Gooch & Housego

ENABLING OPTICAL TECHNOLOGIES

Photobiological Measurement Per IEC 62471 Solutions Overview

Gooch and Housego (Orlando)

IEC 62471 – Photobiological Safety of Lamps and Lamp Systems

- Objectives include evaluation and control of optical radiation hazards from lamps at points of human access through standardization of measurement techniques.
- Deals with spectroradiometric measurements of not point but extended sources emitted in terms radiance and irradiance.
- Sources can be altered by filtration, projection and diffusing optics in terms of distribution and spectral content.
- Takes into consideration distance, projected size, retinal hazard and response.
- Provides recommendations measurement technique and instrumentation to be used.

Source Measurement

The most common measurements of sources include:

- Radiance - Light emitted in a particular direction
- Irradiance – Light falling onto a surface
- Total flux – Total light emitted in all directions

IEC 62471 Relevant Parameters

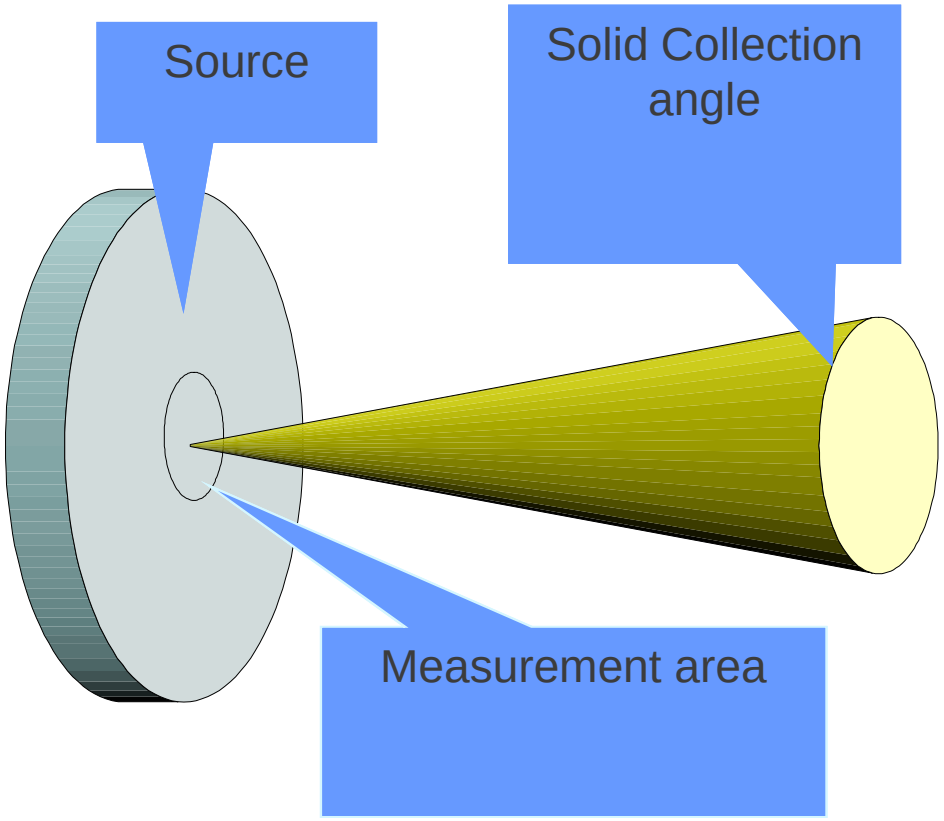
Skin or cornea hazard

- Actinic UV Skin and Eye: 200-400 nm (E_S)
- Eye UV: 315-400nm (E_{UVA})
- Blue Light Small Source: 300-700nm (E_B)
- Eye IR: 780-3000nm (E_{IR})
- Skin Thermal 380-3000nm (E_H)

Retinal hazard

- Blue Light: 300-700nm (L_B)
- Retinal Thermal: 380-1400nm (L_R)
- Retinal Thermal (weak): 780-1400nm (L_{IR})

