Exploring the Night: Amateur Astronomy in NJ

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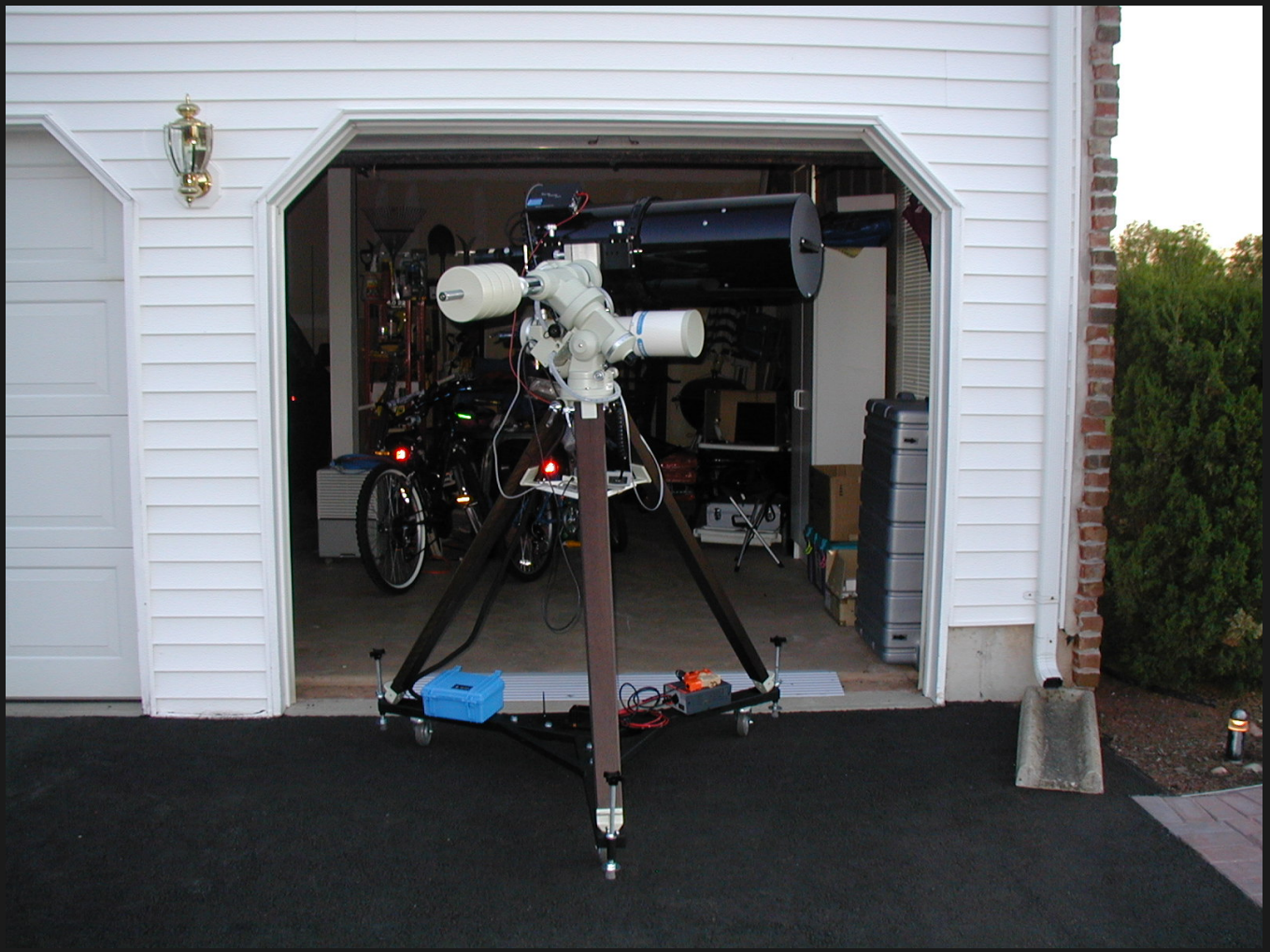
South Brunswick Public Library
110 Kingston Lane, Monmouth Junction, NJ 08852
732-329-4000 x 7290

