

Gstlal Online Search in O1

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CBC Call, Sept 29 2015

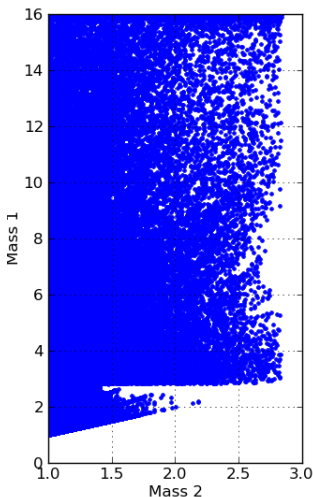
Parameter space

This covers an EM bright region created with pycbc geometric bank placement

- ▶ Component masses 1-2.83, 1-16
- ▶ BH maximal spin
- ▶ NS up to 0.05
- ▶ 25 Hz Flow
- ▶ 171,277 templates per ifo

You can find more details here:

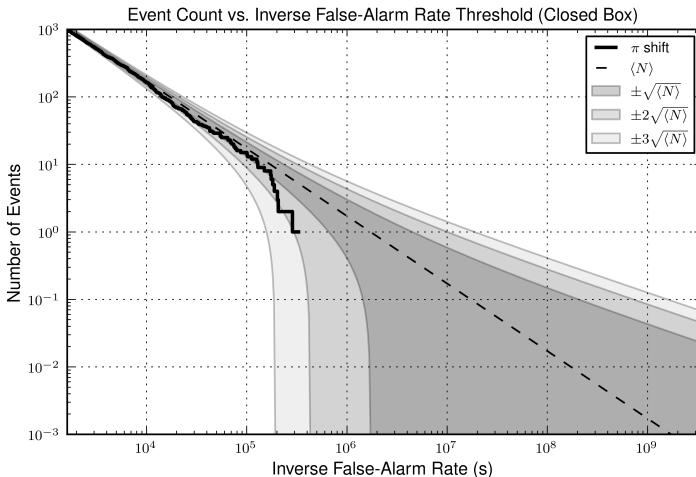
https://www.lsc-group.phys.uwm.edu/ligovirgo/cbcnote/01/gstlal/low_latency



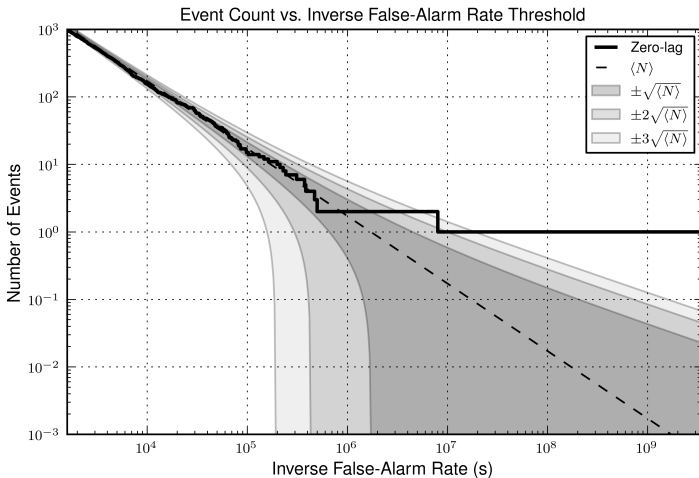
The search uses gstlal based code

- ▶ Time domain matched filtering with orthonormal basis made by SVD
 - ▶ Phys. Rev. D 82, 044025 (2010)
 - ▶ Phys. Rev. D 83, 084053 (2011)
 - ▶ ApJ 748 136 (2012)
- ▶ Likelihood ratio based ranking statistic and slideless FAR estimation
 - ▶ Phys. Rev. D 88, 024025
 - ▶ arXiv:1504.04632
- ▶ It applies exact match coincidence and can decompose and filter spin-aligned waveforms
 - ▶ Phys. Rev. D 89, 024003 (2014)
- ▶ It has been tested on Gaussian and recolored MDC data in conjunction with BAYESTAR and lalinference
 - ▶ ApJ 795 105 (2014)
 - ▶ ApJ 804 114 (2015)

Validation on S6 replay with big dog: closed box offline



Validation on S6 replay with big dog: open box offline



Validation on S6 replay with big dog: Comparison of online vs offline parameters

Offline

FAR	FAP	SNR	M_{total}	M_{chirp}
$2. \times 10^{-25}$ Hz	4×10^{-19}	17.45	10.87	4.72

Online

FAR	FAP	SNR	M_{total}	M_{chirp}
$9. \times 10^{-25}$ Hz	1×10^{-19}	17.48	10.87	4.72

Remarkably similar parameters were found between the online and offline runs although we have not yet completed the full S6 replay **online** run over the 1 month period.

