photobiologyLamps Version 0.1.12
Catalogue of Lamps

Pedro J. Aphalo

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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.

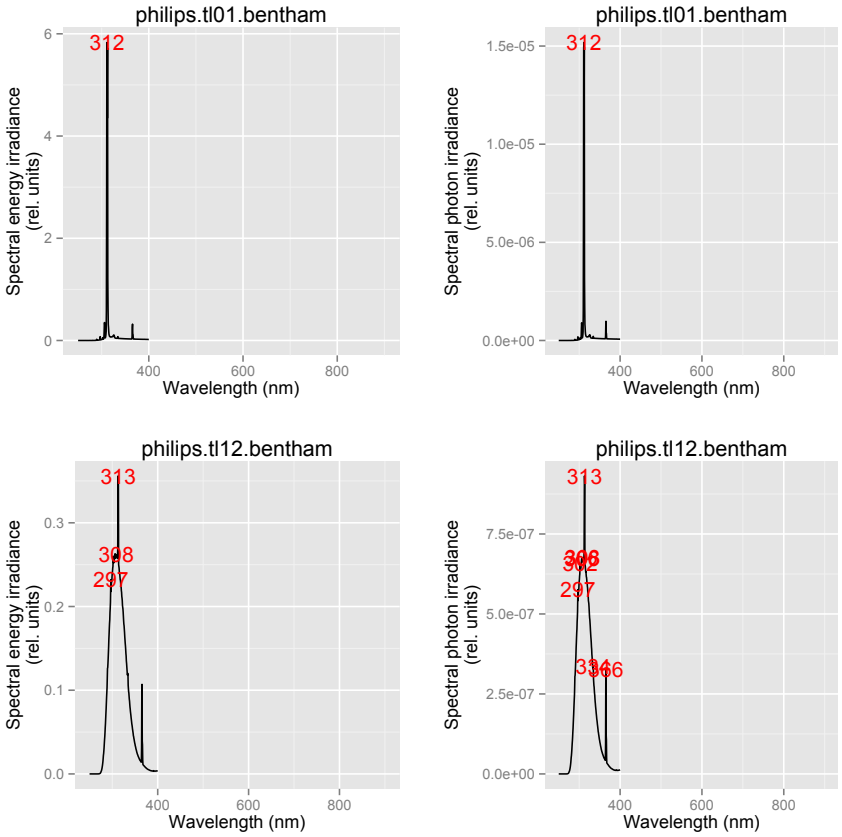
```
library(ggplot2)
library(photobiology)
library(photobiologyLamps)
library(photobiologygg)
```