Radiance Measurement

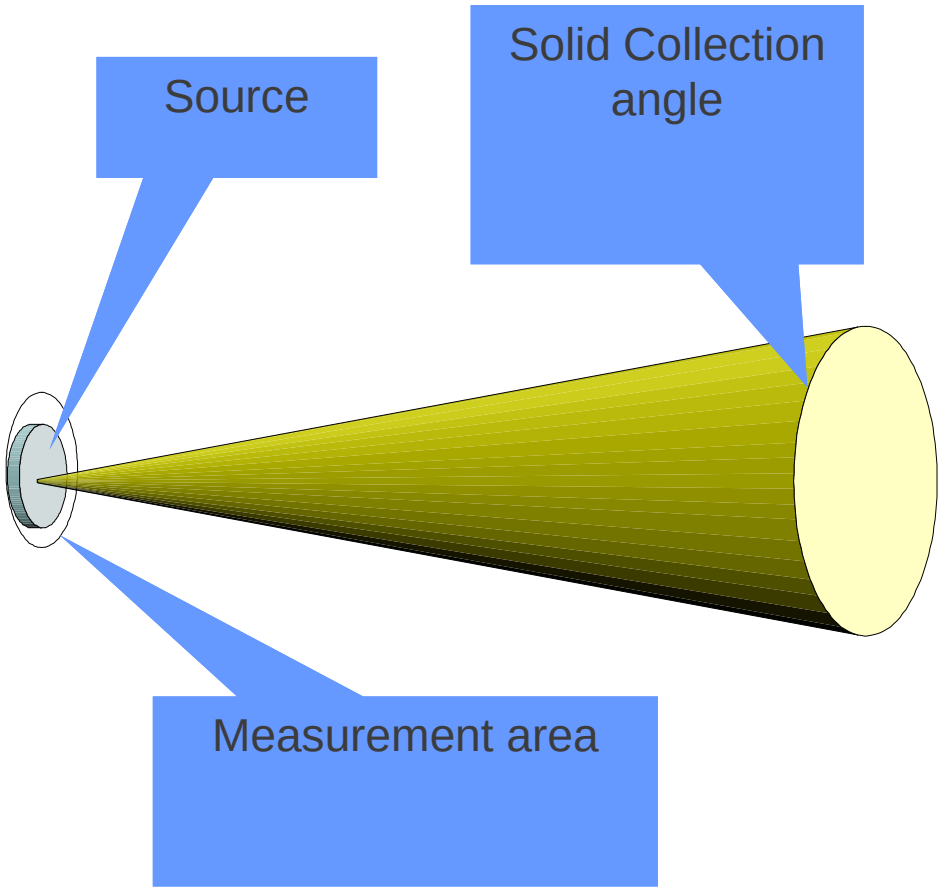


Radiance is normally measured with a telescope

The solid collection angle corresponds to the size of the lens

The measurement area corresponds to the field-of-view of the telescope

Radiance Measurement

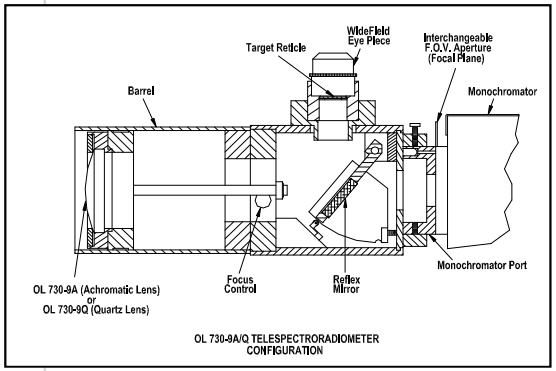


The term “radiance” in this section also refers to related units such as luminance and radiant intensity

Radiant intensity applies to small or distant objects that are smaller than the telescope field-of-view

