# Design of Fluorescent Wide-Field Microscope

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20.309

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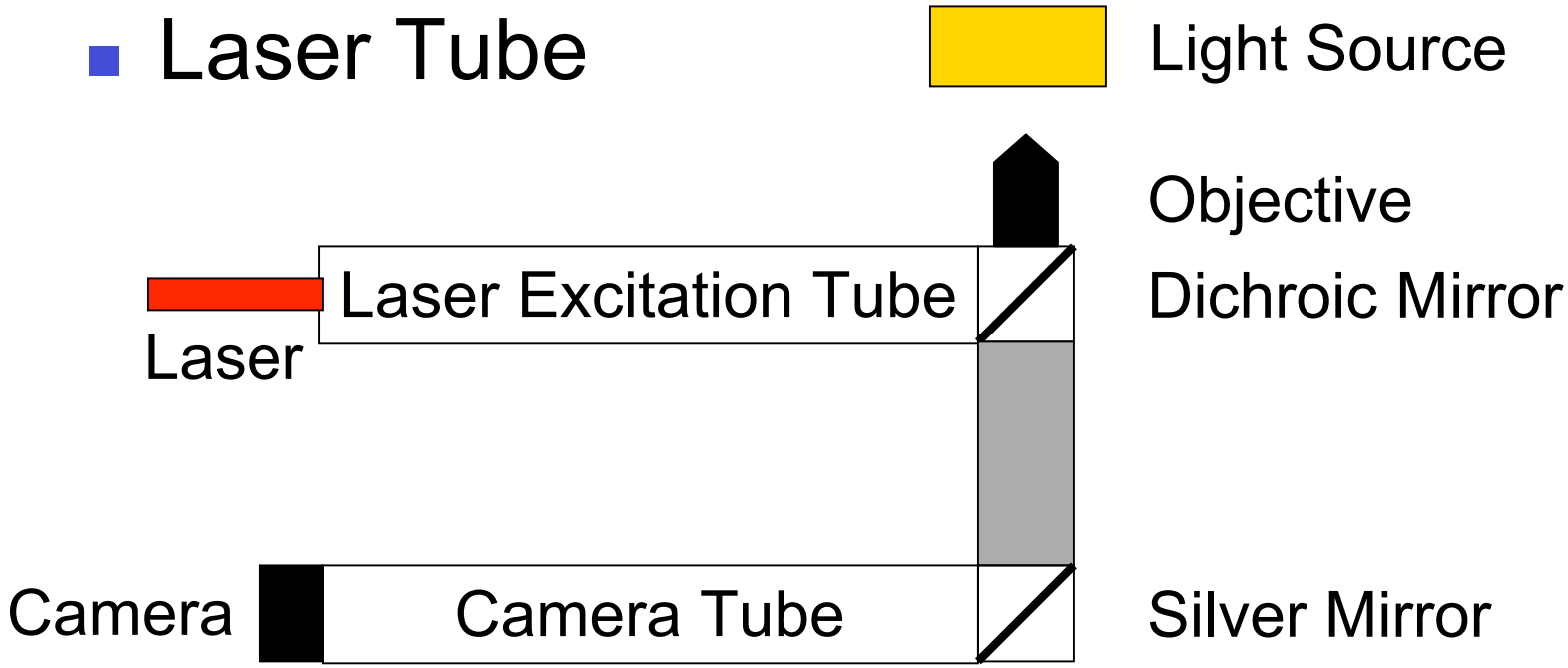
# Parts To Construct