Validation on S6 replay with second loudest: Comparison of online vs offline parameters

Offline

FAR	FAP	SNR	M_{total}	M_{chirp}
$1. \times 10^{-7}$ Hz	2×10^{-1}	9.19	3.17	1.29

Online

FAR	FAP	SNR	M_{total}	M_{chirp}
$2. \times 10^{-7}$ Hz	1×10^{-1}	9.21	3.17	1.29

Remarkably similar parameters were found between the online and offline runs although we have not yet completed the full S6 replay **online** run over the 1 month period.

Including zero lag in the background estimate.

As requested we have tools to rank events leaving zero lag into the background (normal behavior is to remove)

```
gstlal_inspiral_recompute_online_far_from_gracedb  
--with-zerolag T185258
```

FAR of T185258 before: $8.86624e-25$

likelihood ratio of T185258 after: 20.185222

FAR of T185258 after: $2.00153e-11$

Cody is working on automating this for offline, but the above tool exists for online analysis.

Results on various timescales

Seconds:

gracedb
simdb

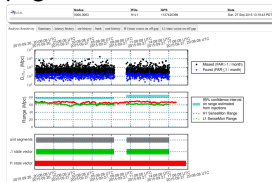
Gracedb — Gravitational Wave Candidate Event Database

Filter: — as of 21 September 2015 09:00 CDT

ID	Label	Group	Algorithm	Search	Instrument	gwTC P-Value	FWHM (s)	Latency (ms)	Original
1501700	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501701	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501702	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501703	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501704	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501705	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501706	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501707	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501708	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501709	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501710	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501711	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501712	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501713	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501714	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501715	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501716	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501717	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC
1501718	sim	gracedb	mbhmerger	mbhmerger	HL12	1.1176926217	0.176601	100.000000	2015-09-20 22:01:00 UTC

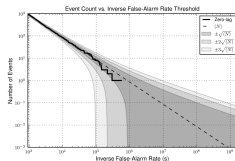
Minutes:

summary monitoring
page



Hours:

Full “offline style”
summary pages



We will be working hard throughout O1 to increase the quality and quantity of information available at each timescale.

Seconds: Keep up to date with gracedb latest

GraceDB — Gravitational Wave Candidate Event Database

HOME SEARCH CREATE REPORTS **LATEST** OPTIONS DOCUMENTATION AUTHENTICATED AS: CHAD HANNA

Latest — as of 27 September 2015 20:32 CDT

Query:

Get neighbors:

UID	Labels	Group	Pipeline	Search	Instruments	GPS Time Event Time	FAR (Hz)	Latency (sec)	UTC Created
G187896		Burst	CWB	AllSky	H1,L1	1127436420.14	2.123e-06	285.864400	2015-09-28 00:51:29 UTC
G187895		CBC	MBTAOnline		H1,L1	1127436429.77	5.148e-05	170.231090	2015-09-28 00:49:43 UTC
G187894		CBC	gstlal	LowMass	H1,L1	1127436436.02	8.512e-05	69.975852	2015-09-28 00:48:09 UTC
G187884		CBC	gstlal	LowMass	H1,L1	1127433073.68	5.898e-05	68.318940	2015-09-27 23:52:05 UTC
G187862		CBC	gstlal	LowMass	H1,L1	1127426223.56	2.384e-05	67.437212	2015-09-27 21:57:54 UTC
G187858		CBC	gstlal	LowMass	H1,L1	1127425550.86	1.586e-05	66.135091	2015-09-27 21:46:40 UTC
G187809		CBC	gstlal	LowMass	H1,L1	1127407877.13	4.072e-05	78.873317	2015-09-27 16:52:19 UTC
G187808		CBC	gstlal	LowMass	H1,L1	1127407877.11	3.478e-05	65.894382	2015-09-27 16:52:06 UTC
G187800		CBC	gstlal	LowMass	H1,L1	1127405893.43	4.651e-05	65.571987	2015-09-27 16:19:02 UTC
G187799		CBC	gstlal	LowMass	H1,L1	1127405770.58	5.512e-05	64.616044	2015-09-27 16:16:58 UTC
G187785		CBC	gstlal	LowMass	H1,L1	1127400885.33	9.173e-05	64.674878	2015-09-27 14:55:33 UTC
G187783		Burst	CWB	AllSky	H1,L1	1127400415.47	3.715e-06	145.528900	2015-09-27 14:49:04 UTC
G187778		CBC	gstlal	LowMass	H1,L1	1127399013.22	9.503e-05	63.776314	2015-09-27 14:24:20 UTC
G187777		CBC	gstlal	LowMass	H1,L1	1127399006.66	3.356e-06	65.344062	2015-09-27 14:24:15 UTC
G187775		CBC	gstlal	LowMass	H1,L1	1127398970.03	9.143e-05	69.972126	2015-09-27 14:23:43 UTC
G187766		CBC	MBTAOnline		H1,L1	1127395443.98	1.113e-05	99.015389	2015-09-27 13:25:26 UTC
G187751		CBC	MBTAOnline		H1,L1	1127391620.57	9.665e-05	58.426461	2015-09-27 12:21:02 UTC
G187746		CBC	gstlal	LowMass	H1,L1	1127390077.49	6.846e-05	70.510114	2015-09-27 11:55:31 UTC
G187740		CBC	gstlal	LowMass	H1,L1	1127388490.46	1.257e-05	65.539433	2015-09-27 11:28:59 UTC