Radiance Measurement

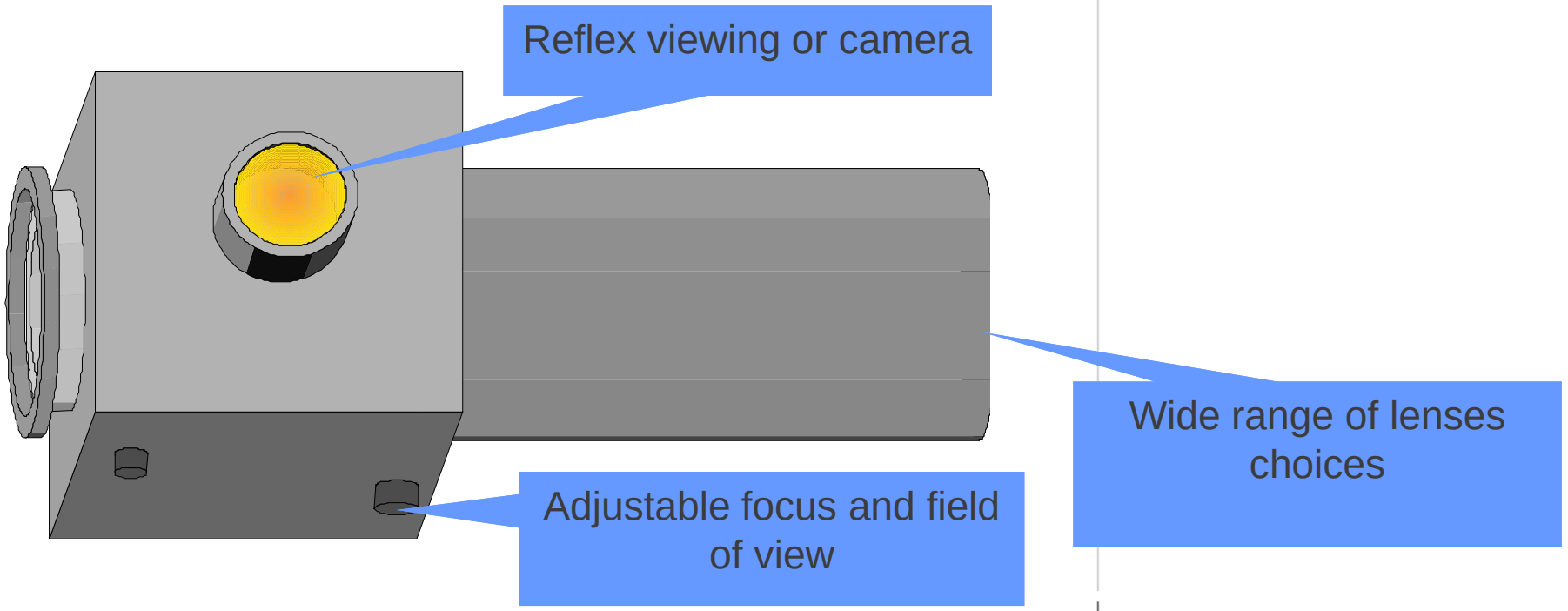
Gooch & Housego, Inc. manufactures a large range of telescope, microscope and imaging optic modules for radiance measurements



OL 730-9A/Q TELESPECTRORADIOMETER CONFIGURATION

Imaging Telescopes

For luminance and radiance of sources from 200 nm to 14,000 nm

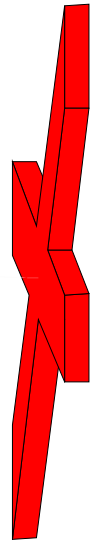


Imaging Telescopes

For luminance and radiance of sources from 200 nm to 14,000 nm

Here is how it works

Light coming from the source…



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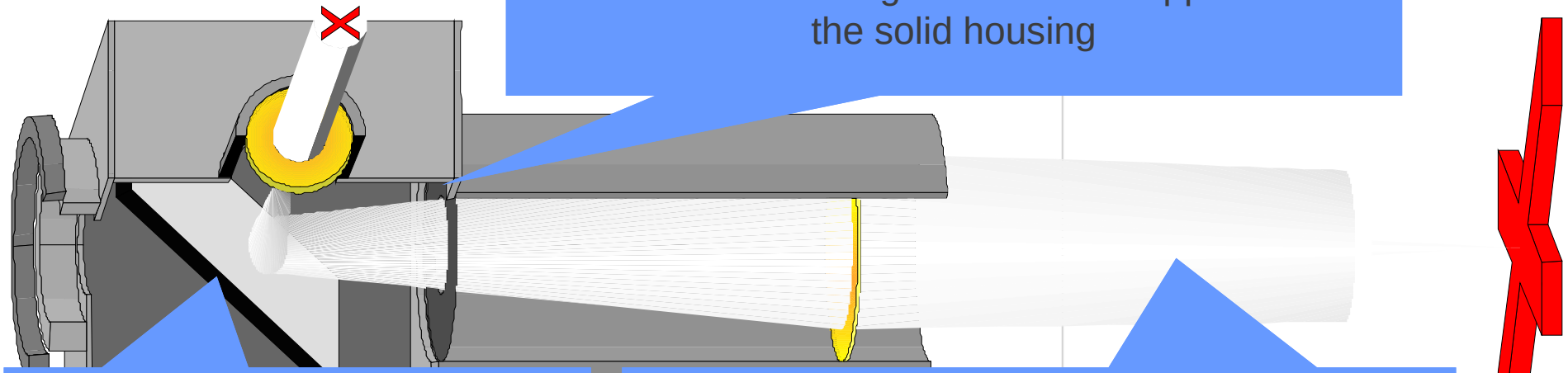

