CROSS-REFERENCING LIGHTING STANDARDS IN A PHOTOMETRIC LABORATORY

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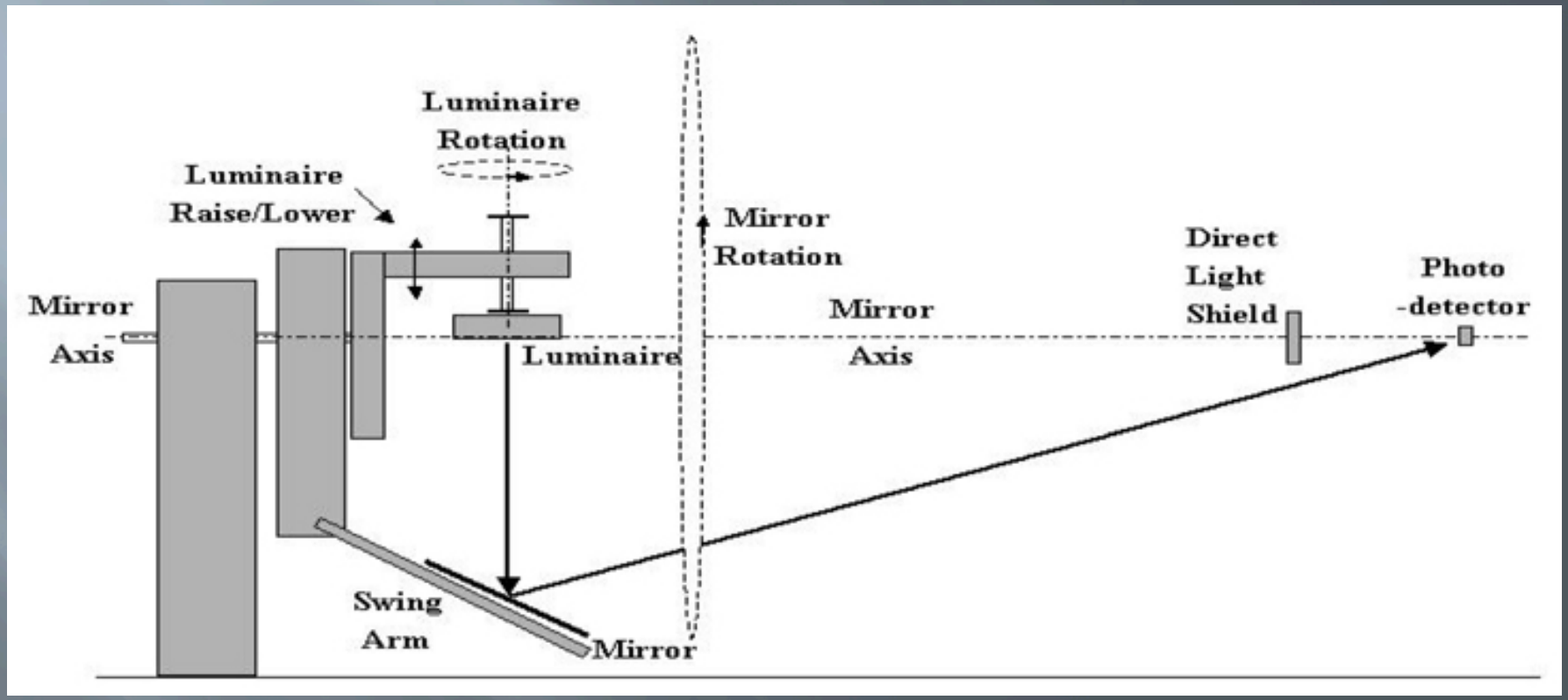
Topics

1) Mirror photometer calibration
2) Integrating Sphere
   a) Total lumen measurement
   b) Luminance standards
   c) Calibrated light sources
3) Irradiance standards and candela standard lamps
4) Lambertian surfaces

