Getting started with RLumCarlo

Sebastian Kreutzer, Johannes Friedrich, Vasilis Pagonis, Christoph Schmidt

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Scope

RLumCarlo is collection of energ-band models to simulate luminescence signal production using Monte-Carlo (MC) methods. This document aims at providing an overview and a brief introduction to RLumCarlo and on how to use the models. The first section, will, however, provide a brief introduction into RLumCarlo and how plot and extracts its data.

A simple exlample

TODO

The models in RLumCarlo

MODEL.NAME	R.CALL	FILES
MC_CW_IRSL_DELOC	run_MC_CW_IRSL_DELOC()	R/run_MC_CW_IRSL_DELOC.R src/MC_C_MC_CW_IRSL_DELOC.cpp
MC_CW_IRSL_LOC	run_MC_CW_IRSL_LOC()	R/run_MC_CW_IRSL_LOC.R src/MC_C_MC_CW_IRSL_LOC.cpp
MC_CW_IRSL_TUN	run_MC_CW_IRSL_TUN()	R/run_MC_CW_IRSL_TUN.R src/MC_C_MC_CW_IRSL_TUN.cpp
MC_ISO_DELOC	run_MC_ISO_DELOC()	R/run_MC_ISO_DELOC.R src/MC_C_MC_ISO_DELOC.cpp
MC_ISO_LOC	run_MC_ISO_LOC()	R/run_MC_ISO_LOC.R src/MC_C_MC_ISO_LOC.cpp
MC_ISO_TUN	run_MC_ISO_TUN()	R/run_MC_ISO_TUN.R src/MC_C_MC_ISO_TUN.cpp
MC_LM_OSL_DELOC	run_MC_LM_OSL_DELOC()	R/run_MC_LM_OSL_DELOC.R src/MC_C_MC_LM_OSL_DELOC.cpp
MC_LM_OSL_LOC	run_MC_LM_OSL_LOC()	R/run_MC_LM_OSL_LOC.R src/MC_C_MC_LM_OSL_LOC.cpp
MC_LM_OSL_TUN	run_MC_LM_OSL_TUN()	R/run_MC_LM_OSL_TUN.R src/MC_C_MC_LM_OSL_TUN.cpp
MC_TL_DELOC	run_MC_TL_DELOC()	R/run_MC_TL_DELOC.R src/MC_C_MC_TL_DELOC.cpp
MC_TL_LOC	run_MC_TL_LOC()	R/run_MC_TL_LOC.R src/MC_C_MC_TL_LOC.cpp
MC_TL_TUN	run_MC_TL_TUN()	R/run_MC_TL_TUN.R src/MC_C_MC_TL_TUN.cpp

Figure 1

```
times <- seq(0, 5000)

## Run MC simulation
run_MC_ISO_TUN(E = 1.2,
           s = 1e10,
           T = 200,
           rho = 0.007,
           times = times) %>%
  plot_RLumCarlo(norm = TRUE, legend = TRUE)
```