- Mirror Housing / Objective Mount
- Camera Tube
- Laser Tube



# Objective Mount

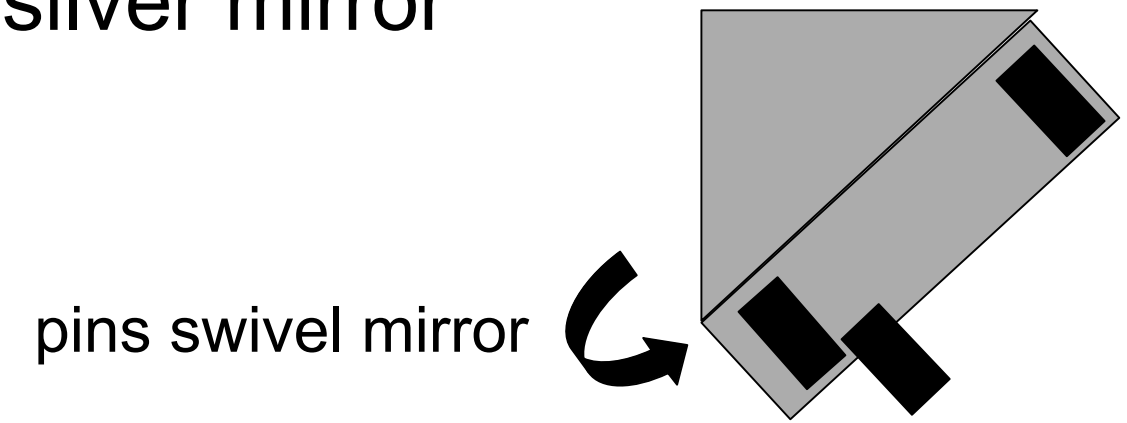
- Multiple different objectives
  - Air based: 10x, 20x,40x
  - Oil based: 100x
- Use Male to Male connector
- Do not over-tighten

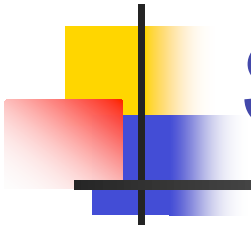
# Mirror Housing

- Supported by large metallic rod
- 2 components of casing
  - Dichroic mirror
  - Silver mirror
- Total Height = 150 mm

# Dichroic Mirror

- Sits in cube directly below objective
- Meant to allow only fluorescence to reach camera
- Adjustable by three pin system, similar to silver mirror



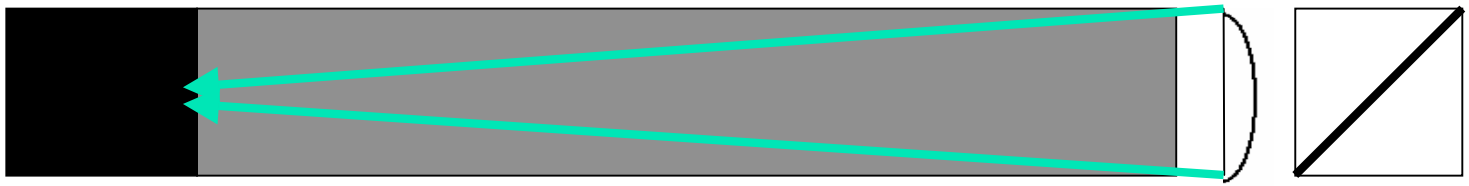


# Silver Mirror

- Sits in triangular box at same height as camera
- Positioned by three pin system

# Camera Tube

- Components
  - 200 mm lens mount
  - Camera mount
  - Long tubing to camera
- Total Length = 250 mm
- Focus light on 1/2” (diagonal) aperture



