

# Package ‘zeitgebr’

May 6, 2018

**Title** Analysis of Circadian Behaviours

**Date** 2018-05-05

**Version** 0.0.0.9000

**Description** Computes period, rhythmicity and other circadian variables.

**Depends** R (>= 3.00),  
behavr,  
lomb,  
pracma

**Imports** data.table

**Suggests** testthat,  
covr,  
knitr

**Remotes** rethomics/behavr

**License** GPL-3

**Encoding** UTF-8

**LazyData** true

**URL** <https://github.com/rethomics/zeitgebr>

**BugReports** <https://github.com/rethomics/zeitgebr/issues>

**RoxygenNote** 6.0.1

**Roxygen** list(markdown = TRUE)

## R topics documented:

|                               |   |
|-------------------------------|---|
| dams_sample . . . . .         | 2 |
| find_peaks . . . . .          | 2 |
| periodogram . . . . .         | 3 |
| periodogram_methods . . . . . | 4 |

|              |          |
|--------------|----------|
| <b>Index</b> | <b>6</b> |
|--------------|----------|

---

|             |   |
|-------------|---|
| dams_sample | <i>A behavr table with approximatly ten days of DAM2 recording for 32 fruit flies. The first 10, the following 11 and the last 11 animals have long, short and wild type period, respectively (see meta(dams_sample)). Raw data stored at <a href="https://github.com/rethomics/zeitgebr/tree/master/raw_data">https://github.com/rethomics/zeitgebr/tree/master/raw_data</a></i> |
|-------------|---|

---

### Description

A behavr table with approximatly ten days of DAM2 recording for 32 fruit flies. The first 10, the following 11 and the last 11 animals have long, short and wild type period, respectively (see meta(dams\_sample)). Raw data stored at [https://github.com/rethomics/zeitgebr/tree/master/raw\\_data](https://github.com/rethomics/zeitgebr/tree/master/raw_data)

### Usage

```
dams_sample
```

### Format

An object of class behavr (inherits from data.table, data.frame) with 415040 rows and 3 columns.

### Author(s)

Maite Ogueta

---

|            |                                    |
|------------|------------------------------------|
| find_peaks | <i>Find peaks in a periodogram</i> |
|------------|------------------------------------|

---

### Description

Locate the peaks in a pregenerated periodogram. Detection is based on [pracma::findpeaks](#). Only the significant (with threshold 'alpha') peaks are extracted.

### Usage

```
find_peaks(data, n_peaks = 3)
```

### Arguments

|         |   |
|---------|---|
| data    | <a href="#">behavr::behavr</a> table representing a periodogram, as returned by <a href="#">periodogram</a> |
| n_peaks | maximal numbers of peak to be detected  |

**Value**

`behavr::behavr` table that is data with an extra column `peak`. `peak` is filled with zeros except for rows match a peak. In which case, they have an integer value corresponding to the rank of the peak (e.g. 1 for the first peak).

**Examples**

```
data(dams_sample)
per_dt_xs <- periodogram(activity, dams_sample, FUN=chi_sq_periodogram)
per_dt_xs_with_peaks <- find_peaks(per_dt_xs)
per_dt_xs_with_peaks[peak==1]
## Not run:
ggetho::ggperio(per_dt_xs_with_peaks) + geom_line() +
geom_line(aes(y=signif_threshold), colour="blue") +
geom_point(data = per_dt_xs_with_peaks[peak==1], col="red") +
facet_wrap( ~ id, ncol = 8, labeller = id_labeller)

## End(Not run)
```

---

|             |                              |
|-------------|------------------------------|
| periodogram | <i>Computes periodograms</i> |
|-------------|------------------------------|

---

**Description**

This function builds peroidograms, with one of several methods, for each individual of `behavr` table

**Usage**

```
periodogram(var, data, period_range = c(hours(16), hours(32)),
  resample_rate = 1/mins(15), alpha = 0.01, FUN = chi_sq_periodogram, ...)
```

**Arguments**

|                            |   |
|----------------------------|---|
| <code>var</code>           | variable to analyse   |
| <code>data</code>          | <code>behavr</code> table   |
| <code>period_range</code>  | vector of size 2 defining minimal and maximal range of period to study (in seconds) |
| <code>resample_rate</code> | frequency to resample (up or down) the data at (in hertz)                           |
| <code>alpha</code>         | significance level  |
| <code>FUN</code>           | function used to compute periodogram (see <a href="#">periodogram_methods</a> )     |
| <code>...</code>           | additional arguments to be passed to <code>FUN</code>                               |

**Value**

a `behavr` table with `TODO`

## Examples

```
data(dams_sample)
pdt <- periodogram(activity, dams_sample, FUN=ls_periodogram, oversampling = 4)
pdt <- periodogram(activity, dams_sample, FUN=chi_sq_periodogram)
```

---

periodogram\_methods      *Methods For Computing Periodograms*

---

## Description

These functions provides a series of methods to assess periodicity of circadian processes.

## Usage

```
ac_periodogram(x, period_range = c(hours(16), hours(32)),
  sampling_rate = 1/mins(1), alpha = 0.05)

chi_sq_periodogram(x, period_range = c(hours(16), hours(32)),
  sampling_rate = 1/mins(1), alpha = 0.05, time_resolution = hours(0.1))

fourier_periodogram(x, period_range = c(hours(16), hours(32)),
  sampling_rate = 1/mins(1), alpha = 0.05)

ls_periodogram(x, period_range = c(hours(16), hours(32)),
  sampling_rate = 1/mins(1), alpha = 0.05, oversampling = 8)
```

## Arguments

|                 |   |
|-----------------|---|
| x               | numeric vector  |
| period_range    | vector of size 2 defining minimal and maximal range of period to study (in seconds) |
| sampling_rate   | the – implicitly regular – sampling rate of x (in hertz)                            |
| alpha           | significance level  |
| time_resolution | the resolution of periods to scan   |
| oversampling    | the oversampling factor   |

## Value

a [data.table](#) with the columns:

- period – the period (in s)
- power – the power (or equivalent) for a given period
- p\_value – the significance of the power
- signif\_threshold – the significance threshold of the power (at alpha)

**See Also**

- [lomb::lsp](#) the original function for `ls_periodogram`
- [xsp::chiSqPeriodogram](#) (code modified from)
- [acf](#) the original function for `ac_periodogram`

# Index

## \*Topic **datasets**

- dams\_sample, [2](#)
- ac\_periodogram (periodogram\_methods), [4](#)
- acf, [5](#)
- beavr, [3](#)
- beavr::beavr, [2](#), [3](#)
- chi\_sq\_periodogram  
    (periodogram\_methods), [4](#)
- dams\_sample, [2](#)
- data.table, [4](#)
- find\_peaks, [2](#)
- fourier\_periodogram  
    (periodogram\_methods), [4](#)
- lomb::lsp, [5](#)
- ls\_periodogram (periodogram\_methods), [4](#)
- periodogram, [2](#), [3](#)
- periodogram\_methods, [3](#), [4](#)
- pracma::findpeaks, [2](#)
- xsp::chiSqPeriodogram, [5](#)