Imaging Telescopes

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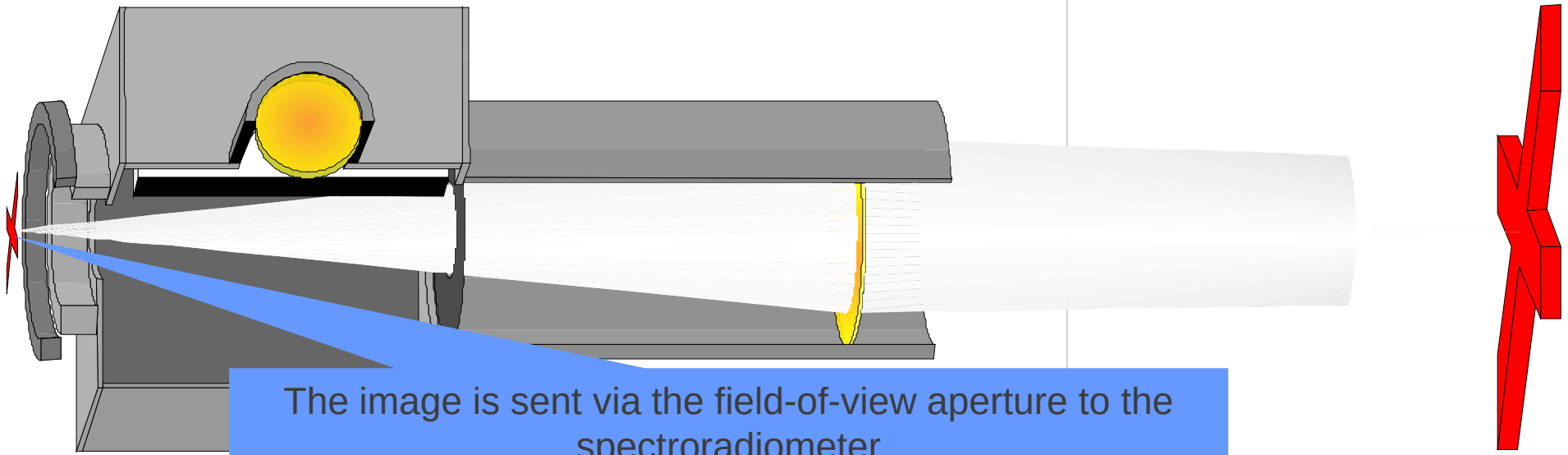
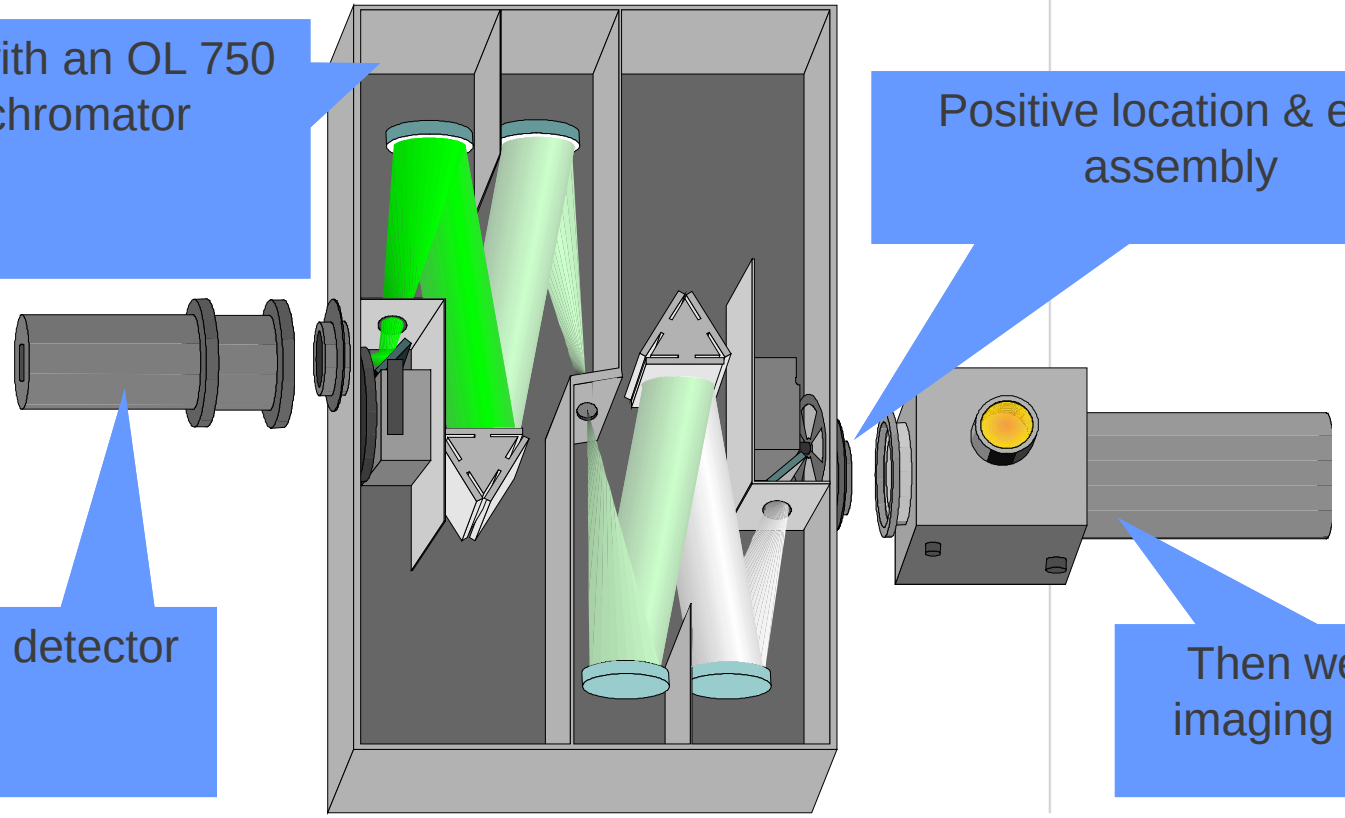