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

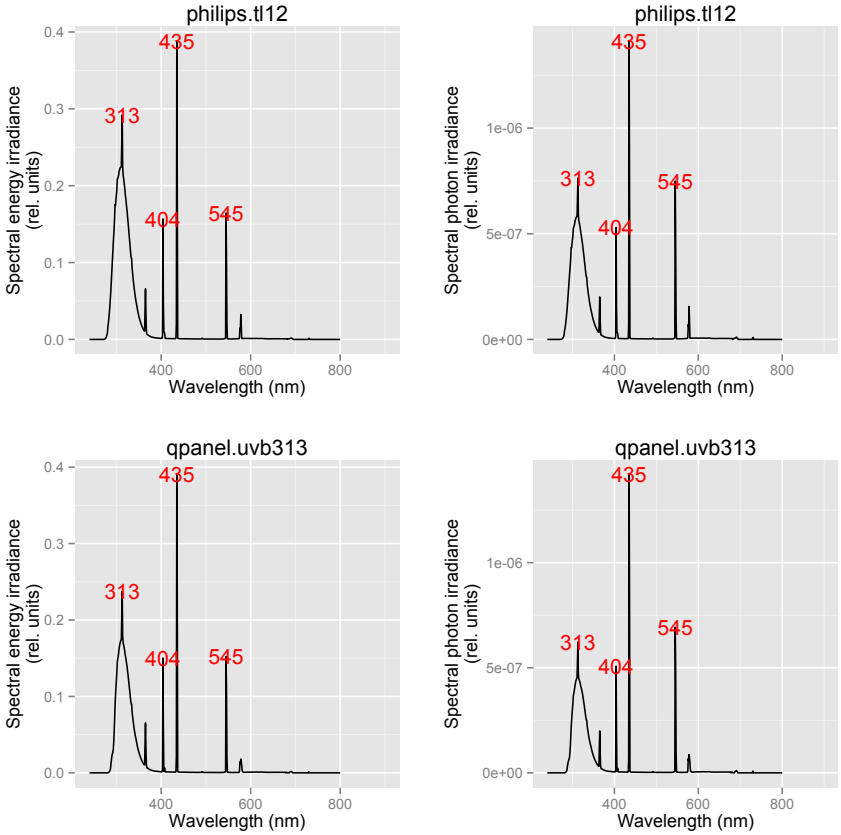
```
lamp.plotter <- function(lamp.name, w.low=250.0, w.high=900.0, scaled="area"){
spectrum.data <- get(paste(lamp.name, ".spct", sep=""))
spectrum.data <- e2q(trim_spct(spectrum.data, high.limit = w.high, fill = NA))
fig_energy <- ggplot(aes(x=w.length, y=s.e.irrad), data=spectrum.data) +
  labs(x="Wavelength (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) +
  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

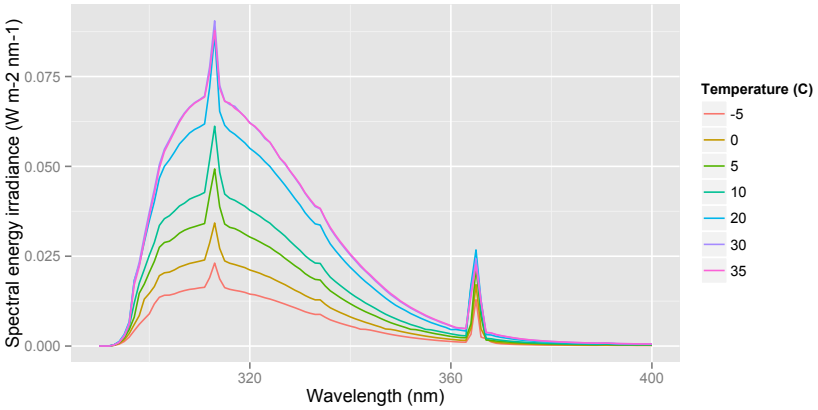
```
UVB.lamps <- c("philips.tl01.bentham", "philips.tl12.bentham")
for (lamp in UVB.lamps) {
  lamp.plotter(lamp.name=lamp)
}
```




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

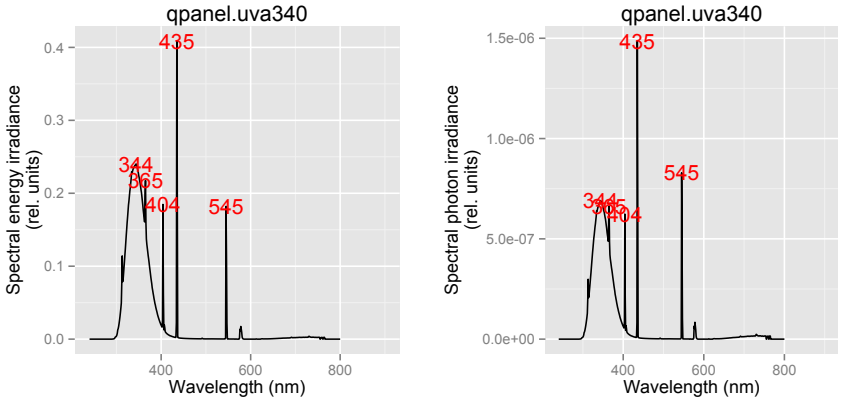



