

Package ‘RLumCarlo’

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Type Package

Title Monte-Carlo Methods for Simulating Luminescence Phenomena

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Description

A collection of functions to simulate luminescence signals with Monte-Carlo methods in the mineral feldspar based on published models.

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License GPL-3

BugReports <https://github.com/R-Lum/RLumCarlo/issues>

Depends R (>= 3.3.0),
utils,
magrittr

URL <https://CRAN.R-project.org/package=RLumModel>

LinkingTo Rcpp,
RcppProgress,
RcppArmadillo

Imports abind,
doParallel,
foreach,
parallel,
methods,
Rcpp

Suggests R.rsp

Encoding UTF-8

VignetteBuilder R.rsp

RoxygenNote 6.1.1

R topics documented:

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calc_RLumCarlo	<i>Plot results from Monte-Carlo simulations with RLumCarlo</i>
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Description

Plot results from Monte-Carlo simulations with RLumCarlo

Usage

```
calc_RLumCarlo(results)
```

Arguments

results [list](#) of class `RLumCarlo_Model_Output`: RLumCarlo simulation output object produced by all

Value

This function returns a [data.frame](#)

Function version

0.1.0

How to cite

Friedrich, J., Kreutzer, S., 2019. `calc_RLumCarlo()`: Plot results from Monte-Carlo simulations with RLumCarlo. Function version 0.1.0. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence Phenomena R package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Johannes Friedrich, University of Bayreuth (Germany), Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS-Université Bordeaux Montaigne, France

plot_RLumCarlo*Plot results from Monte-Carlo simulations with RLumCarlo*

Description

Plot results from Monte-Carlo simulations with RLumCarlo

Usage

```
plot_RLumCarlo(results, times = NULL, plot_uncertainty = TRUE,  
  norm = FALSE, add = FALSE, ...)
```

Arguments

results	data.frame (required)
times	numeric (optinal) : Optional vector for the x-axis
plot_uncertainty	logical (with default) : Enable/disable uncertainty polygon plot
norm	logical (with default) : Normalise curve to the highest intensity
add	logical (with default) : allow overplotting of results
...	further arguments that can be passed to control the plot output. Currently supported are: xlab, xlim, ylim, main, lwd, type, pch, lty,col, grid, legend

Value

This function returns a graphical output

Function version

0.1.0

How to cite

Friedrich, J., Kreutzer, S., 2019. plot_RLumCarlo(): Plot results from Monte-Carlo simulations with RLumCarlo. Function version 0.1.0. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence PhenomenaR package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Johannes Friedrich, University of Bayreuth (Germany), Sebastian Kreutzer, IRAMAT-CRP2A, Université Bordeaux Montaigne (France)

run_MC_CW_IRSL

*Run Monte-Carlo simulation for CW-IRSL***Description**

Run Monte-Carlo simulation for CW-IRSL

Usage

```
run_MC_CW_IRSL(A, rho, times, clusters = 10, r = NULL, N_e = 200,
  method = "seq", output = "signal", ...)
```

Arguments

A	numeric
rho	numeric
times	vector (with default)
clusters	numeric (with default):
r	numeric (with default)
N_e	numeric (with default):
method	character (with default):
output	character (with default):
...	further arguments

Value

This function returns a list.

Function version

0.2.0

How to cite

Friedrich, J., Kreutzer, S., 2019. run_MC_CW_IRSL(): Run Monte-Carlo simulation for CW-IRSL. Function version 0.2.0. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence Phenomena R package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Johannes Friedrich, University of Bayreuth (Germany), Sebastian Kreutzer, IRAMAT-CRP2A, Université Bordeaux Montaigne (France)

References

Pagonis 2017

Examples

```
## Not run:

##=====##
## Example 1: Simulate CW-IRSL measurement
##=====##

run_MC_CW_IRSL(A = 0.12, rho = 0.003, times = 0:1000) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(norm = T, legend = T)

## End(Not run)
```

run_MC_CW_IRSL_DELOC *Run Monte-Carlo simulation for CW-IRSL for GOT model*

Description

```
##TODO
```

Usage

```
run_MC_CW_IRSL_DELOC(A, times, clusters = 10, N_e = 200,
  n_filled = N_e, R, method = "par", output = "signal", ...)
```

Arguments

A	numeric (required)
times	numeric (with default)
clusters	numeric (with default):
N_e	integer (with default)
n_filled	integer (with default)
R	numeric (with default):
method	character (with default):
output	character (with default):
...	further arguments