http://www.princeton.edu/∼rvdb

Equipment

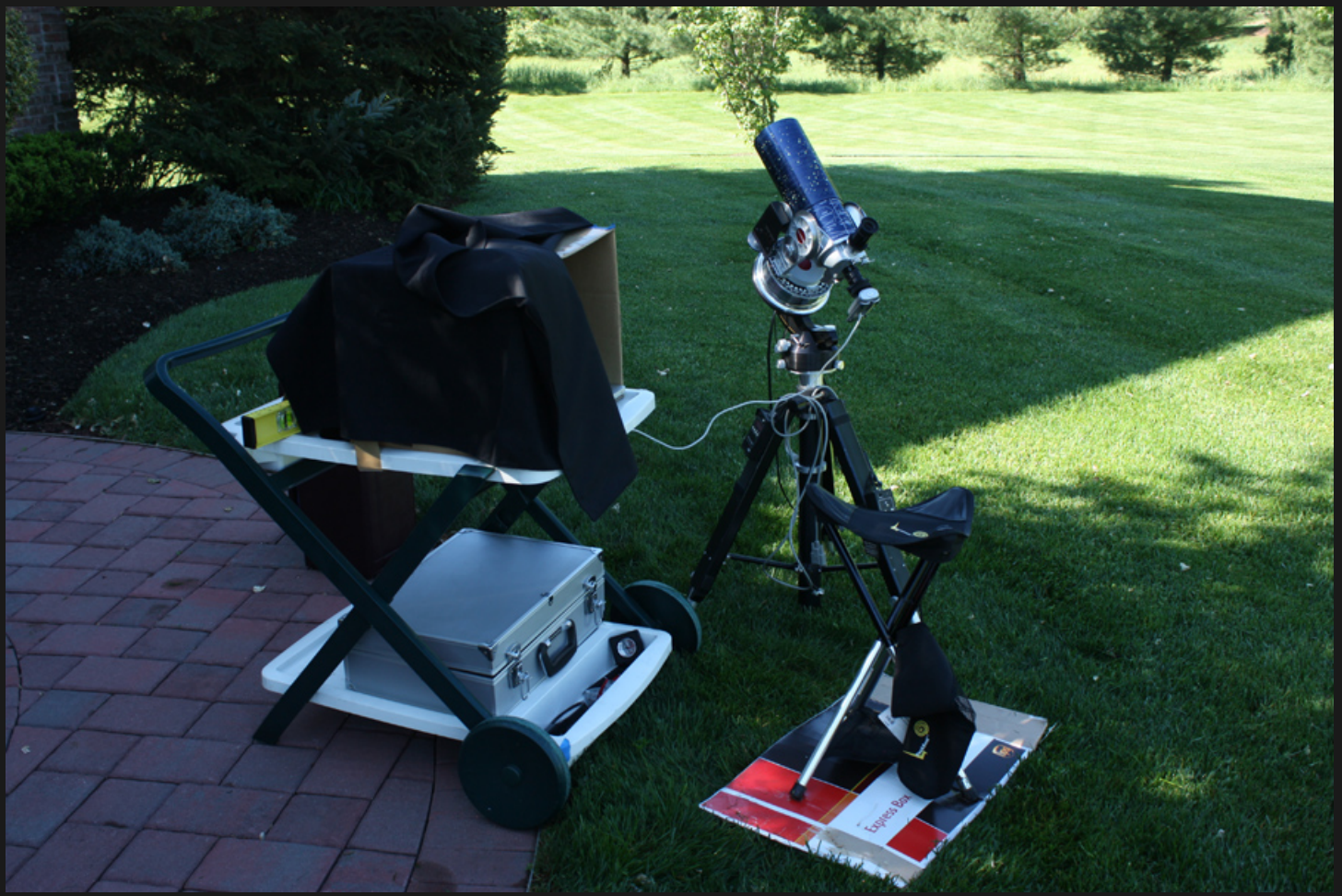
1. Mount
2. Camera
   Computer
   Software
3. Telescope (OTA)

Move equipment outside.



Ready To Go...

Small and Portable Alternative...



Our Solar System

SuperMoon...