# 200 mm Lens Mount

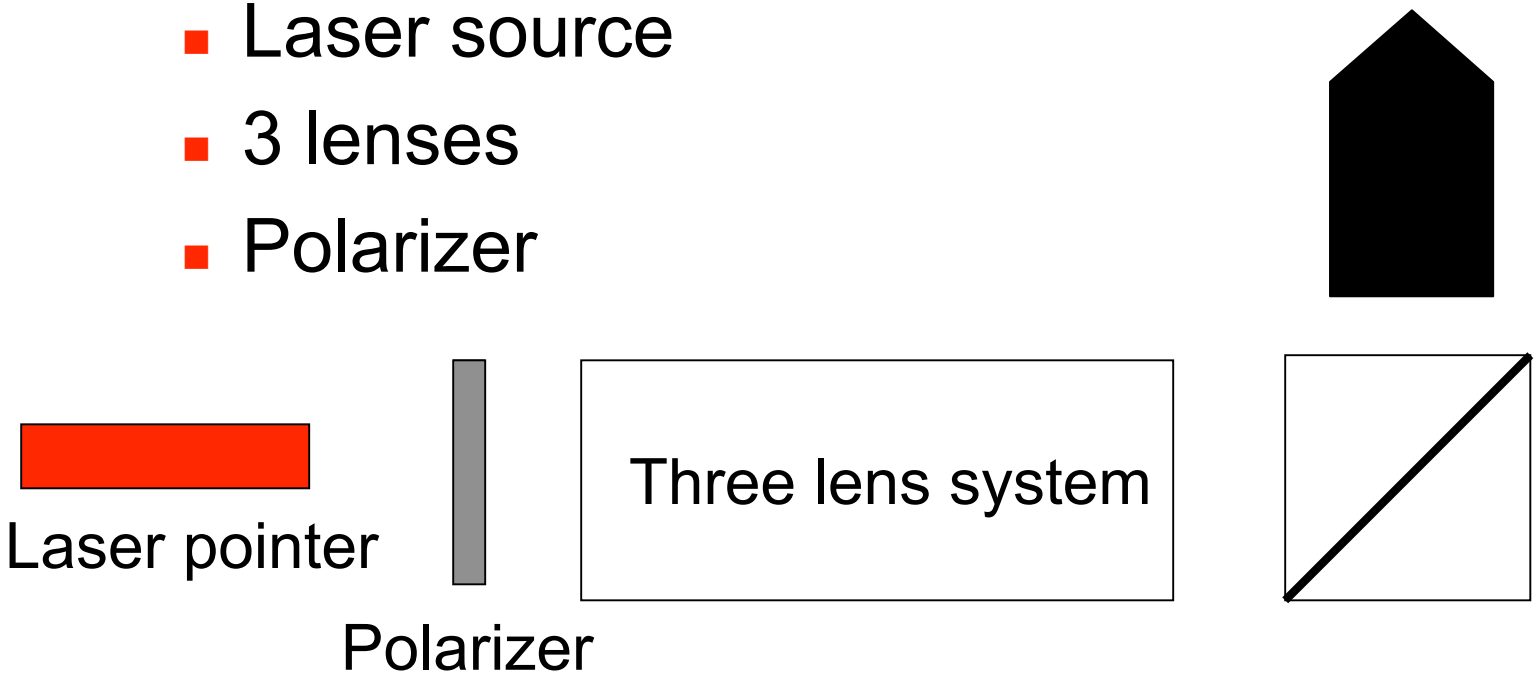
- Attached to mirror housing, with lens 50 mm away from housing
  - Allows for 200 mm distance total from objective to lens
- Collimated light should face the curved side of lens
  - Decreases errors

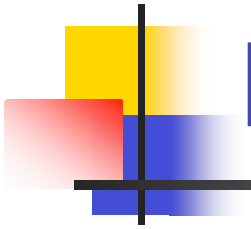
# Camera Mount

- Quick Connect joint
- Note the recessed location of camera piece within mount
- Approximate location of camera is at the intersection of the two rectangular pieces of the mount