```
fig_temp <- ggplot(data=qpanel.uvb313.temperature.dt,
                   aes(x=w.length, y=s.e.irrad, colour=factor(temperature)))
fig_temp <- fig_temp + geom_line() +
  labs(x="Wavelength (nm)", y="Spectral energy irradiance (W m-2 nm-1)",
       colour="Temperature (C)")
print(fig_temp)
```



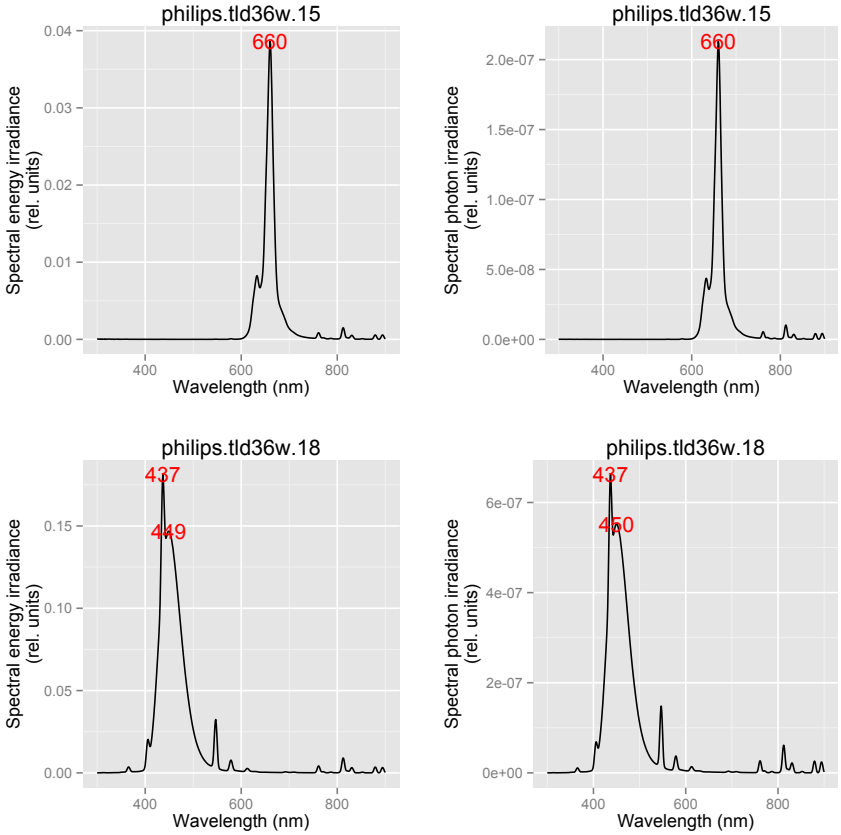
3 UV-A lamp spectra

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



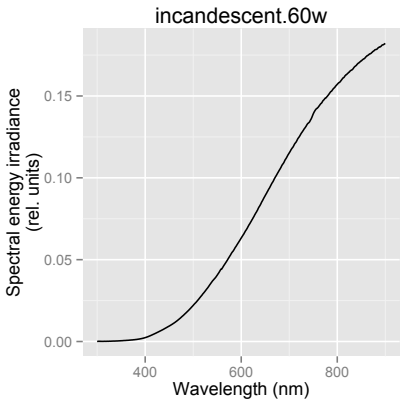
4 Narrow spectrum VIS lamps

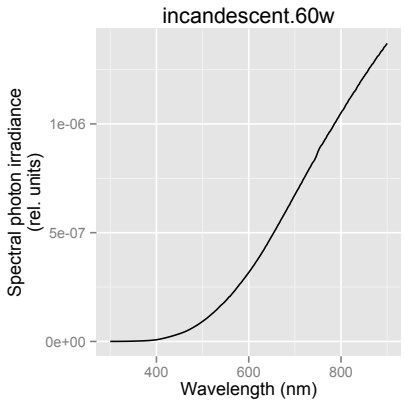
```
colour.lamps <- c("philips.tld36w.15", "philips.tld36w.18")
for (lamp in colour.lamps) {
  lamp.plotter(lamp.name=lamp)
}
```

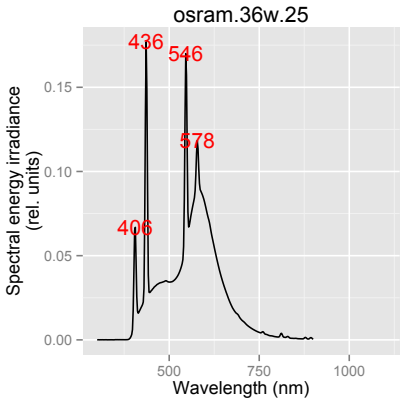


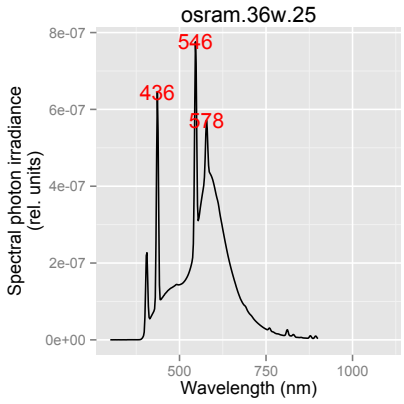
5 Broad VIS lamps

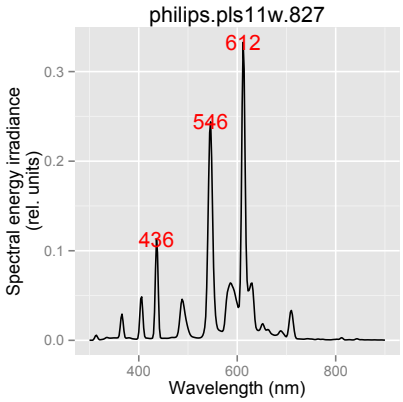
```
white.lamps <- c("incandescent.60w", "osram.36w.25", "philips.pls11w.827",
                 "philips.tld36w.83", "philips.tld36w.865", "philips.tld36w.89",
                 "philips.tld36w.92", "philips.tll36w.950", "sylvania.215w.vho")
for (lamp in white.lamps) {
  lamp.plotter(lamp.name=lamp)
}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