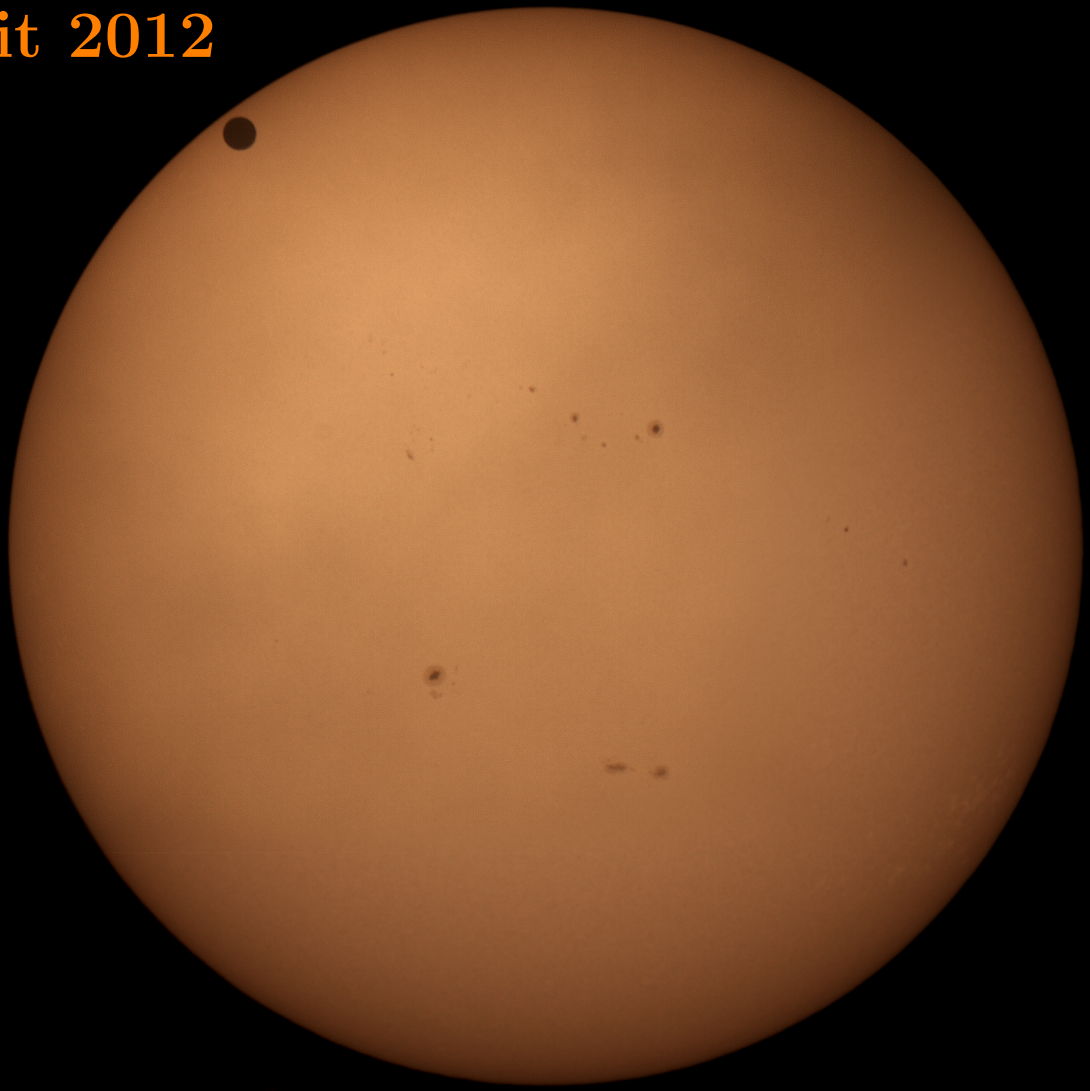
Daytime Moon...

Lunar Eclipse (2010 Dec. 21)

Jupiter and Saturn

Crescent Venus (Daytime!)

Venus Transit 2012




Venus Transit Weather

Jupiter in the Daytime

Disclaimer:

The Pictures Are Better Than The “Visual” View

Comets Come and Go...


