

Status of the LIGO/LSC Algorithm Library (LAL)

<http://www.lsc-group.phys.uwm.edu/lal/>

OVERVIEW

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I Purpose of the LAL

- ◇ To provide a set of functions sharing a common interface and error checking/reporting scheme.
- ◇ To specify a common standard for coding and documentation.
- ⇒ To produce data-analysis code that is tested, portable, and easy to maintain.

Carrot: “...a software specification that fosters widespread-use and collaborative-development of a well-tested analysis library.”

Stick: “In turn, all participating groups will be required to analyze LIGO data using LAL-compliant software.”

(From the LAL specification)

II Base functionality

hello

template Example packages.

sample

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std

Packages providing basic LAL structures, constants, macros, and essential but non-compliant functions.

support

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factories

Packages providing basic manipulation of LAL structures.

date

tools

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utilities

Packages providing useful numerical routines.

vectorops

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comm

MPI communication routines.

III Common data analysis packages

`fft` Interface to FFTW Fourier transform functions.

`framedata` Routines for reading frames.

`noisemodels` Routines to generate simulated noise for various interferometers.

`window` Routines for windowing data.

`tdfilter` Generic time-domain filtering functions.

`clremoval` Coherent line removal functions for cleaning line noise from data.

IV Packages for inspiral sources

`fct` Functions to perform the Fast Chirp Transform to detect generic chirping waveforms.

`inspiral` Modules for generating binary inspiral waveforms.

`bank` Routines to lay out a bank of inspiral templates.

`findchirp` Functions to perform matched filtering to detect detect binary inspirals.

V Packages for continuous/stochastic sources

`pulsar` Functions for demodulating data to search for quasi-periodic signals. **Under development.**

`stochastic` Functions to compute the the cross correlation statistic for two interferometers. **Major revisions planned.**

VI Packages for unmodeled bursts

`timefreq` Functions to compute a time-frequency plane using various types of T-F transformations.

`tracksearch` Functions to search a time-frequency plane for generic curvilinear features.

`burstsearch` Functions to search for excess power in various areas of time-frequency space.

VII Interface with LDAS

- ◇ LAL-compliant multi-processor search code is linked with a translator package (`lalwrapper`) and compiled to a dynamic shared object library.
- ◇ The shared-object library is loaded and executed by a process (`wrapperAPI`) that runs on an LDAS system.
- ◇ At present, the following shared-object libraries have been developed and tested under LDAS:
 - ▷ `libinspiral.so`, implementing search code from the package `findchirp`
 - ▷ `libpower.so`, implementing search code from the package `burstsearch`