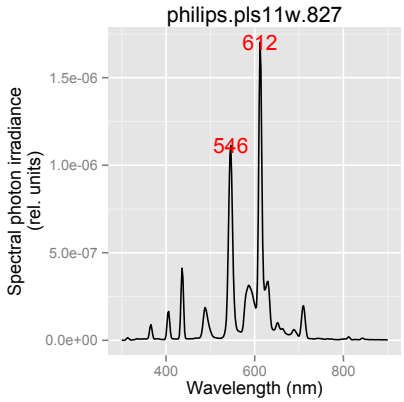

incandescent.60w
Spectral energy irradiance (rel. units)
0.15
0.10
0.05
0.00
400
600
800
Wavelength (nm)

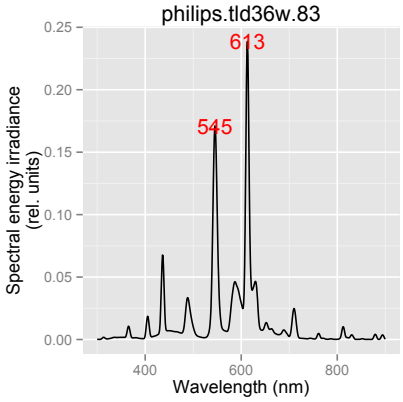

incandescent.60w
Spectral photon irradiance (rel. units)
1e-06
5e-07
0e+00
400
600
800
Wavelength (nm)