Lulin


17P-Holmes


Garradd


Comet 103p Hartley and Double Cluster

Nebulae In Our Home Galaxy (the Milky Way)


Crab Nebula


Lagoon Nebula


Swan Nebula


Dumbbell Nebula

Orion Nebula

Orion Nebula—Close Up

Orion Nebula—Driveway Version

Orion Nebula—Hubble Space Telescope

Running Man Nebula

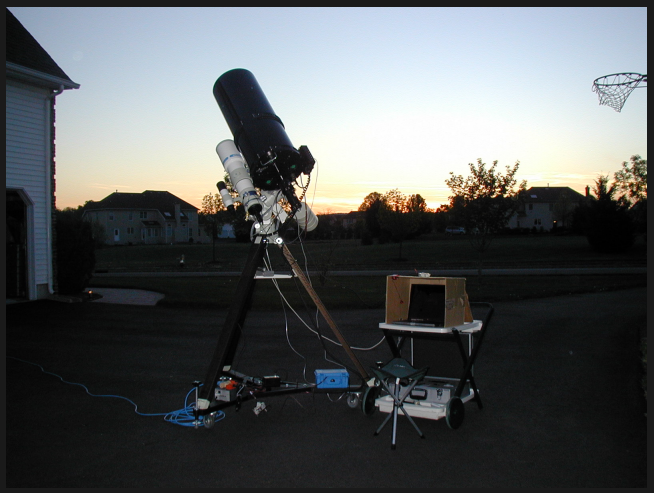

Rosette Nebula

Rosette Nebula—Widefield

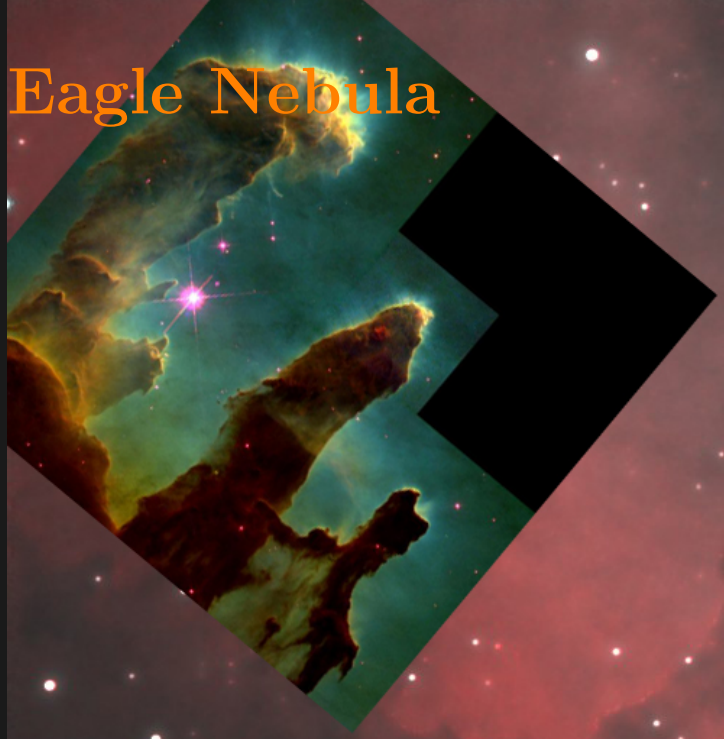
Rosette Nebula—Driveway vs. Mt. Palomar

Driveway

Mt. Palomar (48-inch)