The image is sent via the field-of-view aperture to the spectroradiometer

Radiance Measurement

Putting together an OL 750 radiance system

We start with an OL 750 monochromator

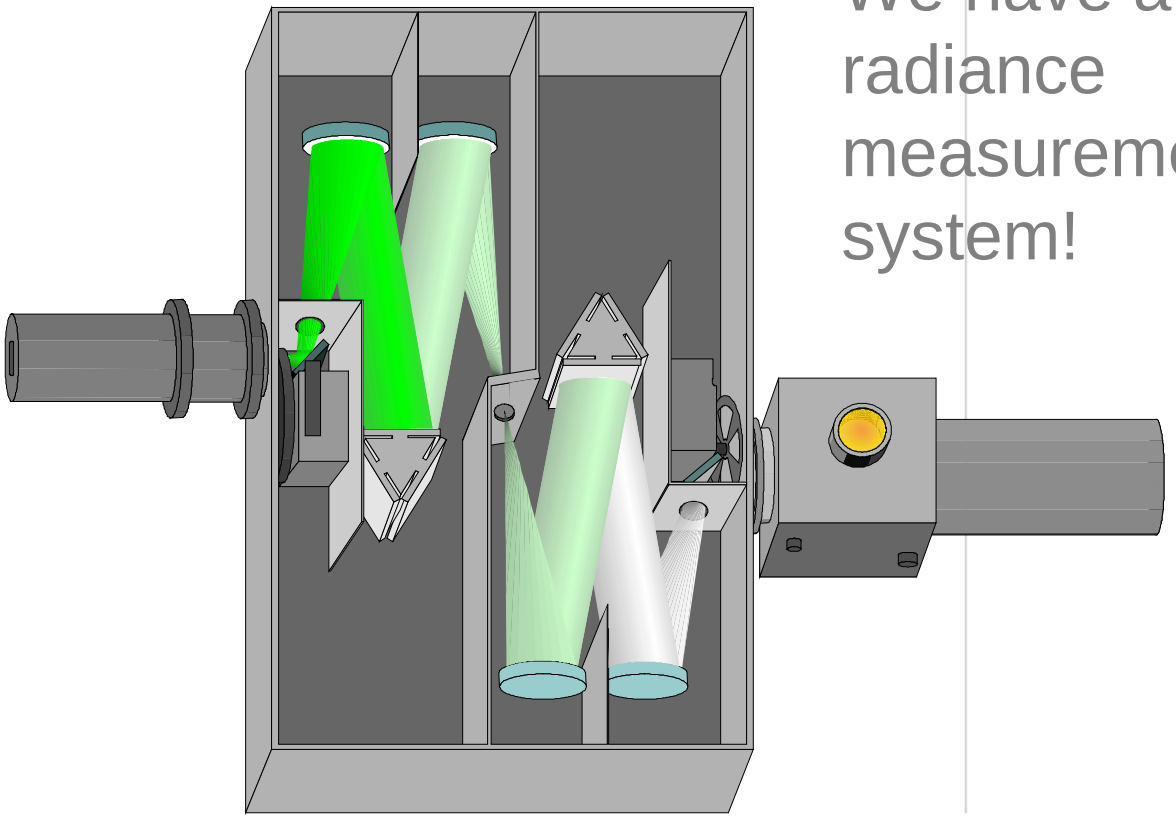


