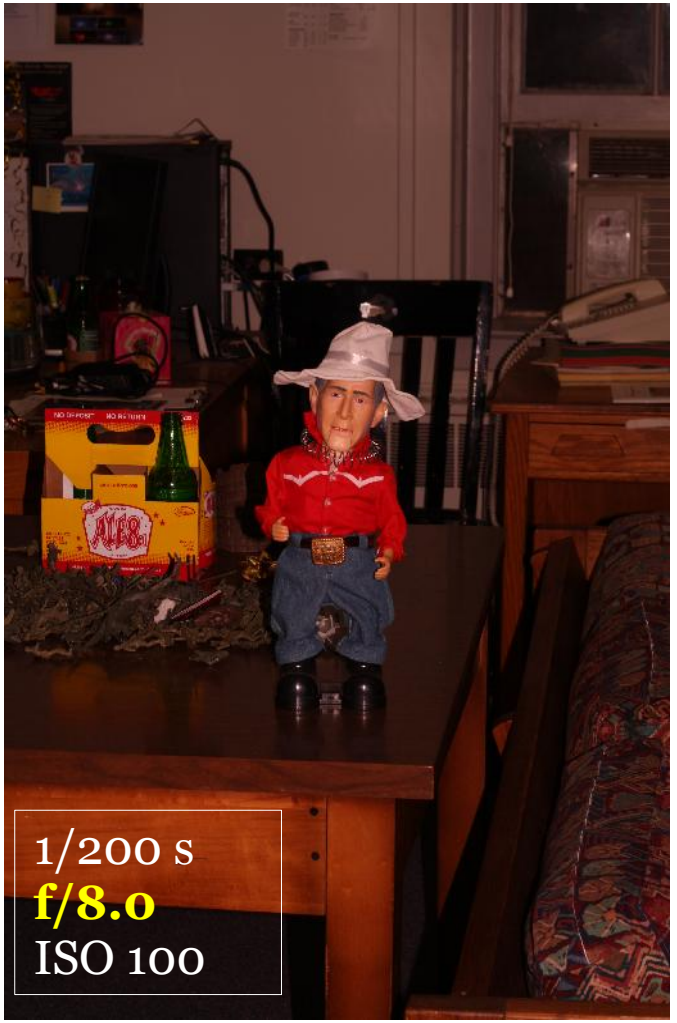
Low ISO:

- lower light sensitivity
- lower noise
- better resolution

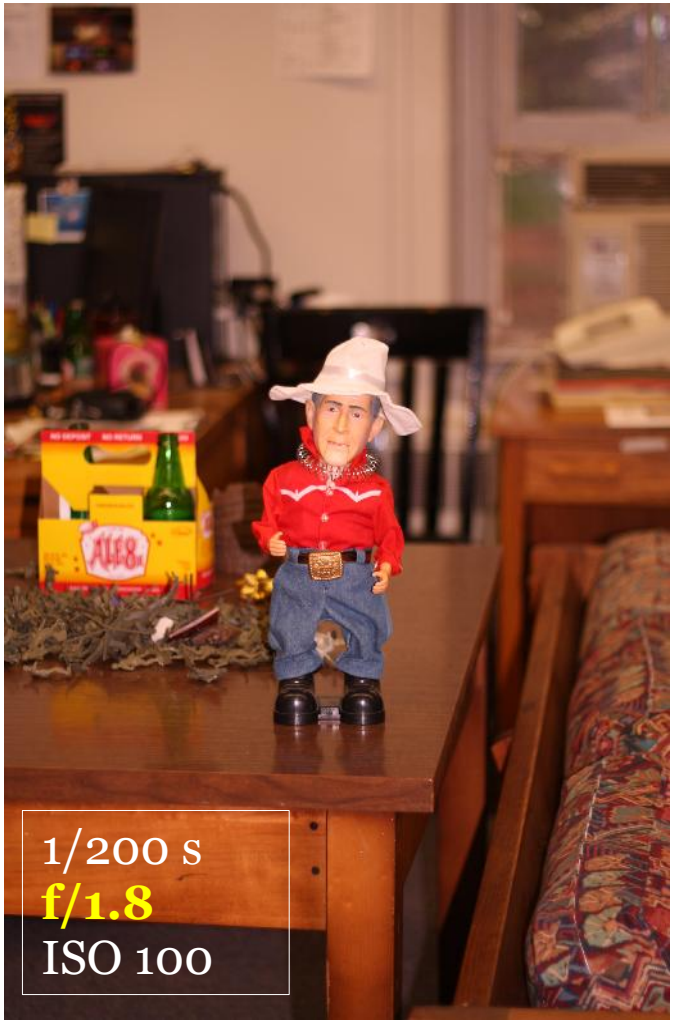
High ISO:

- more light sensitivity
- more noise
- lower resolution (grainy)

IV. Camera Use: Aperture (f/ stop)



High f/# = slow
- less light



Low f/# = fast
- more light!

IV. Camera Use: Aperture (f/ stop)

Low f/# = Shallow Depth of Field
← *only a small region of the image is actually in focus*

- this is because opening up the aperture wide means that light rays can come in from all angles through the lens, this has the effect of only letting a narrow region come into focus

High f/# = Deep Depth of Field
← *more of the image is actually in focus*

- by stopping down the aperture we cut back on the off-axis rays and more of the image is brought into focus
- we also let in **less** light and so need to take longer exposures or up the ISO

V. Examples

Privon & Beaton 2007

- National Solar Observatory + Star Trail
- *18 mm*
- *F/5.6*
- *415 seconds (~7 minutes)*
- *WB: Incandescent*
- *ISO 200*

Here the Moon is behind the photographer and casts a shadow of the tree across the observatory. The clouds also create the colors near the horizon due to reflections.

V. Examples

Beaton 2008

- Fan Mountain Observatory
- *18 mm*
- *F/3.5*
- *40 seconds*
- *WB: Manual*
- *ISO 400*

We can see people's flashlights moving around during this exposure on the ground!

V. Examples

Privon & Beaton 2007

From Left: Rachael Beaton, Paul Ries, David Whelan

- Firetruck + Ghost People
- *18 mm*
- *F/5.6*
- *220 seconds (~3.7 minutes)*
- *WB: Incandescent*
- *ISO 800*

Use Flashlight to illuminate subjects for brief periods of time to create ghost figures and illuminate the foreground.

V. Examples

Beaton 2008

- Clarke 6 inch + Orion Short Trail
  - The image is focused on the telescope and a flashlight was used to illuminate the telescope for this image.
- *20 mm*
- *F/5.6*
- *90 seconds*
- *WB: Incandescent*
- *ISO 200*

V. Examples

Privon & Beaton 2007

- National Solar Observatory + Star Trail
- *18 mm*
- *F/5.6*
- *1566 seconds (~26.1 minutes)*
- *WB: Incandescent*
- *ISO 400*

This long trail is off-centered on Polaris to show the full motion.

V. Examples

Beaton 2008

- Leesville Lake + Big Dipper
- *18 mm*
- *F/4*
- *308 seconds (~5 minutes)*
- *WB: Manual*
- *ISO 200*

Here you can see the light pollution from houses and on the horizon from a nearby city. Theses are things to try and avoid for some images, but add aesthetic quality for other images.

V. Examples

Privon & Beaton 2007: A long trail of the VLA showing some motion in the dishes.

V. Examples

V. Examples

February 2009 Total Lunar Eclipse

V. Examples

The Plieades through the McCormck dome slit.

A chance alignment of the crescent Moon with three planets.

V. Examples


Beaton 2009


Beaton 2008

TOP: Flashlights and sparklers can be used to sketch out shapes and “write” on an image. They can also be used to illuminate people.

LEFT: A long exposure of the Full Moon can create daylight in an image. The bright streaks around the Moon are diffuse clouds.

V. Examples

You can use a flash light to illuminate someone in shadow with a long trail.

V. Examples

Try using normal light sources, like this light in my parent's house to illuminate objects in your image – check the light on the tree.

V. Examples

You can use a full or bright Moon to get shots of people “doing” Astronomy.

V. Examples

... if the Moon is bright, you can use it to get nice shadows and detail without saturating the sky.