University of Michigan REU Presentation

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10 Simple Steps to Building an Apparatus to Calibrate Telescopes
Step 1
Know Thy Telescope

- SDSS Telescope (Sloan Digital Sky Survey) Apache Point, NM
- 2.5\(m\) main mirror
- 1.08\(m\) secondary mirror
Step 1
Know Thy Telescope

30 2048x2048 pixel CCD’s

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Step 2
What do you need to mimic?

- Stars, Galaxies, and other luminous bodies
- Characteristics
  - Point source
  - Parallel light
  - Visible spectrum
Step 3
Choose a light source

- Xenon lamp (cheap)
- Relatively constant intensity in visible range
Step 4
Wavelength Selection

- Monochromators!
- Using diffraction gratings we can sort light by wavelength
- Calibrated to $\pm 0.01 \text{ nm}$
Step 5
Light Distribution

Top View

Front View

- Integration Chamber
- Equally distribute light
- Reflectance > 97%
Step 6: Diffuse Light

- Diffuser with 50° spread
- Indirect light, not a direct beam
Step 6
Diffuse Light
Step 7
Mirrors

- Parabolic Mirrors
- Light source at focus

Focus for all rays
Step 8
Mounting The Full Setup
Mimic sources at infinity
Apply a known intensity of light
Control of wavelength to 0.01 nm
Step 10
Future Applications

Sloan Telescope, Apache Point, NM

Mayall Telescope, Kitt Peak, AZ
Shout Outs

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