Positive location & easy assembly

And a detector

Then we add the imaging telescope

Radiance Measurement

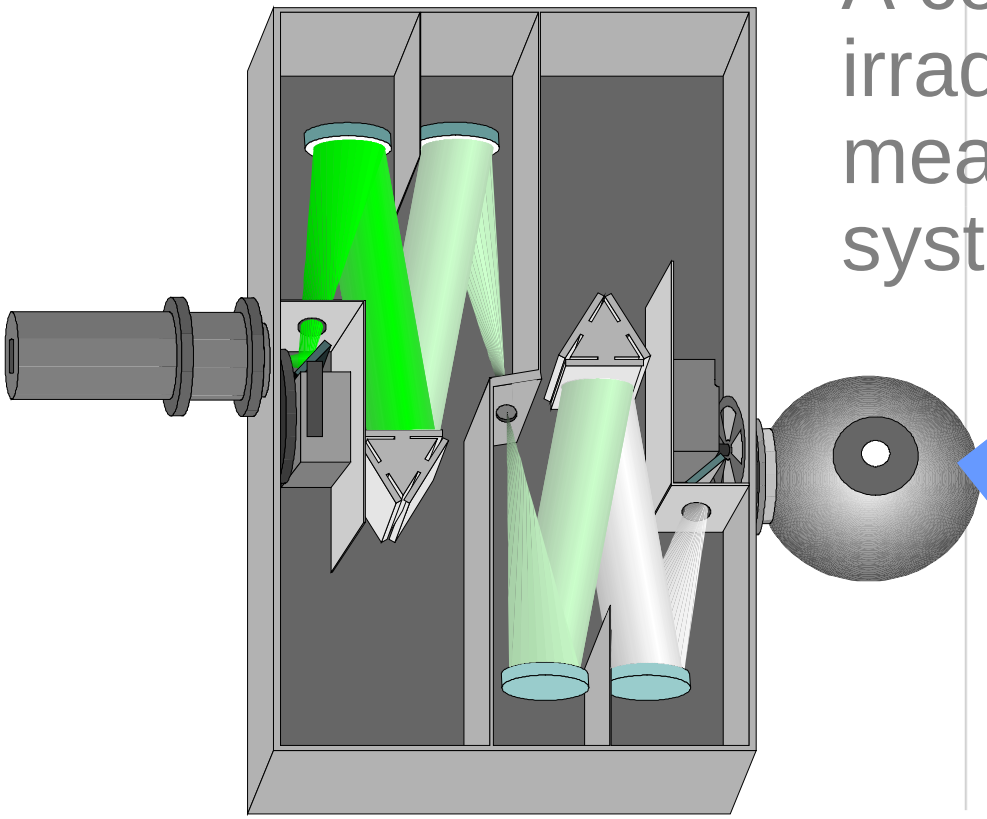


We have a complete radiance measurement system!