1.0 Mirror Photometer

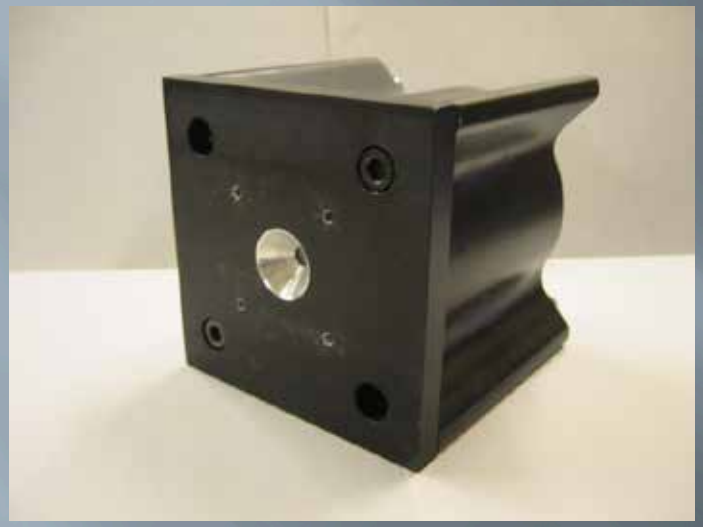
1.1 Mirror Photometer

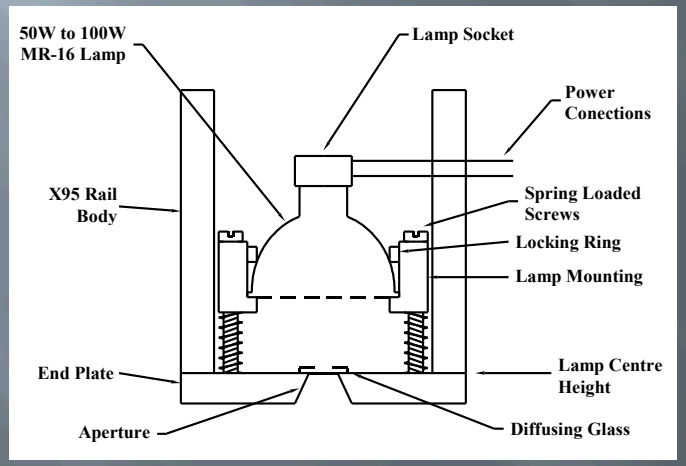


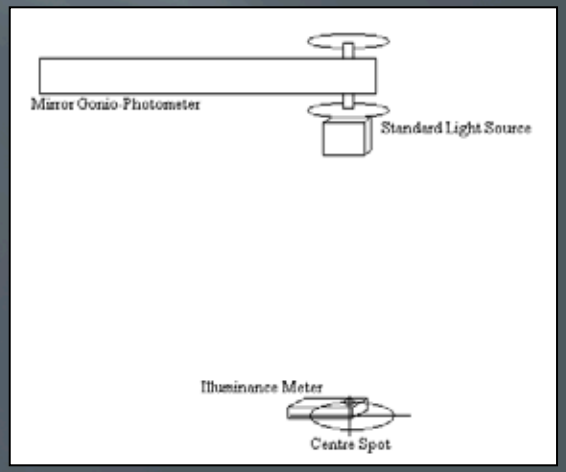
1.2 Mirror Photometer

- Type C Goniophotometer (Mirror Photometer) Calibrated for:
  - Total lumen, using Lumen Standard Lamps
  - Candlepower, using Intensity Standard Lamps
  - Candlepower, using Uniform Light Source and Illuminance Meters