Pleiades aka Subaru

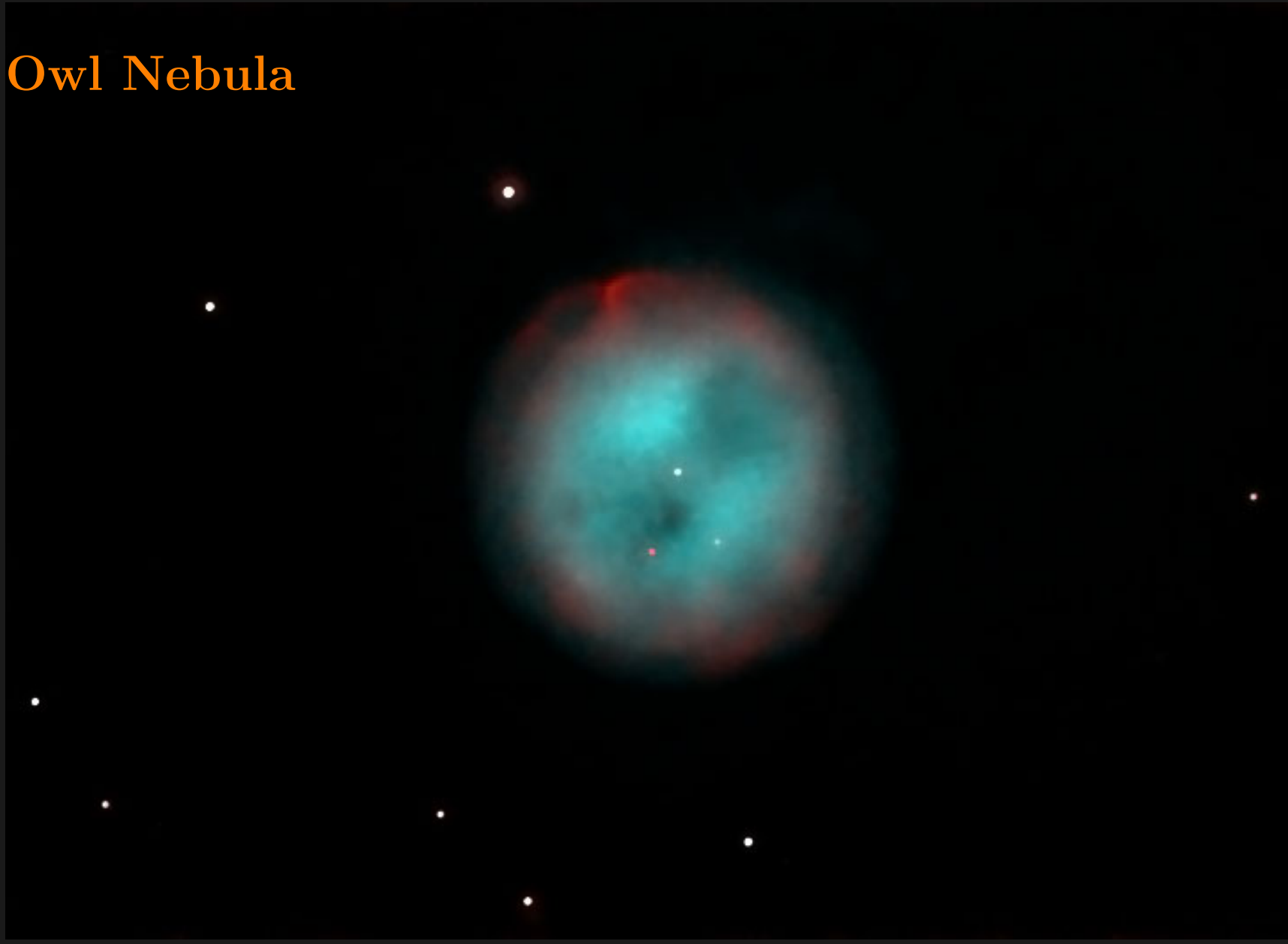


Eagle Nebula

Ring Nebula

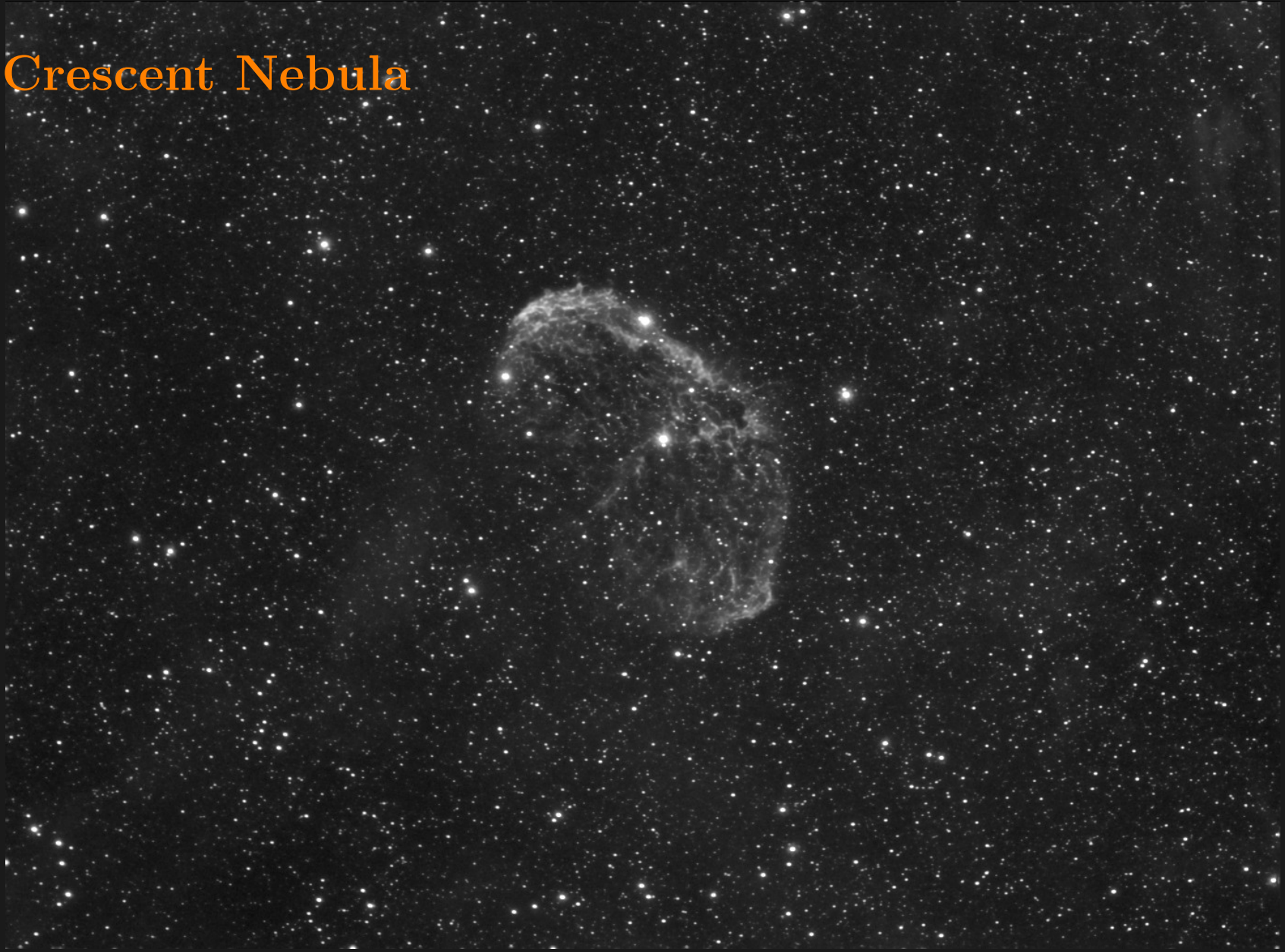

Little Dumbbell Nebula

Owl Nebula




Pacman Nebula

Eskimo Nebula


Crescent Nebula


Veil Nebula


Bubble Nebula

Horsehead Nebula

Clusters Clustered Around The Milky Way

Hercules Globular Cluster


M15

