photobiologyLamps Version 0.1.10
Catalogue of Lamps

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1 Introduction

We will plot the emission spectra of the different lamps for which data is provided in the pacakge. We plot side-by-side the lamp output as spectral energy irradiance and as spectral photon irradiance. All spectra are normalized to an area of one under the whole curve.

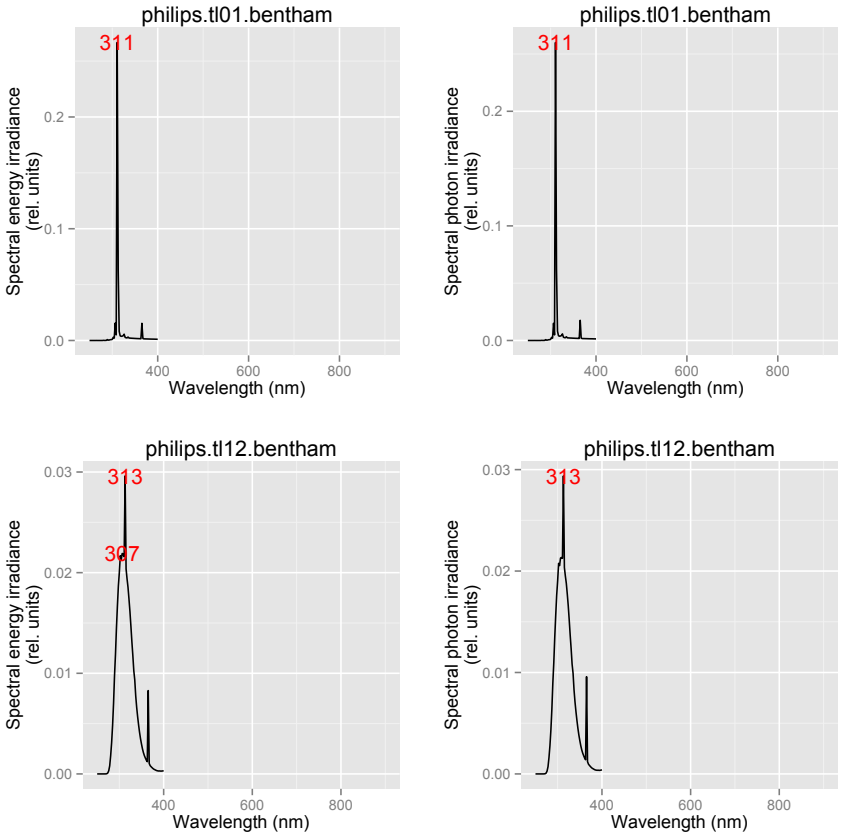
```
library(ggplot2)
library(photobiology)
library(photobiologyLamps)
library(photobiologygg)

## Loading required package:  proto
## Loading required package:  splus2R
## Loading required package:  plyr
```

We define a function to do the actual plotting so as to not repeat code, and to make changes easier in the future.