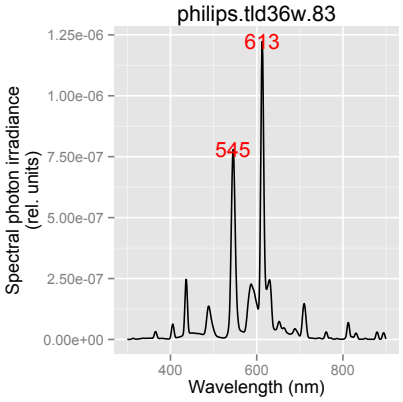

osram.36w.25
436
546
578
406
Spectral energy irradiance (rel. units)
0.15
0.10
0.05
0.00
500
750
1000
Wavelength (nm)

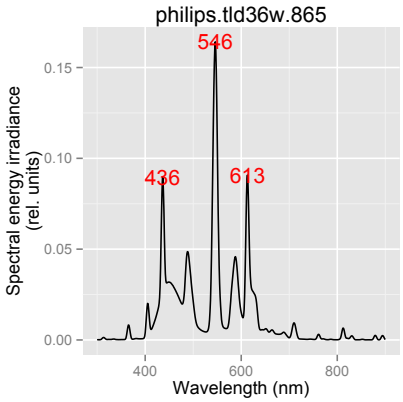

osram.36w.25
546
436
578
Spectral photon irradiance (rel. units)
8e-07
6e-07
4e-07
2e-07
0e+00
500
750
1000
Wavelength (nm)

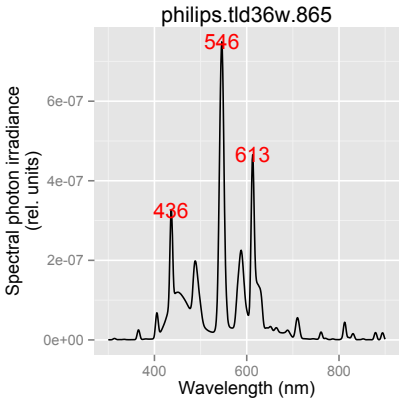

philips.pls11w.827
612
546
436
Spectral energy irradiance (rel. units)
0.3
0.2
0.1
0.0
400
600
800
Wavelength (nm)

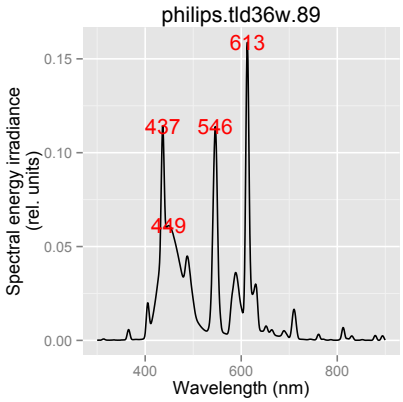

philips.pls11w.827
612
546
Spectral photon irradiance (rel. units)
1.5e-06
1.0e-06
5.0e-07
0.0e+00
400
600
800
Wavelength (nm)

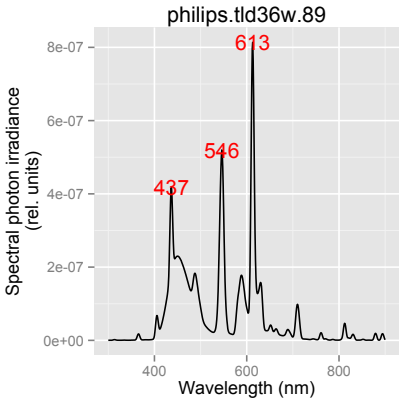

philips.tld36w.83
Spectral energy irradiance (rel. units)
Wavelength (nm)
613
545