1.3 Uniform Diffused Point Source







2.0 Integrating Sphere

2.1 Integrating Sphere

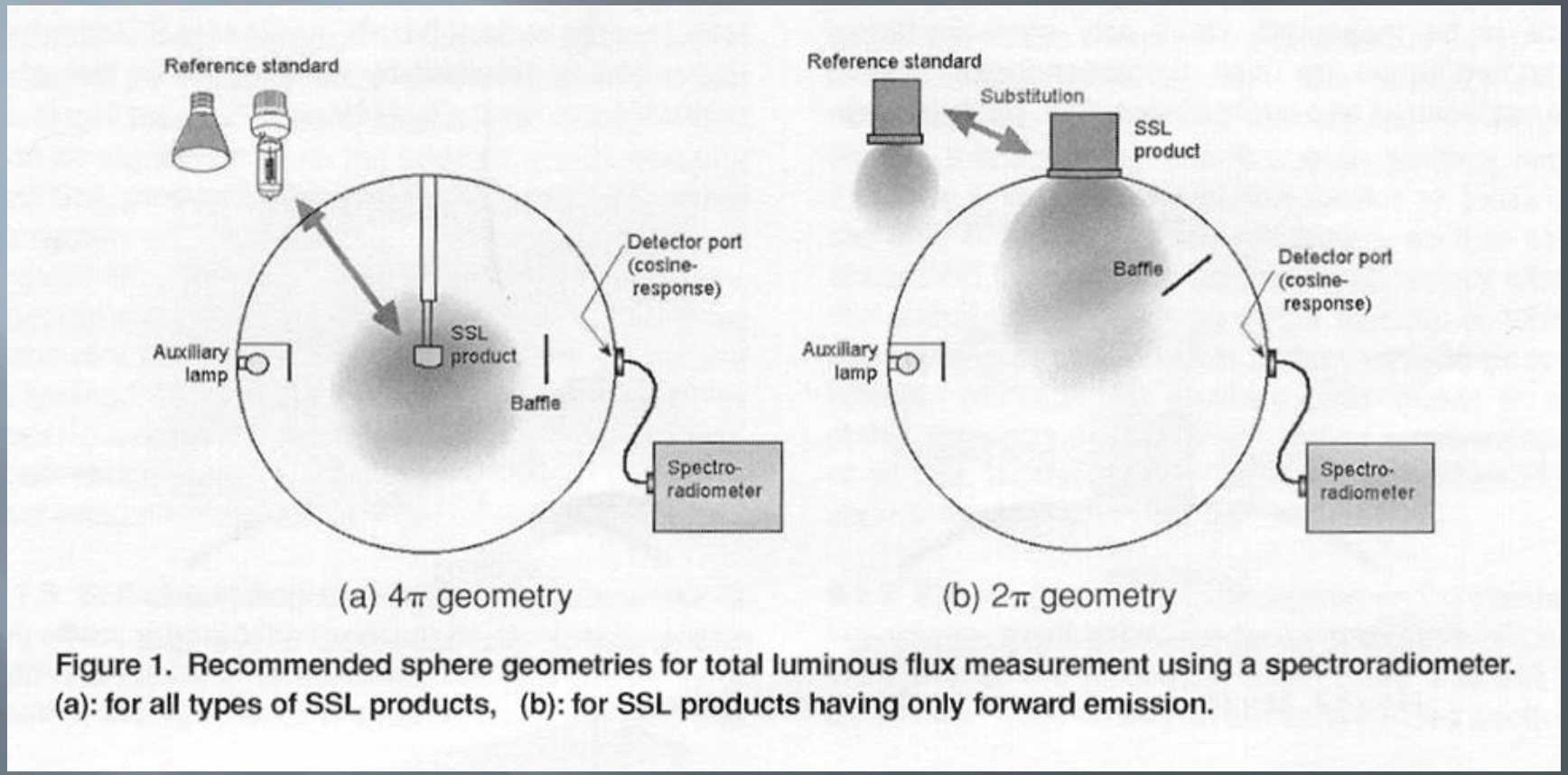


Figure 1. Recommended sphere geometries for total luminous flux measurement using a spectroradiometer. (a): for all types of SSL products, (b): for SSL products having only forward emission.

2.2 Integrating Sphere

- Luminance Standards using Small Integrating Spheres becomes a Known Intensity Standard lamp by:
  - (Luminance Value) x (Area of Opening)
  - Position of lightsource: Outer boundary of sphere opening
  - Low candela values, sensitive Illuminance meters needed
  - Typical use distance: 30 cm and up

3.0 Irradiance Standards and Candela Standard Lamp

- Quartz-Halogen Irradiance Standard Lamps specified for 50 hours of use.
- Could become off calibration by:
  - Shipping
  - Routine laboratory handling
  - Bad chemistry inside the lamp

3.1 Irradiance Standards and Candela Standard Lamp

- Calibrated Illuminance meter set at Calibrated distance of Standard lamp can be used to verify each other. (History of Comparison is useful)
  - Need computer software to convert irradiance data to Illuminance value
  - Difference of CCT values for the lamp and Illuminance meter may cause small offset around 1%

4.0 Lambertian Surfaces

- A light source and a diffuse translucent plate used to create a Uniform Luminance Source
- A Labsphere Sectralon (50 mm x 50 mm) illuminated by a Uniform Light source
- At normal incidence about 1.5 m away. Luminance values can be observed 10 to 15 degrees off normal
- $Luminance = (LCF) \times R \times Illuminance \div 3.14$
- R: Reflectance of Spectralon Plate (typical value 0.99)
- LCF: Lambertian Correction Factor (typical value 1.06)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