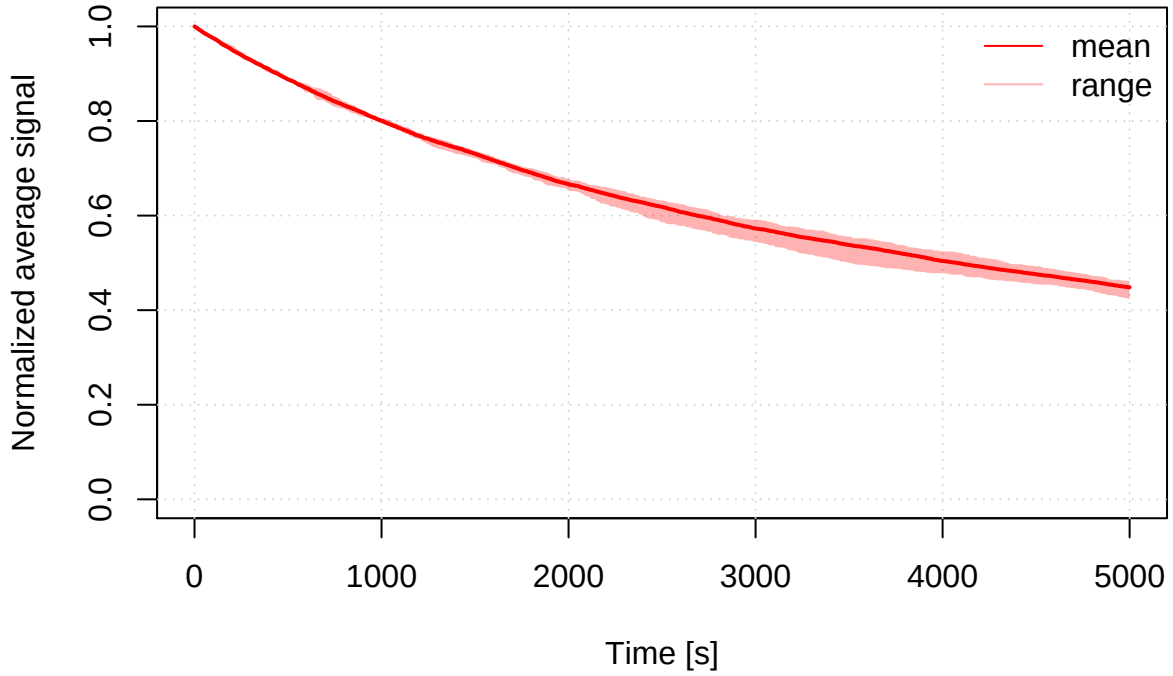

Figure 2

```
times <- seq(0, 1000)

## Run MC simulation
run_MC_CW_IRSL_TUN(A = 0.12, rho = 0.003, times = times) %>%
  plot_RLumCarlo(norm = T, legend = T)

run_MC_CW_IRSL_TUN(A = 0.21, rho = 0.003, times = times) %>%
  plot_RLumCarlo(norm = T, add = T)
```

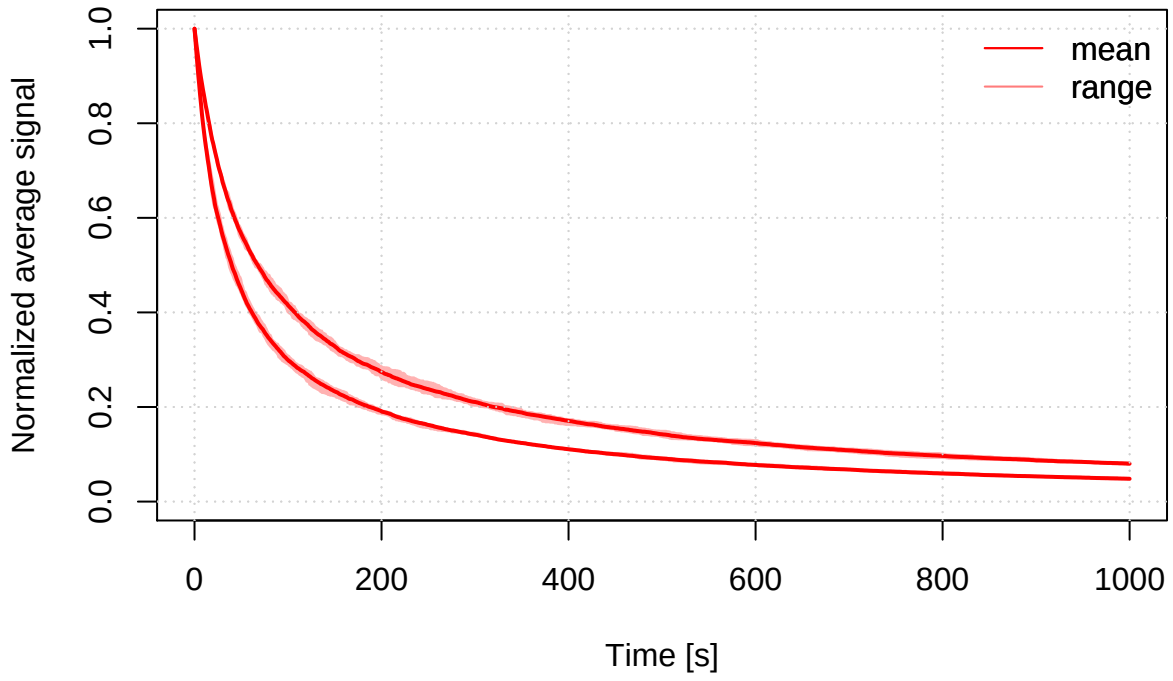

Figure 3

```
s <- 3.5e12
rho <- 0.015
E <- 1.45
r_c <- c(0,0.7,0.77,0.86, 0.97)
times <- seq(100, 450) # time = temperature
results <- lapply(r_c, function(x) {
  run_MC_TL_TUN(
    s = s,
    E = E,
    rho = rho,
    r_c = x,
    times = times
  )

})
```

```
plot_RLumCarlo(
  object = results,
  ylab = "normalized TL signal",
  xlab = "Temperature [°C]",
  plot_uncertainty = "range",
  legend = FALSE,
  col = c("black", "green", "blue", "red"),
  norm = TRUE

)
```

```
## NULL
```

```r
legend(
  "topright",
  bty = "n",
  legend = paste0("r_c: ", r_c),
  lty = 1,
  col = c("black", "green", "blue", "red")
)
```