Details

$$I_{DELOC}(t) = -dn/dt = p(t) * (n^2 / (NR + n(1 - R)))$$

Value

This function returns an [array](#) with dimension length(times) x length(r) x clusters

Function version

0.0.1

How to cite

Kreutzer, S., 2019. run_MC_CW_IRSL_DELOC(): Run Monte-Carlo simulation for CW-IRSL for GOT model. Function version 0.0.1. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence Phenomena R package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS - Université Bordeaux Montaigne (France)

References

##TODO

Examples

```
##=====##
## Example 1: Simulate CW-IRSL
##=====##
## Not run:
run_MC_CW_IRSL_DELOC(
  A = 0.12,
  R = 1,
  times = 0:100) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(legend = T)

## End(Not run)
```

run_MC_CW_IRSL_LOC	<i>Run Monte-Carlo simulation for CW-IRSL for localised transition</i>
--------------------	--

Description

##TODO

Usage

```
run_MC_CW_IRSL_LOC(A, times, clusters = 10, n_filled = 100, r,
  method = "par", output = "signal", ...)
```

Arguments

A	numeric (required)
times	numeric (with default):
clusters	numeric (with default):
n_filled	integer (with default):
r	numeric (with default):
method	character (with default):
output	character (with default):
...	further arguments

Details

$$I_{LOC}(t) = -dn/dt = A * (n^2 / (r + n))$$

Value

This function returns an [array](#) with dimension length(times) x length(r) x clusters

Function version

0.0.1

How to cite

Kreutzer, S., 2019. run_MC_CW_IRSL_LOC(): Run Monte-Carlo simulation for CW-IRSL for localised transition. Function version 0.0.1. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence Phenomena R package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS - Université Bordeaux Montaigne (France)

References

##TODO

Examples

```
##=====##
## Example 1: Simulate CW-IRSL
##=====##
## Not run:
run_MC_CW_IRSL_LOC(
  A = 0.12,
  r = 1,
  times = 0:100) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(legend = T)

## End(Not run)
```

run_MC_ISO

Run Monte-Carlo simulation for isothermal measurements

Description

Run Monte-Carlo simulation for isothermal measurements

Usage

```
run_MC_ISO(E, s, T = 200, rho, times, clusters = 10, r = NULL,
  N_e = 200, method = "par", output = "signal", ...)
```

Arguments

E	numeric (required)
s	numeric (required)
T	numeric (required)
rho	numeric (required)
times	numeric (with default)
clusters	numeric (with default):
r	numeric (with default)
N_e	numeric (with default)
method	character (with default)
output	character (with default)
...	further arguments

Value

This function returns a list.

Function version

0.1.0

How to cite

Friedrich, J., Kreutzer, S., 2019. run_MC_ISO(): Run Monte-Carlo simulation for isothermal measurements. Function version 0.1.0. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence Phenomena R package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Johannes Friedrich, University of Bayreuth (Germany), Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS - Université Bordeaux Montaigne (France)

References

Pagonis 2017

Examples

```
## Not run:
##=====##
## Example 1: Simulate isothermal measurement
##=====##

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



```

E = 1.2,
s = 1e10,
T = 200,
rho = 0.007,
times = times) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(legend = T)

## End(Not run)

```

run_MC_ISO_DELOC

*Run Monte-Carlo simulation for ISO for GOT model***Description**

##TODO

Usage

```
run_MC_ISO_DELOC(s, E, T = 20, times, clusters = 10, N_e = 200,
  n_filled = N_e, R, method = "par", output = "signal", ...)
```

Arguments

s	numeric (required)
E	numeric (required)
T	numeric (with default)
times	numeric (with default)
clusters	numeric (with default):
N_e	integer (with default)
n_filled	integer (with default)
R	numeric (with default):
method	character (with default):
output	character (with default):
...	further arguments

Details

$$I_{DELOC}(t) = -dn/dt = p(t) * (n^2 / (NR + n(1 - R)))$$

Value

This function returns an [array](#) with dimension length(times) x length(r) x clusters

Function version

0.0.1

How to cite

Kreutzer, S., 2019. run_MC_ISO_DELOC(): Run Monte-Carlo simulation for ISO for GOT model. Function version 0.0.1. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence Phenomena R package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS - Université Bordeaux Montaigne (France)

References

##TODO

Examples

```
##=====##
## Example 1: Simulate ITL
##=====##
## Not run:
run_MC_ISO_DELOC(
  s = 3.5e12,
  E = 1.45,
  T = 200,
  R = 1,
  times = 0:10000) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(legend = T)