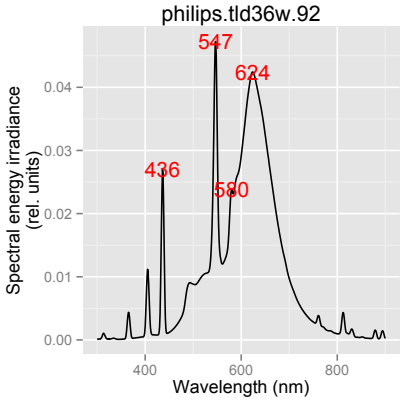

philips.tld36w.83
Spectral photon irradiance (rel. units)
Wavelength (nm)
613
545

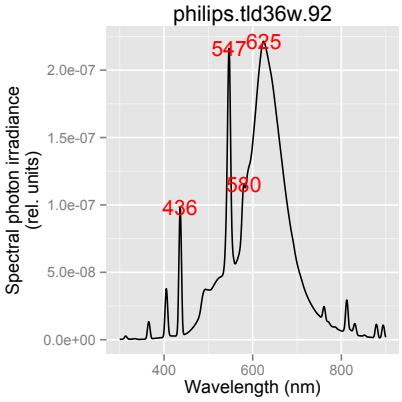

philips.tld36w.865
Spectral energy irradiance (rel. units)
Wavelength (nm)
546
436
613

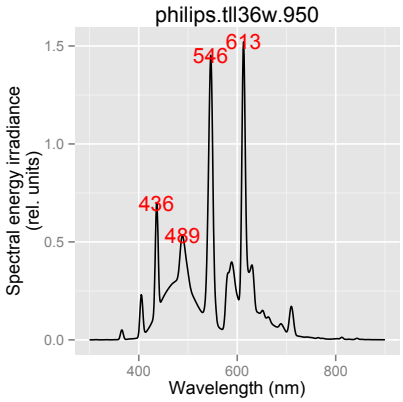

philips.tld36w.865
Spectral photon irradiance (rel. units)
Wavelength (nm)
546
613
436

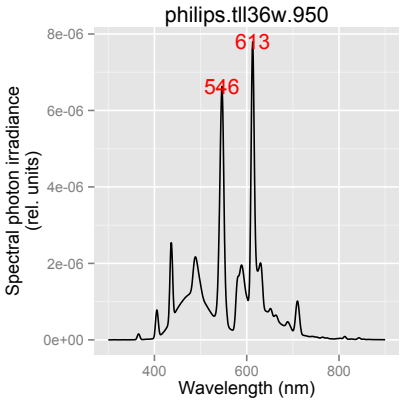

philips.tld36w.89
Spectral energy irradiance (rel. units)
Wavelength (nm)
613
437
546
449

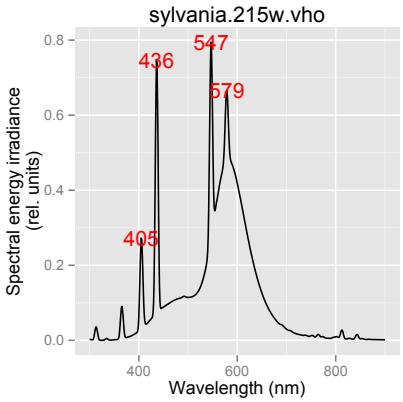

philips.tld36w.89
Spectral photon irradiance (rel. units)
Wavelength (nm)
613
546
437

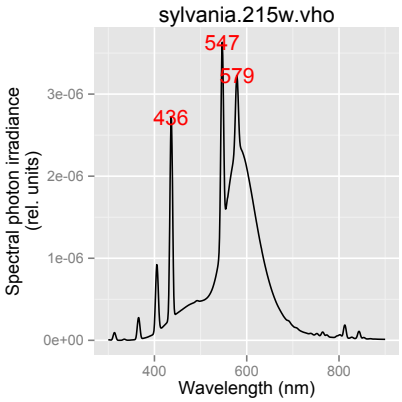












6 Calibration lamps

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