Whether it is CWB, MBTA or gstlal, you can keep up with the excitement in realtime by leaving gracedb.ligo.org/latest open in your browser.

Seconds: See event parameters as they come in

Basic Info

UID	Labels	Group	Pipeline	Search	Instruments	GPS Time - Event Time	FAR (Hz)	Links	UTC - Submitted
G187894		CBC	gstlal	LowMass	H1,L1	1127436436.0241	8.512e-05	Data	2015-09-28 00:48:09 UTC

Coinc Tables

End Time (GPS)	1127436436.0241 s
Total Mass	4.8836 M_{\odot}
Chirp Mass	1.6805 M_{\odot}
SNR	9.8794
False Alarm Probability	1.000e+00

Single Inspirals Tables

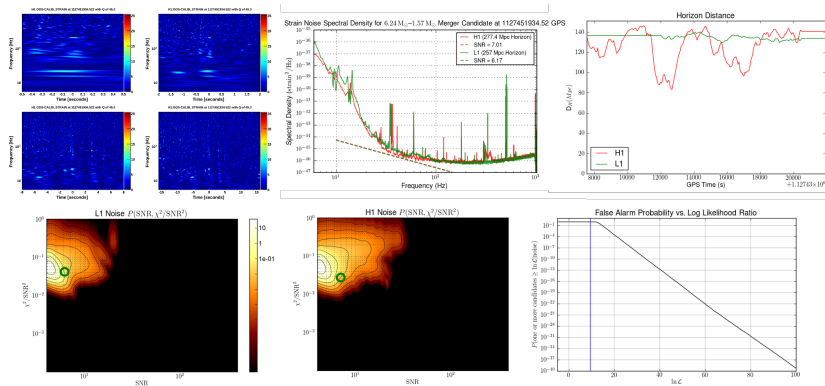
IFO	L1	H1
Channel	GDS-CALIB_STRAIN	GDS-CALIB_STRAIN
End Time (GPS)	1127436436.033419061 s	1127436436.024147402 s
Template Duration	53.9506306604 s	53.9506306604 s
Effective Distance	232.52345 Mpc	195.14787 Mpc
COA Phase	-0.2201813 rad	-2.9525366 rad
Mass 1	3.8318219 M_{\odot}	3.8318219 M_{\odot}
Mass 2	1.051777 M_{\odot}	1.051777 M_{\odot}
η	0.16898534	0.16898534
F Final	1024.0 Hz	1024.0 Hz
SNR	5.75316	8.0313959
χ^2	0.82651901	1.9612914
χ^2 DOF	1	1
spin1z	-0.075058058	-0.075058058
spin2z	-0.02389881	-0.02389881

Neighbors [-5,+5]

No neighbors in range.

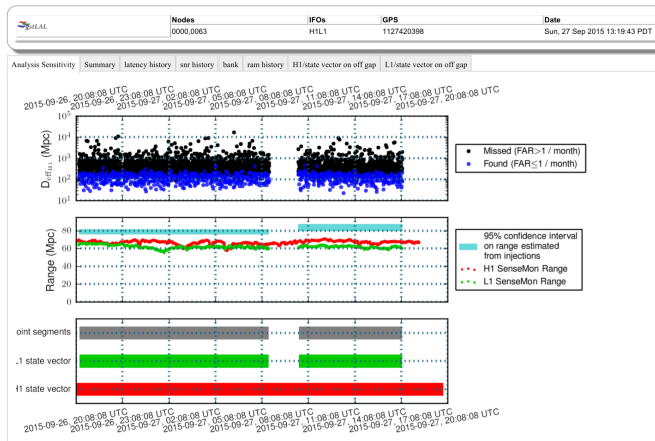
Basic parameters, mass, spin, FAR, SNR, ... are available at the top of each event page.

Seconds – hours: See additional supporting information uploaded automatically to gracedb



We will be continue to add more automated plots / information.