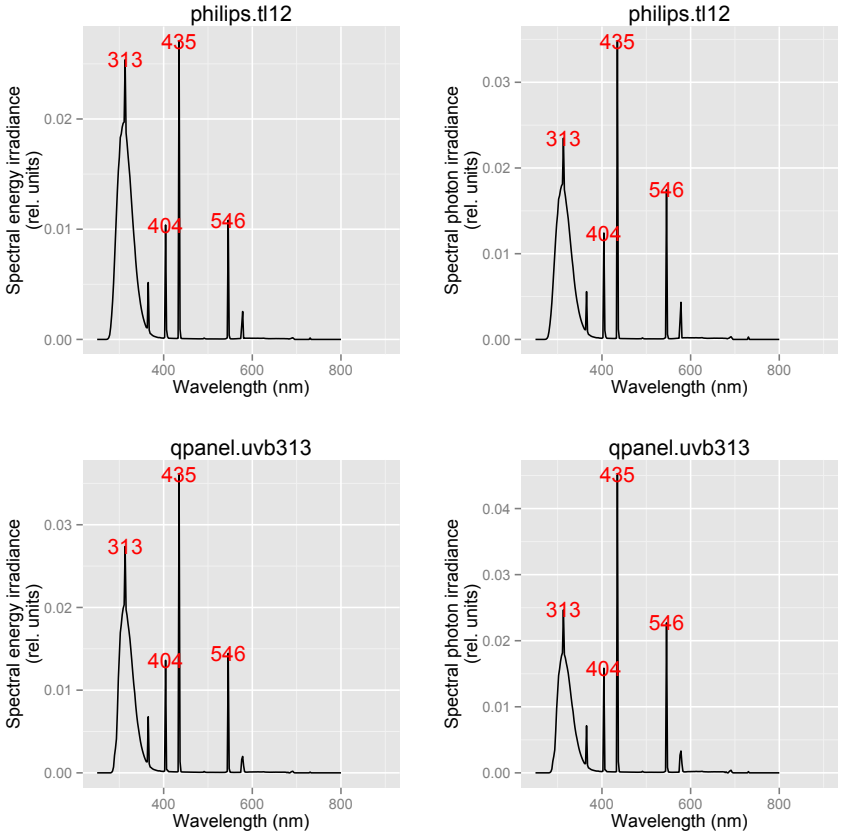
```
lamp.plotter <- function(lamp.name, w.low = 250, w.high = 900, scaled = "area") {
    w.length.out <- seq(from = w.low, to = w.high, length.out = 300)
    spectrum.data <- calc_source_output(w.length.out = w.length.out, source.name = lamp.name,
        scaled = scaled, fill = NULL)
    spectrum.data <- na.omit(spectrum.data)
    fig_energy <- ggplot(aes(x = w.length, y = s.e.irrad), data = spectrum.data) +
        xlim(w.low, w.high) + labs(x = "Wavelength (nm)", y = "Spectral energy irradiance\n(rel. units)",
        title = lamp.name) + geom_line() + stat_peaks(ignore_threshold = 0.33,
        colour = "red")
    fig_photon <- ggplot(aes(x = w.length, y = s.q.irrad), data = spectrum.data) +
        xlim(w.low, w.high) + labs(x = "Wavelength (nm)", y = "Spectral photon irradiance\n(rel. units)",
        title = lamp.name) + geom_line() + stat_peaks(ignore_threshold = 0.33,
        colour = "red")
    print(fig_energy)
    print(fig_photon)
}
```

2 UV-B lamp spectra

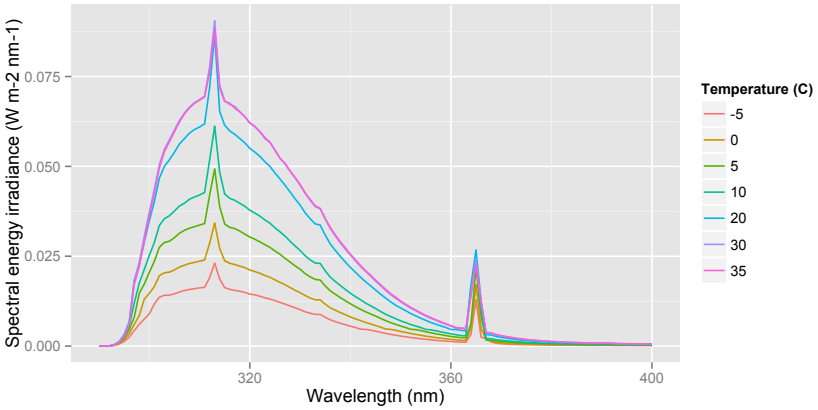
```
UVB.lamps <- c("philips.tl01.bentham", "philips.tl12.bentham")
for (lamp in UVB.lamps) {
    lamp.plotter(lamp.name = lamp)
}
```




```
UVB.M.lamps <- c("philips.tl12", "qpanel.uvb313")
for (lamp in UVB.M.lamps) {
    lamp.plotter(lamp.name = lamp)
}
```