Galaxies Beyond Our Milky Way


M82 and M81

Whirlpool Galaxy

Whirlpool Galaxy—Supernova 2005cs

Whirlpool Galaxy

Whirlpool Galaxy—Supernova 2011dh


Sombrero Galaxy

NGC 4565

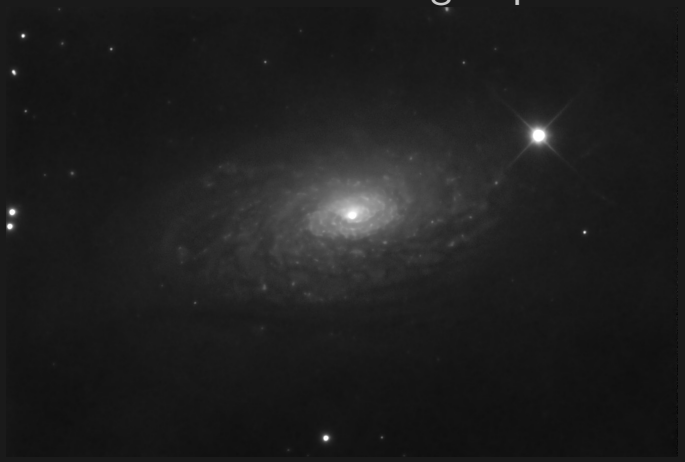
Deerlick Galaxy Cluster

Why Astrophotography?

Long Exposures, Permanent Record, Digital Enhancement, Light Pollution!

