

Analysis Software in the Burst Group

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For the Burst Analysis Group

LSC Meeting
August 18, 2004

LIGO-G040377-01-Z



Existing Burst Search Software (currently used for science results)

■ WaveBurst

- » Burst detection algorithm based on a wavelet time-frequency decomposition.
- » In order to run ONCE on x3 IFO S2 data (1Msec) it requires 14x(2.66GHz)
- » It is under the LAL software project and runs under the LDAS job scheduling.
- » The review of the algorithm/method in its current implementation is complete.
- » The current implementation of this method will no longer be used.
- » There are two changes that are being introduced: (a) CONDORization of existing LAL-based algorithm which will fall under the LALapps (LAL/CONDOR) software project (b) DMT/CONDOR-based algorithm that will fall under the gridDMT software project.

■ TFCLUSTERS

- » Burst detection algorithm based on a Fourier time-frequency decomposition.
- » It is under the LAL software project and runs under the LDAS job scheduling as well as CONDOR. Both versions have been used for results so far.
- » The review of the algorithm/method in its current implementation is in progress.
- » The LAL/CONDOR version of TFCLUSTERS will prevail in future use of the software.
- » Future major upgrades that are considered include a coherent version

■ BlockNormal

- » Burst detection algorithm based on change point statistics of band-filtered data.
- » It is under the MatApps software project (compiled MATLAB code using CONDOR for job scheduling).
- » The review of the algorithm/method in its current implementation is in progress.

Existing Burst Search Software (currently used for science results)

■ **Excess Power**

- » Burst detection algorithm based on a Fourier time-frequency decomposition.
- » Current implementation runs x10 faster than real time in 1 CPU- pending modifications will bring it to O(real-time) on 1 CPU
- » It is under the LAL software project and runs under the CONDOR job scheduling.
- » The review of the algorithm/method in its current implementation is in progress.
- » Future major upgrades that are considered include a coherent version

■ **R-statistic**

- » Waveform consistency test based on the normalized linear coefficient of two time series (performed in time domain)
- » It is under the MATLAB software project and runs under the CONDOR job scheduling.
- » The review of the algorithm/method in its current implementation is complete
- » The next version will be part of CorrPower, an algorithm incorporating r-statistic, the external trigger XCsize and a continuous search on cross-correlated power. In its future form, the algorithm will run both under MATLAB and DMT environments.

■ **XCsize**

- » Time-domain cross-correlation used in the externally triggered search
- » It is under the MATLAB software project
- » The review of the algorithm/method in its current implementation is complete.
- » Next version will be incorporated in CorrPower and will run in near-real time together with r-statistic and correlated power search.



Existing Burst Search Software (used in detector char and data qual)

- **WaveMon**
 - » Burst detection algorithm based on wavelet time-frequency decomposition.
 - » It is under the DMT software project .
 - » No (known) review of the algorithm.
 - » Future plans for this algorithm follow plans for **WaveBurst**
- **glitchMon/Z-glitch/PTmon**
 - » Burst detection algorithms based on filtered time-domain data
 - » It runs under DMT environment.
 - » No (known) reviews of the algorithms.
- **kleineWelle**
 - » Burst detection algorithm based on dyadic wavelet time-frequency transform.
 - » It runs under MATLAB and DMT
 - » No review of the algorithm.



Existing Burst Search Software (used in some way)

■ Slope

- » Time-domain burst detection algorithm used in S1 analysis but not since then.
- » It is under the LAL software project and runs under the LDAS job scheduling.
- » No (known) review of the algorithm.
- » Future plans for this algorithm include the reviving in its LAL/LDAS version and a MATLAB version – see ASIS talk by Amber Stuver

■ Q-transform

- » Burst detection algorithm based on a Fourier time-frequency decomposition.
- » It runs under MATLAB/CONDOR environment.
- » No review of the algorithm.
- » Future changes that are considered include a DMT version.

■ Pulse train

- » Time domain analysis coupled to the external trigger cross-correlation
- » It runs under MATLAB
- » No review of the algorithm



Existing Burst Search Software (used in some way)

- Track search
 - » Time-frequency ridge detection
 - » Implemented in LALapps
 - » No (known) review
 - » See ASIS talk by Charlie Torres
- KSCD
 - » Non-parametric time-frequency change-point detection
 - » Implemented in MATLAB
 - » No (known) review



Existing Matched Filtering Burst Search Software

- Ringdown
 - » It is under the LAL software project and runs under standalone/CONDOR
 - » No (known) review
- Cosmic string cusps
 - » It is under the LAL software project and runs under standalone/CONDOR
 - » No (known) review
- Supernovae
 - » It is under the MATLAB software project
 - » No (known) review



Future Burst Search Software (considered)

- Burst parameter estimation code
 - » May be derived from existing TFCLUSTERS algorithm or built from scratch
 - » General purpose burst parameter extraction starting from raw time series and guided from time-frequency volume defined from other triggers
- ...
- ...

Burst Group Software Summary

Software	Reviewed?	LALWrapper	LALApps	Matlab	DMT	Other
WaveBurst	Yes	Yes	Future		Future	
TFClusters	In progress	Yes	Yes			
Block Normal	In progress			Yes		
Excess Power	In progress		Yes			
r-statistic	Awaiting report			Yes		
Exttrig XCsize	Yes			Yes		
Pulse train	No			Yes		
Slope	No	Yes		Future		
Q-transform	No			Yes		
CorrPower	No			Yes	Future	
WaveMon	No					Yes
glitchMon	No					Yes
Z-glitch	No					Yes
PTmon	No					Yes
kleineWelle	No			Yes		Yes
Track search	No		Yes			
KSCD	No			Yes		
Ringdown	No		Yes			
Cosmic strings	No		Yes			
Supernova filters	No			Yes		