# Laser Excitation Tube

- Components
  - Laser source
  - 3 lenses
  - Polarizer

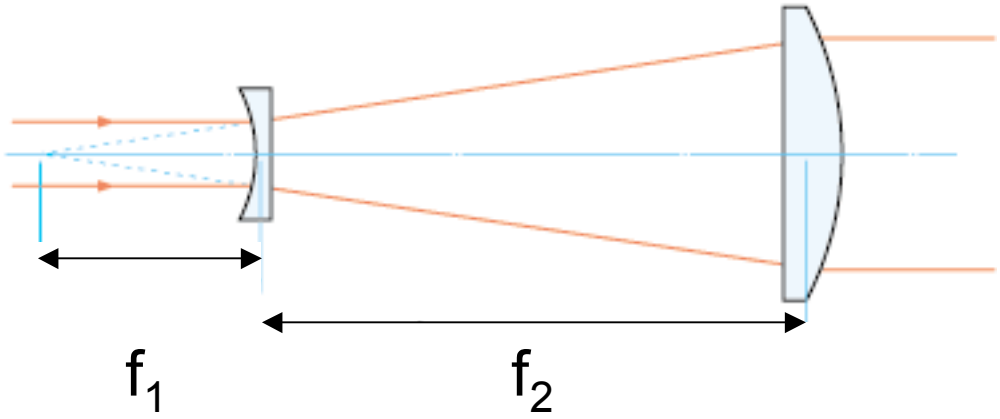


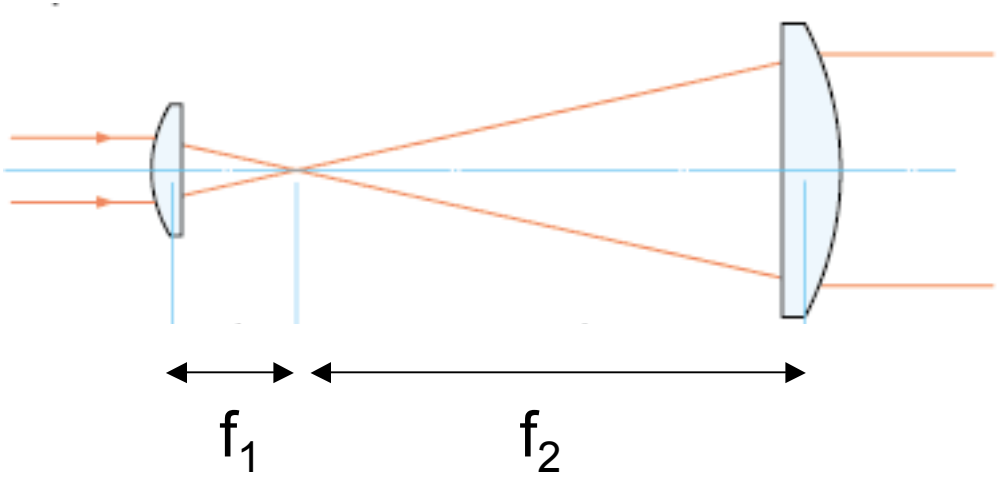


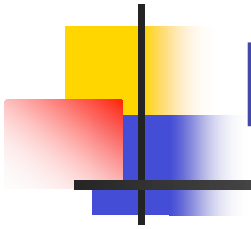
# Lens Setup

- First combination: choice of positive-negative or positive-positive lenses
- Curved sides face collimated light
- Serves as beam expander

# Beam Expanders





# Lens Setup II

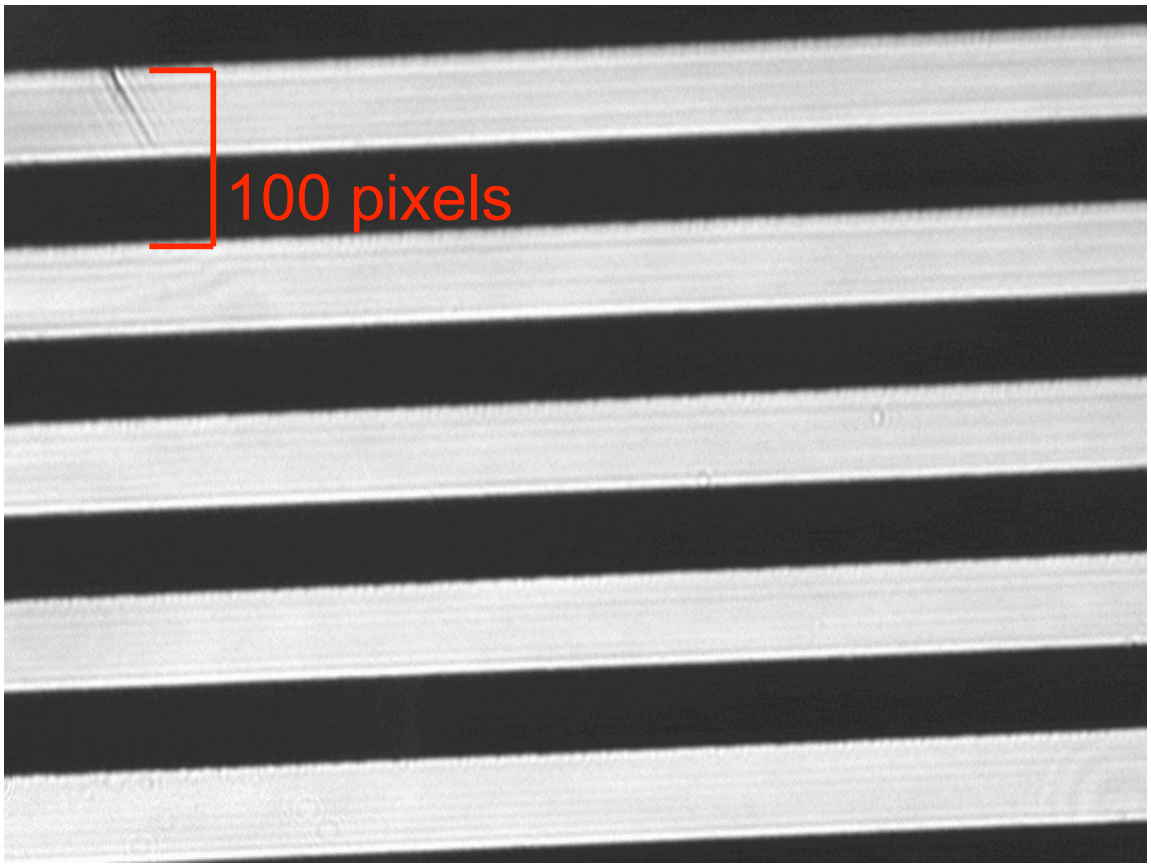
- Last lens is positive
- Focal point chosen to match distance to back focal plane
  - Back focal plane is not exactly at end of objective
  - Will need to adjust on the fly to focus correctly