Visual Experience

Long Exposure



Light Pollution Subtracted

Astronomical CCD camera

- Pixel size: 6.45×6.45 microns
- Pixels: 1392 x 1040
- Quant. Eff.: $\sim 65\%$
- Readout Noise: ~ 7 electrons
- Cooling: $\sim 30^{\circ}$C below ambient
- Download: 3.5 seconds
- Format: 16 bit
- Weight: 350g

Example

"Telescope": 200mm f/3.5 Vivitar lens ($30)

Mount: Questar

Camera: Starlight Express SXV-H9

Filter: Dichroic Hα

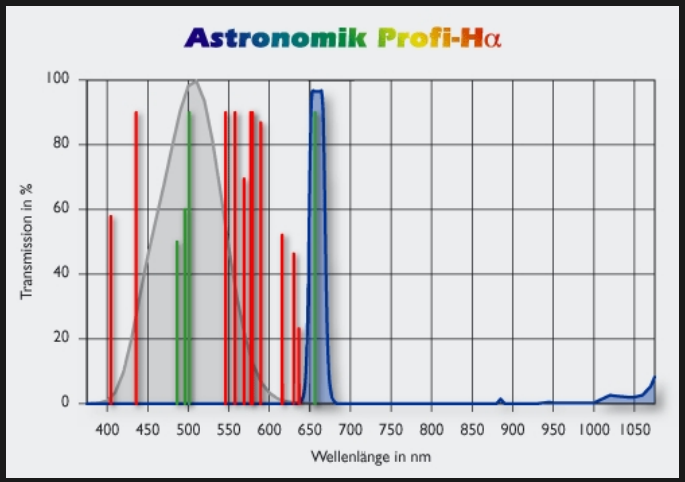
Fundamental Principles

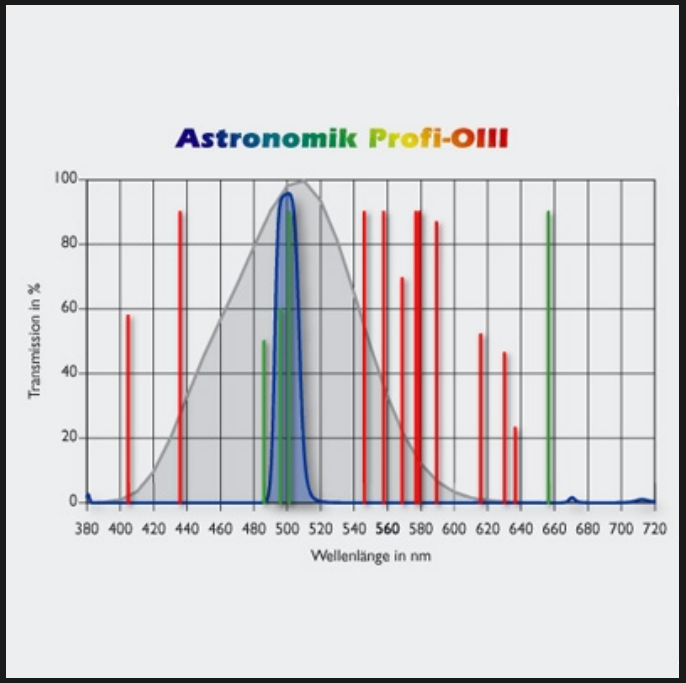
- *Focal length* determines *field of view*
- *F-ratio* determines *exposure time*

Total exposure time $= 156$ mins. Field of view $= 2.5°$.

Combatting Light Pollution

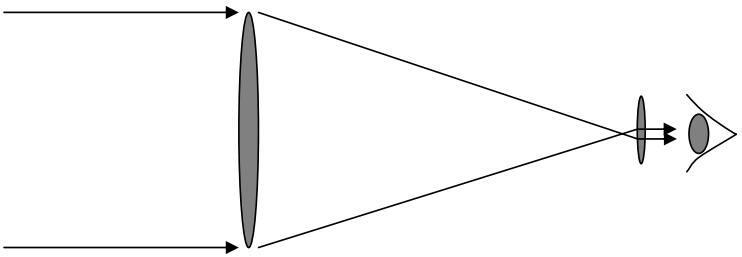
Narrow-Band Filters





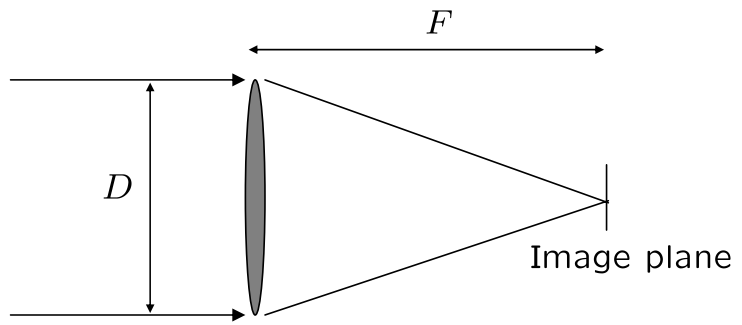
Visual Astronomy vs. Astrophotography

Visual astronomy is complicated.