Minutes: See the current status



The simultaneous real-time injection run provides an up-to-date sensitivity measurement at <https://ldas-jobs.ligo.caltech.edu/~gstlalcbc/cgi-bin/gstlalcbcsummary>

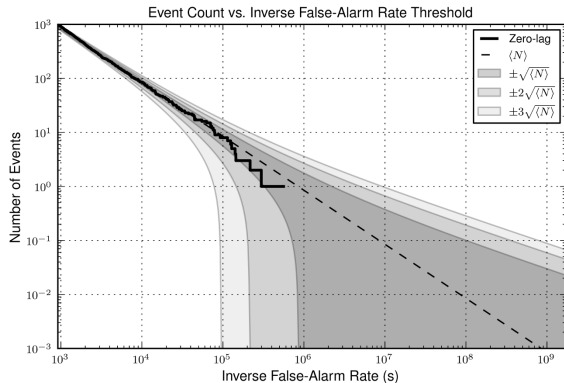
Hours: Full offline style pages



The screenshot shows a web interface for 'gstlal-online'. The top header is dark red with 'CBC' on the left and 'gstlal-online' on the right. Below the header, the date and time 'gstlalcbc - 2015/9/28 10:13' are displayed. A left sidebar contains a list of report sections: 1: Summary information, 2: Injection Parameters, 3: Injection Accuracy, 4: Missed Found, 5: Search Sensitivity, 6: Background, 7: Chi-squared, and 8: Money Plots. The main content area displays 'Welcome' and a message: 'Please select a report section on the left.'

We constantly process the output of the online data in a fashion similar to the offline analysis in order to make offline style summary pages. The pages are cumulative. As we add plots and other information to the offline analysis we should see most of them available to the online search too.

Hours: See the current IFAR plot



The IFAR plot for the search is updated every few hours and is *cumulative*. Currently there are no outliers.

Monitoring with nagios at monitor.ligo.org



A team is automatically notified if the analysis experiences trouble.

Get involved

chad

BurstsEMFollow

Hello **Chad** Hanna?

– Create personal sidebar

Toolbox

- Create New Topic
- Index
- Search
- Changes
- Notifications
- RSS Feed
- Statistics
- Preferences

Webs

- AIC
- ALIGOSystemsAcceptance
- AuthProject
- Bursts
- BayesWave
- EMFollow
- GRBExternal
- GWNW
- LIB
- Review
- SNEWS
- CW
- Calibration
- ComputerSecurity
- DAC
- DASWG
- DetChar
- ALIGOpapers
- DataQuality
- Earthquakes
- GDC
- DetectorEngineeringGroup
- EPO
- ExComm
- ExtTrig
- GEOGC
- GIAINT
- GWHEN
- Help
- InstScience

You are here: LIGOWiki - BurstsEMFollow Web - FollowupAdvocates (24 Sep 2015, PeterShaheen)

Follow-up Advocates

Follow-up Advocates

- Duties
 - Detailed instructions
 - 1. Before your shift
 - 2. Within minutes: approval (or not)
 - 3. Within hours: circulars, and monitor RRT findings
 - 4. Within days: follow-up
 - Key information
 - Volunteers
 - Tentative roster
 - Week 1: 2015-09-18T15:00:00 - 2015-09-23T15:00:00
 - Week 2: 2015-09-25T15:00:00 - 2015-10-02T15:00:00
 - Week 3: 2015-10-02T15:00:00 - 2015-10-09T15:00:00
 - Week 4: 2015-10-09T15:00:00 - 2015-10-16T15:00:00
 - Week 5: 2015-10-16T15:00:00 - 2015-10-23T15:00:00
 - Week 6: 2015-10-23T15:00:00 - 2015-10-30T15:00:00
 - Week 7: 2015-10-30T15:00:00 - 2015-11-06T15:00:00
 - Week 8: 2015-11-06T15:00:00 - 2015-11-13T15:00:00
 - Week 9: 2015-11-13T15:00:00 - 2015-11-20T15:00:00
 - Week 10: 2015-11-20T15:00:00 - 2015-11-27T15:00:00
 - Week 11: 2015-11-27T15:00:00 - 2015-12-04T15:00:00
 - After-hours contacts
 - Technical Documentation

Duties

Follow-up Advocates are arranged into groups of 3-4 people, consisting of at least one member each of the CBC and Burst groups, and when possible a member of DetChar or an instrument science group.

Follow-up Advocates have three duties:

1. **Before your shift**, sign up to receive real-time alerts from GracisDB and familiarize yourself with this Wiki page.
2. **Within minutes** of an event, follow a prescribed set of rules to approve the event, which triggers the distribution of sky maps. (Or disapprove the event in certain cases, which causes a retraction message to be issued.)
3. **Within hours**, compose a prose report describing the candidate in the style of a [GCN Circular](#) (in the [special LVC form](#)) and send it to the LV-EM observers group, and monitor the findings of the site Rapid Response Teams
4. **Within days**, follow internal discussions of the LIGOVirgo analysis of the event as well as follow-up observations by partners.

Detailed instructions

1. Before your shift

Don't like to sleep? You too can be awoken in the middle of the night!