# General Assembly

- Assemble Components before connecting to stands
  - Do not build tension into microscope
  - Tighten elements after parts put together

# Imaging with Microscope

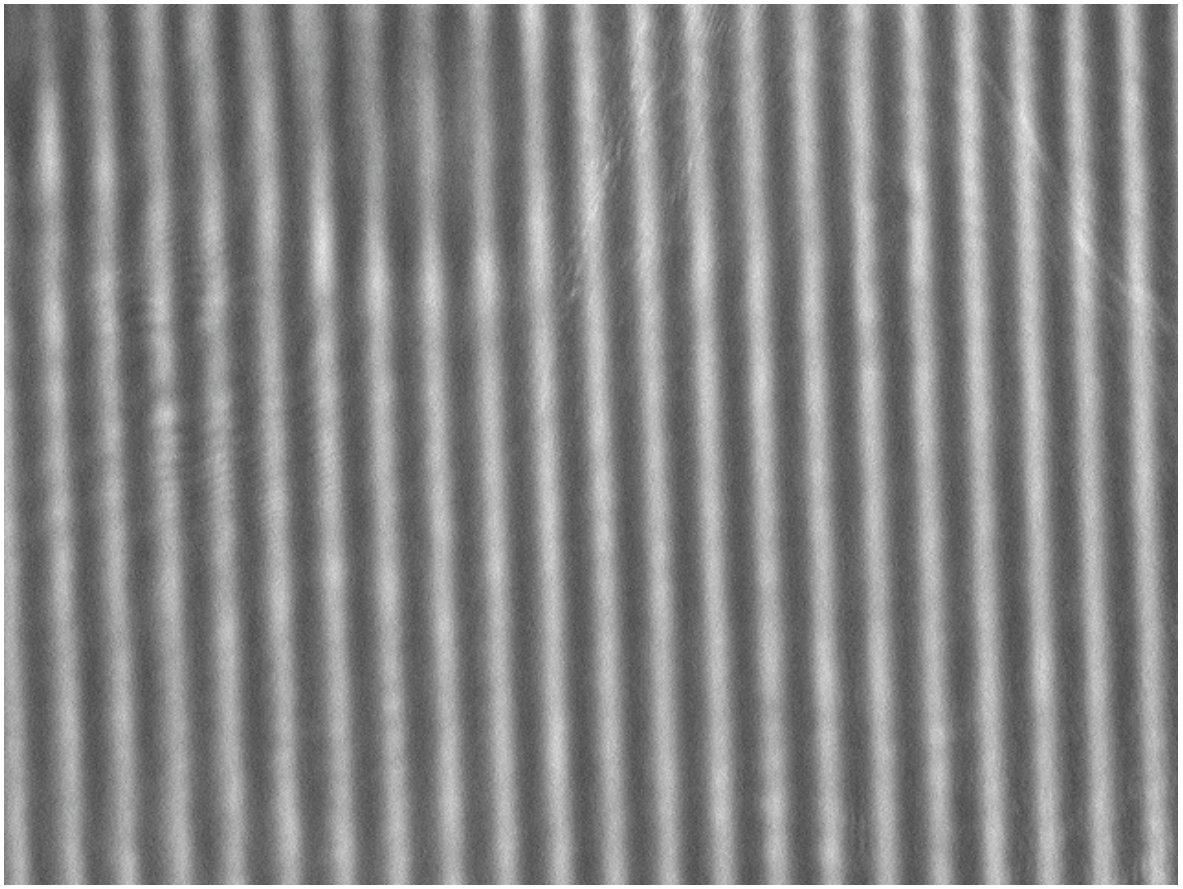
# Verifying Magnification

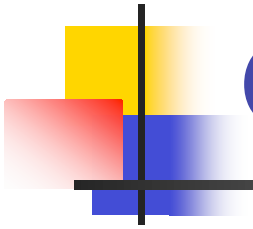



- 1 pixel = 5.6 μm
- “18” = 18 black/white line pairs per 1 mm

# Higher Resolution

600 lines/mm





# Questions?