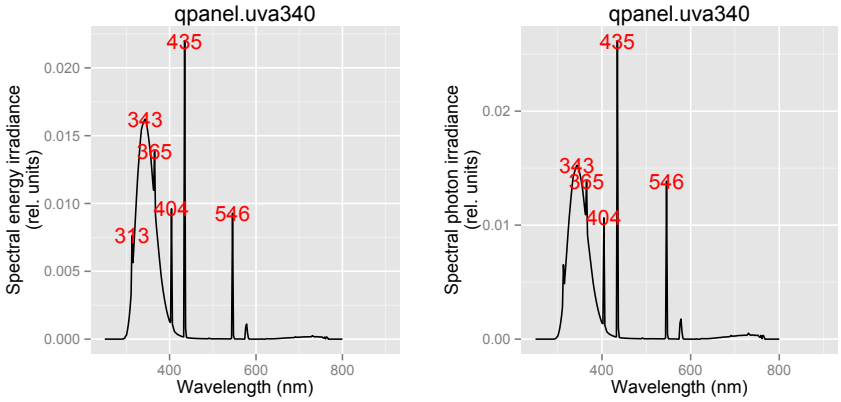



```
fig_temp <- ggplot(data = qpanel.uvb313.temperature.data, aes(x = w.length,
    y = s.e.irrad, colour = factor(temperature)))
fig_temp <- fig_temp + geom_line() + labs(x = "Wavelength (nm)", y = "Spectral energy irradiance (W m-2 nm-1)",
    colour = "Temperature (C)")
print(fig_temp)
```



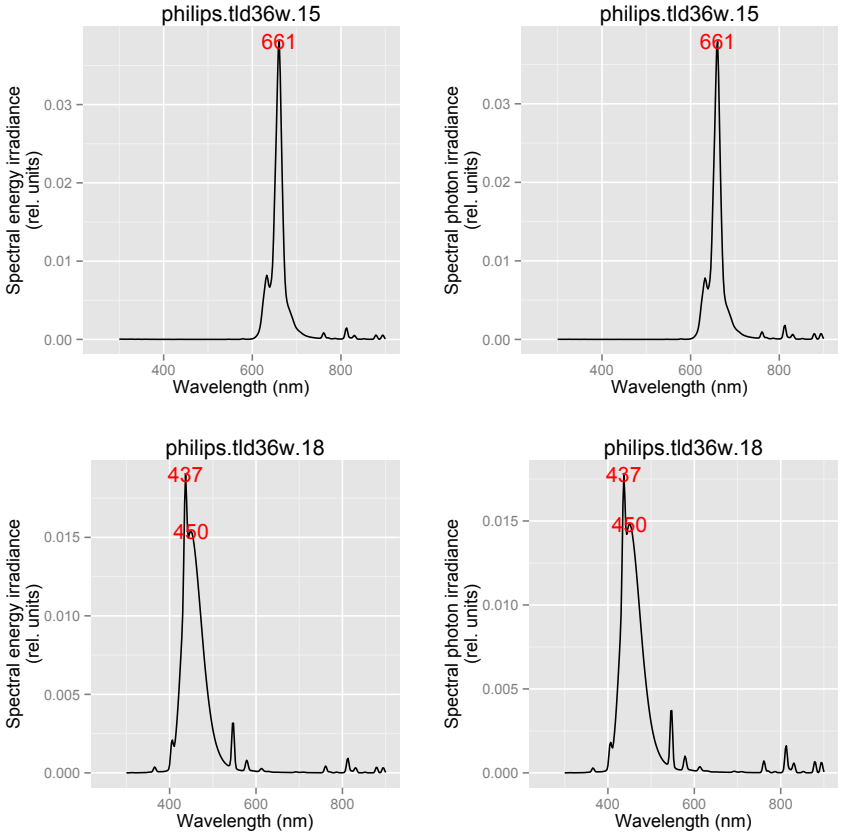
3 UV-A lamp spectra

```
UVA.lamps <- c("qpanel.uva340")
for (lamp in UVA.lamps) {
    lamp.plotter(lamp.name = lamp)
}
```