## End(Not run)
```

run_MC_ISO_LOC

Run Monte-Carlo simulation for ITL for localised transition

Description

##TODO

Usage

```
run_MC_ISO_LOC(s, E, T = 20, times, clusters = 10, n_filled = 100, r,
  method = "par", output = "signal", ...)
```

Arguments

s	numeric (required)
E	numeric (required)
T	numeric (with default)
times	numeric (with default):

clusters	numeric (with default):
n_filled	integer (with default):
r	numeric (with default):
method	character (with default):
output	character (with default):
...	further arguments

Details

$$I_{LOC}(t) = -dn/dt = p(t) * (n^2 / (r + n))$$

Value

This function returns an [array](#) with dimension length(times) x length(r) x clusters

Function version

0.0.1

How to cite

Kreutzer, S., 2019. run_MC_ISO_LOC(): Run Monte-Carlo simulation for ITL for localised transition. Function version 0.0.1. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence PhenomenaR package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS - Université Bordeaux Montaigne (France)

References

##TODO

Examples

```
##=====##
## Example 1: Simulate ITL
##=====##
## Not run:
run_MC_ISO_LOC(
  s = 3.5e12,
  E = 1.45,
  T = 200,
  r = 1,
  times = 0:10000) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(legend = T)

## End(Not run)
```

run_MC_LM_OSL

*Run Monte-Carlo simulation for LM-OSL***Description**

Run Monte-Carlo simulation for LM-OSL

Usage

```
run_MC_LM_OSL(A, rho, times, clusters = 10, r = NULL, delta.r = 0.1,
  N_e = 200, method = "par", output = "signal", ...)
```

Arguments

A	numeric
rho	numeric
times	vector (with default)
clusters	numeric (with default):
r	numeric (with default):
delta.r	numeric (with default):
N_e	numeric (with default):
method	character (with default):
output	character (with default):
...	further arguments

Value

This function returns a list.

Function version

0.1.0

How to cite

Friedrich, J., 2019. run_MC_LM_OSL(): Run Monte-Carlo simulation for LM-OSL. Function version 0.1.0. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence Phenomena R package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Johannes Friedrich, University of Bayreuth (Germany)

References

Pagonis 2017

Examples

```
## Not run:

##TODO: Primary example, should be verified
run_MC_LM_OSL(A = 10000, rho = 0.0001, times = 1:100, clusters = 10, r = NULL,
  delta.r = 0.1,
  N_e = 200, method = "par", output = "signal") %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(norm = T)

## End(Not run)
```

run_MC_LM_OSL_DELOC *Run Monte-Carlo simulation for LM-OSL for GOT model*

Description

##TODO

Usage

```
run_MC_LM_OSL_DELOC(A, times, clusters = 10, N_e = 200,
  n_filled = N_e, R, method = "par", output = "signal", ...)
```

Arguments

A	numeric (required)
times	numeric (with default)
clusters	numeric (with default):
N_e	integer (with default)
n_filled	integer (with default)
R	numeric (with default):
method	character (with default):
output	character (with default):
...	further arguments

Details

$$I_{DELOC}(t) = -dn/dt = p(t) * (n^2 / (NR + n(1 - R)))$$

Value

This function returns an [array](#) with dimension length(times) x length(r) x clusters

Function version

0.0.1

How to cite

Kreutzer, S., 2019. run_MC_LM_OSL_DELOC(): Run Monte-Carlo simulation for LM-OSL for GOT model. Function version 0.0.1. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence Phenomena R package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS - Université Bordeaux Montaigne (France)

References

##TODO

Examples

```
##=====##
## Example 1: Simulate LM-OSL
##=====##
## Not run:
run_MC_LM_OSL_DELOC(
  A = 0.12,
  R = 1,
  times = 0:100) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(legend = T)

## End(Not run)
```

run_MC_LM_OSL_LOC

Run Monte-Carlo simulation for LM-OSL for localised transition

Description

##TODO

Usage

```
run_MC_LM_OSL_LOC(A, times, clusters = 10, n_filled = 100, r,
  method = "par", output = "signal", ...)
```

Arguments

A	numeric (required)
times	numeric (with default):
clusters	numeric (with default):
n_filled	integer (with default):
r	numeric (with default):
method	character (with default):
output	character (with default):
...	further arguments

Details

$$I_{LOC}(t) = -dn/dt = A * (n^2 / (r + n))$$

Value

This function returns an [array](#) with dimension length(times) x length(r) x clusters

Function version

0.0.1

How to cite

Kreutzer, S., 2019. run_MC_LM_OSL_LOC(): Run Monte-Carlo simulation for LM-OSL for localised transition. Function version 0.0.1. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence Phenomena R package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS - Université Bordeaux Montaigne (France)

References

##TODO

Examples

