

## P5839 Radio and Photometry

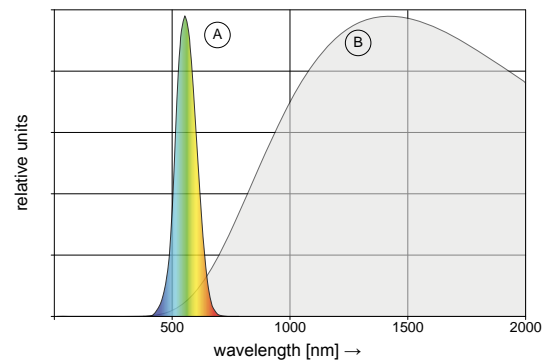
- ✓ Black Body Radiator
- ✓ Thermal and cold light
- ✓ Spectral sensitivity of human eye
- ✓  $V(\lambda)$  filter
- ✓ Photometric units
- ✓ Calibrated radiometer
- ✓ Photometry of:
- ✓ LED and incandescent light
- ✓ Modern energy saving lamps
- ✓  $1/r^2$  Law



### Examples of investigation and measurement

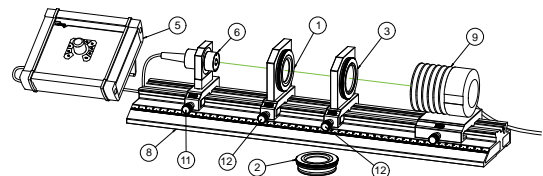
#### $V(\lambda)$ Filter

The figure shown on the right illustrates the relation of the spectral sensitivity of the human eye (A) to the emissions spectrum of an incandescent lamp (B). It becomes clear that most of the energy is wasted which in turn is the reason for the worldwide action to banish incandescent lamps and substitute it against fluorescent or energy saving lamps. The radiometry measures the power of the entire curve (B) and uses Watt as dimension for this power. However the engineer who is responsible for the illumination takes only the fraction of the overlap of curve (A) and (B) because only this part can be seen by the human eye. The dimension of his photometric measurement is the Lumen. For the practical measurements of this photometric units a so called  $V(\lambda)$  filter is used. It has the same spectral curve as the human eye and is placed in front of a radiometer. The combination of such a filter and a calibrated power meter allows the characterization of light sources in photometric units.



#### Photometry of LED

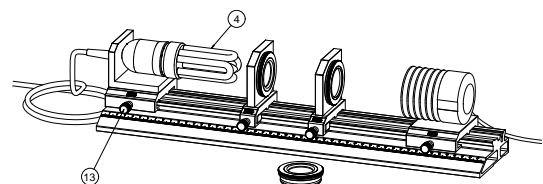
The measurements start with the calibration of a green LED (7). The emission spectrum of the LED is completely covered by the  $V(\lambda)$  filter so that the power meter (8) reading should not be effected by an ideal filter. The comparison of the measurement with and without filter allows the calibration of the filter, provided the entire light spectrum is covered by the filter which is the case for the green emitting LED. In a next step a white light emitting LED is explored and the emission measured in radio and photometric units.



#### Photometry of incandescent and energy saving lamps

In this experiment a modern energy saving lamp (4) which is screwed into the regular E27 socket (13) is compared to an incandescent lamp with the same electrical consumption.

This experiment verifies in an impressive way the advantage of energy saving lamps by applying the science of photometry.



#### P5839 Radio- and Photometry consisting of:

Item	Qty	Description
1	1	$V(\lambda)$ filter in C50 mount
2	1	Diaphragm $\varnothing$ 30 mm in C50 mount
3	1	Imaging optics, C50 mount
4	1	Energy saving lamp E27, 20W/220V
5	1	Adaptive power supply APS-05
6	1	LED white in housing
7	1	LED green in C25 housing

Item	Qty	Description
8	1	Profile rail MG-65, 500 mm
9	1	High sensitive power sensor, 0.3-11 $\mu$ m, CR65
10	1	Laser power meter LabMax-TO
11	1	Mounting plate C25 with carrier 20 mm
12	2	Mounting plate C50 with carrier 20 mm
13	1	Lamp socket E27, CR65