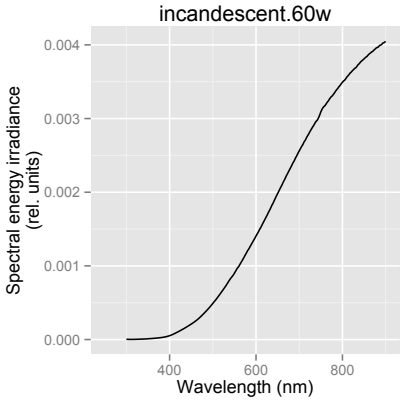
4 Narrow spectrum VIS lamps

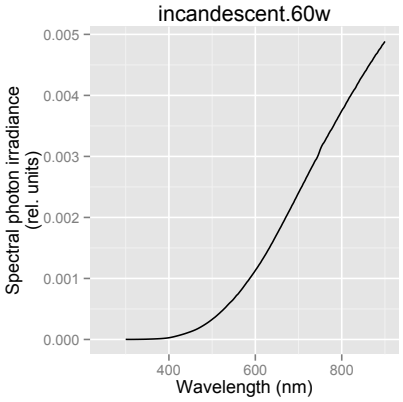
```
colour.lamps <- c("philips.tld36w.15", "philips.tld36w.18")
for (lamp in colour.lamps) {
    lamp.plotter(lamp.name = lamp)
}
```

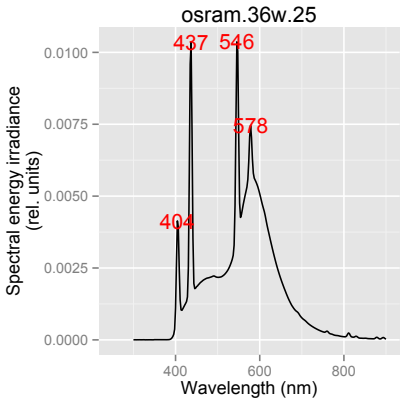


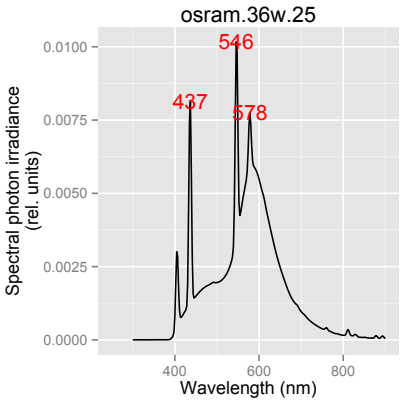
5 Broad VIS lamps

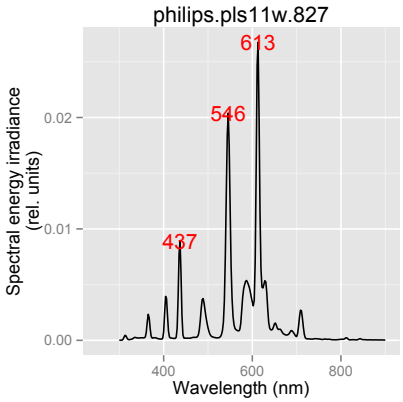
```
white.lamps <- c("incandescent.60w", "osram.36w.25", "philips.pls11w.827", "philips.tld36w.83",
    "philips.tld36w.865", "philips.tld36w.89", "philips.tld36w.92", "philips.tll36w.950",
    "sylvania.215w.vho")
for (lamp in white.lamps) {
    lamp.plotter(lamp.name = lamp)
}
```

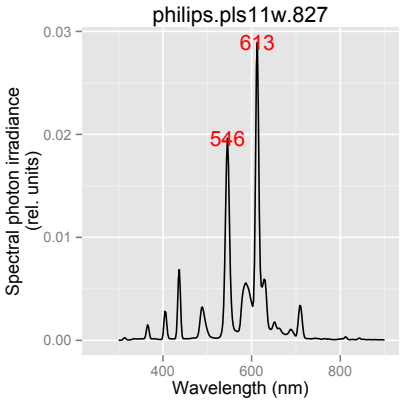

incandescent.60w
Spectral energy irradiance (rel. units)
0.004
0.003
0.002
0.001
0.000
400
600
800
Wavelength (nm)

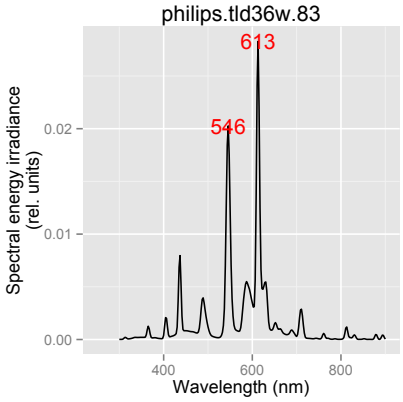

incandescent.60w
Spectral photon irradiance (rel. units)
0.005
0.004
0.003
0.002
0.001
0.000
400
600
800
Wavelength (nm)