Irradiance and Total Flux Measurement

- To measure irradiance (or illuminance), a cosine response integrating sphere such as the OL IS-670 is substituted for the imaging telescope
- To measure total flux, a large sphere (typically 18 to 76 inches) is substituted for the OL 730-9

Irradiance Measurement

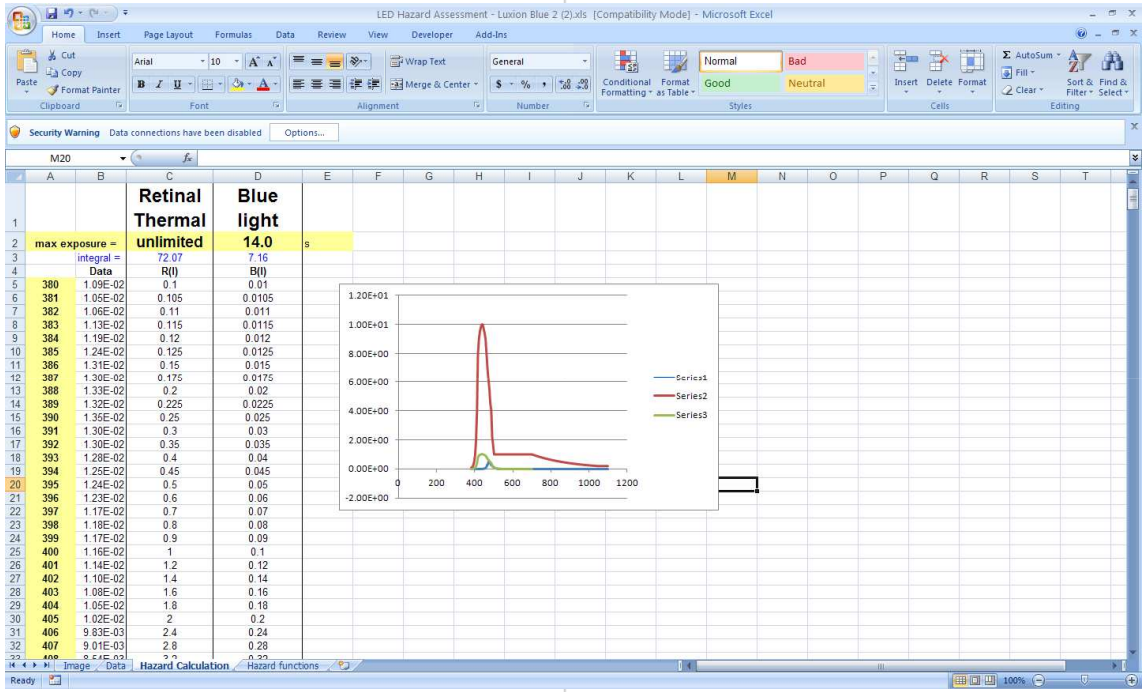


A complete irradiance measurement system

OL IS-670 near-perfect cosine response integrating sphere

Excel IEC 62471 Computation Template

- Library of templates available for a variety of applications.
- Direct reporting capability in OL 750 Application software allows for turn-key operation and analysis of data.
- IEC 62471 Specific parameters can be tailored to facilitate post-capture presentation.



Summary

- Objectives of IEC 62471 are the evaluation and control of optical radiation hazards from lamps at points of human access through standardization of measurement techniques.
- Considers skin, cornea and retinal hazard.
- OL 750D Platform offers all capabilities required to measure, analyze and easily report relevant IEC 62471 quantities.
- Modular and flexible design allow for easy adaptation to other applications beyond IEC 62471.

For more information find us at:

www.GHInstruments.com