- *Aperture* determines *photon flux*

Astrophotography is easier!



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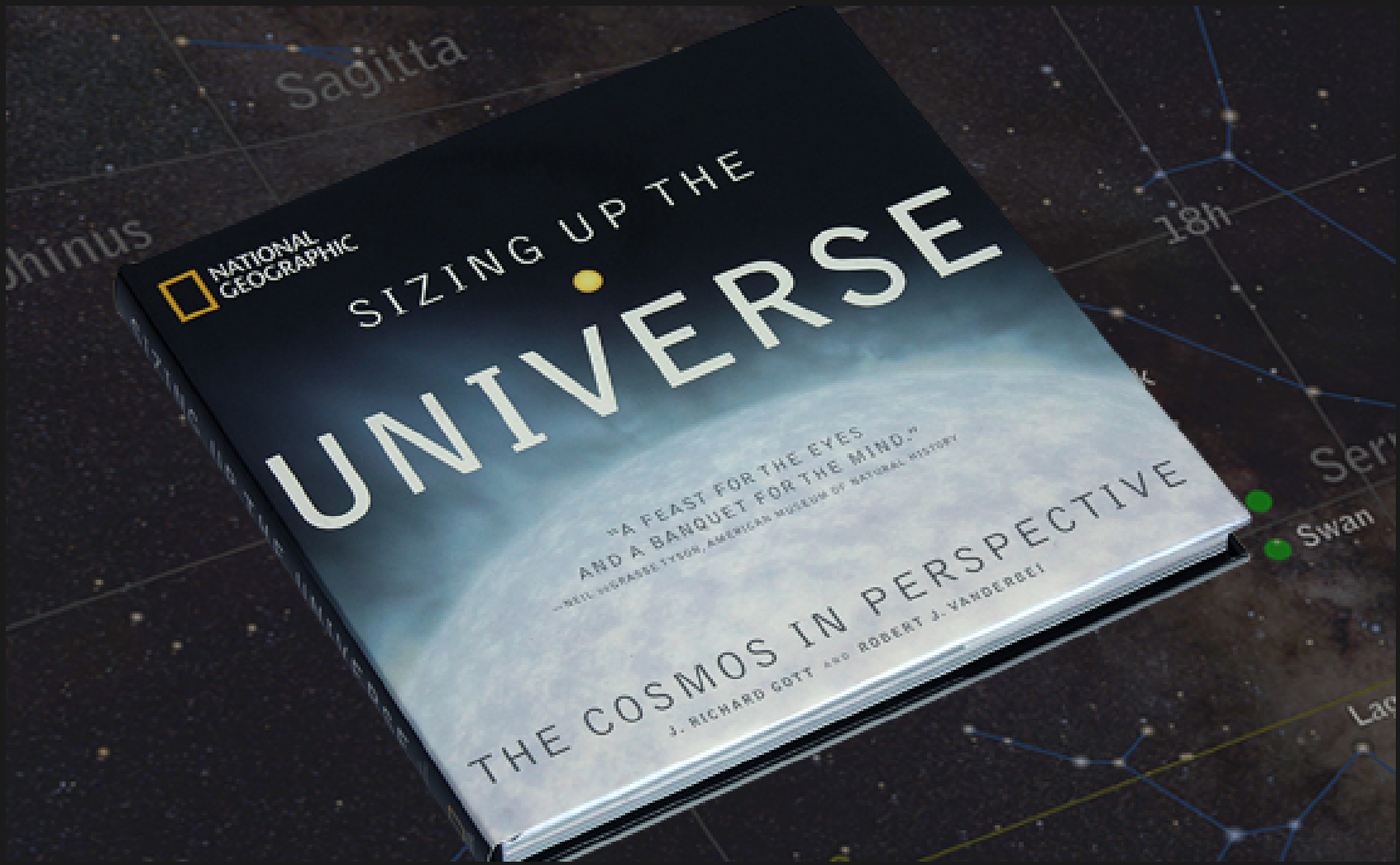
Further Reading...



Let The Movie Begin

Backup Slides

Biases