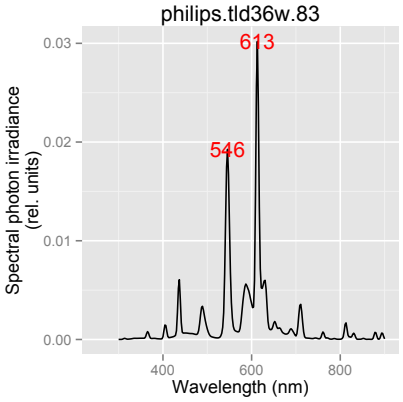

osram.36w.25
Spectral energy irradiance (rel. units)
437
546
578
404
0.0100
0.0075
0.0050
0.0025
0.0000
400
600
800
Wavelength (nm)

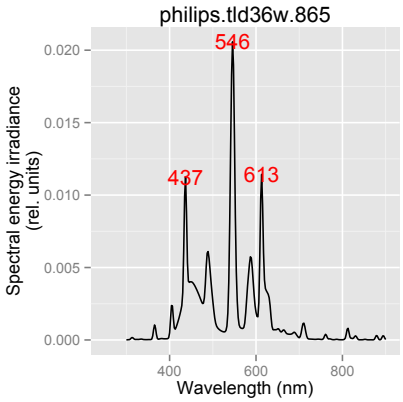

osram.36w.25
Spectral photon irradiance (rel. units)
546
437
578
0.0100
0.0075
0.0050
0.0025
0.0000
400
600
800
Wavelength (nm)

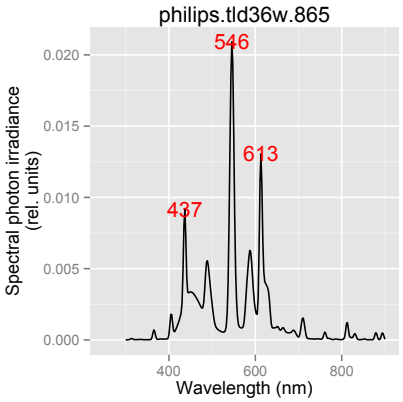

philips.pls11w.827
Spectral energy irradiance (rel. units)
613
546
437
0.02
0.01
0.00
400
600
800
Wavelength (nm)

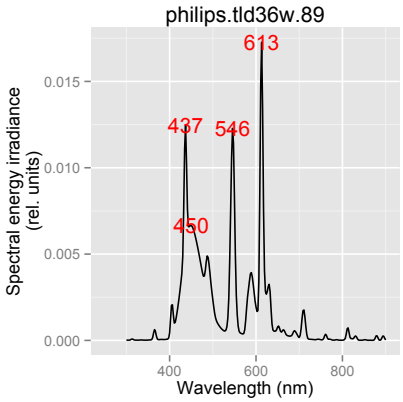

philips.pls11w.827
Spectral photon irradiance (rel. units)
613
546
0.03
0.02
0.01
0.00
400
600
800
Wavelength (nm)

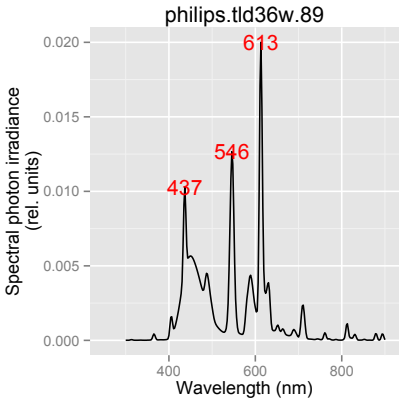

philips.tld36w.83
Spectral energy irradiance (rel. units)
Wavelength (nm)
613
546