```
##=====##
## Example 1: Simulate LM-OSL
##=====##
## Not run:
run_MC_LM_OSL_LOC(
  A = 0.12,
  r = 1,
  times = 0:100) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(legend = T)

## End(Not run)
```

run_MC_TL

Run Monte-Carlo simulation for TL

Description

Run Monte-Carlo simulation for TL

Usage

```
run_MC_TL(s, E, rho, r_c, times, clusters = 10, N_e = 200,
  delta.r = 0.1, method = "par", output = "signal", ...)
```

Arguments

s	list
E	numeric
rho	numeric
r_c	numeric (with default)
times	vector (with default)
clusters	numeric (with default):
N_e	numeric (with default):
delta.r	numeric (with default):
method	character (with default):
output	character (with default):
...	further arguments

Value

This function returns an **array** with dimension length(times) x length(r) x clusters

Function version

0.1.0

How to cite

Friedrich, J., 2019. run_MC_TL(): Run Monte-Carlo simulation for TL. Function version 0.1.0. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence Phenomena R package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Johannes Friedrich, University of Bayreuth (Germany)

References

Pagonis 2017

Examples

```
## Not run:
##=====##
## Example 1: Simulate TL measurement
##=====##

times <- seq(200, 500) # time = temperature

run_MC_TL(s = 3.5e12,
```



```

        E = 1.45,
        rho = 0.015,
        r_c = 0.85,
        times = times) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(legend = T)

## End(Not run)

```

run_MC_TL_DELOC

*Run Monte-Carlo simulation for TL for GOT model***Description**

##TODO

Usage

```

run_MC_TL_DELOC(s, E, times, clusters = 10, N_e = 200,
  n_filled = N_e, R, method = "par", output = "signal", ...)

```

Arguments

s	numeric (required)
E	numeric (required)
times	numeric (with default)
clusters	numeric (with default):
N_e	integer (with default)
n_filled	integer (with default)
R	numeric (with default):
method	character (with default):
output	character (with default):
...	further arguments

Details

$$I_{DELOC}(t) = -dn/dt = p(t) * (n^2 / (NR + n(1 - R)))$$

Value

This function returns an [array](#) with dimension length(times) x length(r) x clusters

Function version

0.0.1

How to cite

Kreutzer, S., 2019. run_MC_TL_DELOC(): Run Monte-Carlo simulation for TL for GOT model. Function version 0.0.1. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence PhenomenaR package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS - Université Bordeaux Montaigne (France)

References

##TODO

Examples

```
##=====##
## Example 1: Simulate TL
##=====##
## Not run:
run_MC_TL_DELOC(
  s = 3.5e12,
  E = 1.45,
  R = 1,
  times = 100:450) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(legend = T)

## End(Not run)
```

run_MC_TL_LOC

Run Monte-Carlo simulation for TL for localised transition

Description

##TODO

Usage

```
run_MC_TL_LOC(s, E, times, clusters = 10, n_filled = 100, r,
  method = "par", output = "signal", ...)
```

Arguments

s	numeric (required)
E	numeric (required)
times	numeric (with default)
clusters	numeric (with default):
n_filled	integer (with default)

r	numeric (with default):
method	character (with default):
output	character (with default):
...	further arguments

Details

$$I_{LOC}(t) = -dn/dt = p(t) * (n^2/(r + n))$$

Value

This function returns an [array](#) with dimension length(times) x length(r) x clusters

Function version

0.0.1

How to cite

Kreutzer, S., 2019. run_MC_TL_LOC(): Run Monte-Carlo simulation for TL for localised transition. Function version 0.0.1. In: Friedrich, J., Kreutzer, S., Pagonis, V., Schmidt, C., 2019. RLumCarlo: Monte-Carlo Methods for Simulating Luminescence PhenomenaR package version 0.1.0.9000-35. <https://CRAN.R-project.org/package=RLumModel>

Author(s)

Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS - Université Bordeaux Montaigne (France)

References

##TODO

Examples

```
##=====##
## Example 1: Simulate TL
##=====##
## Not run:
run_MC_TL_LOC(
  s = 3.5e12,
  E = 1.45,
  r = 1,
  times = 100:450) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(legend = T)

## End(Not run)
```

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