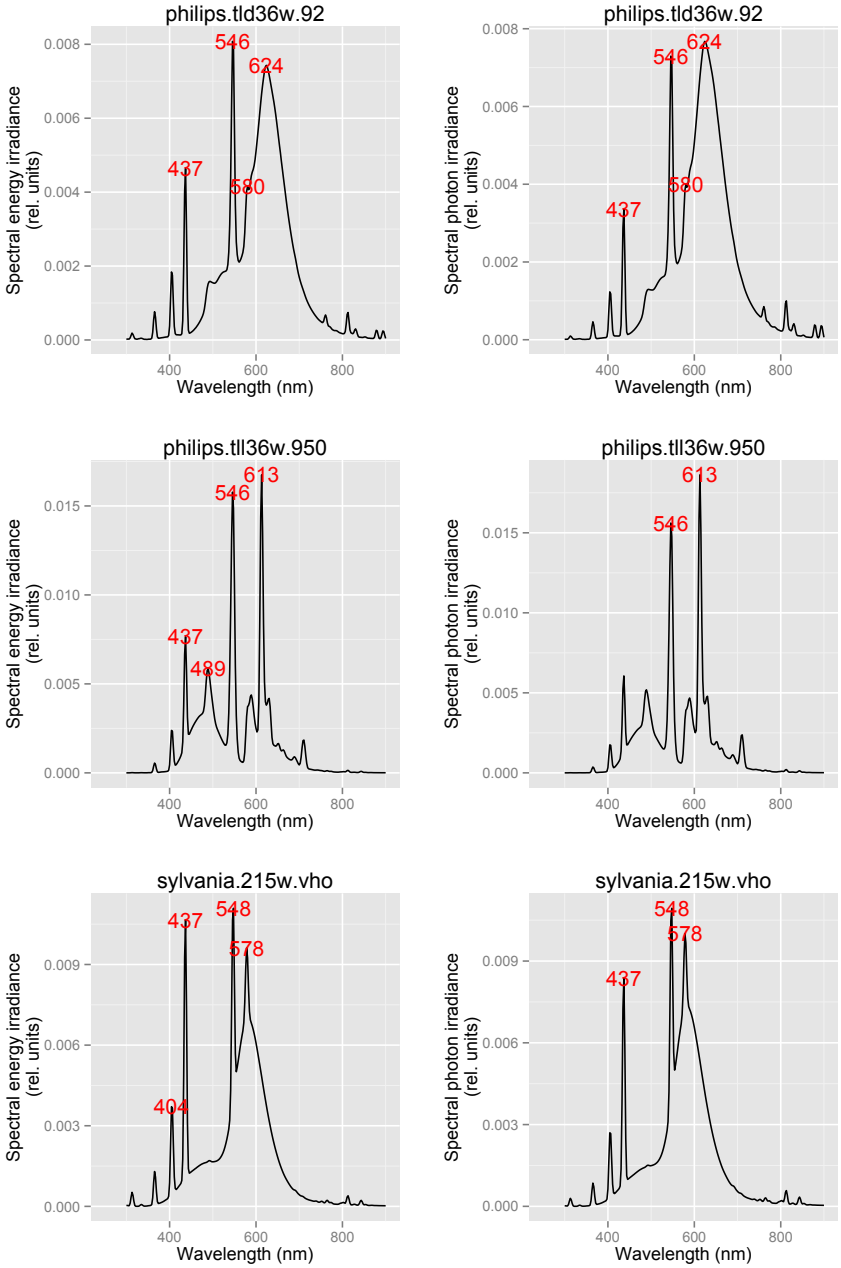

philips.tld36w.83
Spectral photon irradiance (rel. units)
Wavelength (nm)
613
546


philips.tld36w.865
Spectral energy irradiance (rel. units)
Wavelength (nm)
546
437
613


philips.tld36w.865
Spectral photon irradiance (rel. units)
Wavelength (nm)
546
613
437


philips.tld36w.89
Spectral energy irradiance (rel. units)
Wavelength (nm)
613
437
546
450


philips.tld36w.89
Spectral photon irradiance (rel. units)
Wavelength (nm)
613
546
437



6 Calibration lamps

```
FEL.data <- FEL_spectrum(250:900)
D2.data <- D2_spectrum(250:900)
calibration.lamps <- c("FEL", "D2")
for (lamp in calibration.lamps) {
    lamp.plotter(lamp.name = lamp, scaled = NULL)
}
```