# Status on Public Alerts

LIGO-Virgo Low-latency Analysis Group May 23, 2019





#### GraceDB — Gravitational Wave Candidate Event Database

LOGIN

UTC

Created

2019-05-21 03:02:49

2019-05-19 15:36:04

2019-05-18 19:19:39

2019-05-17 05:51:23

2019-05-13 20:54:48

2019-05-12 18:07:42

2019-05-10 03:00:03

2019-05-03 18:54:26

2019-04-26 15:22:15

2019-04-25 08:18:26

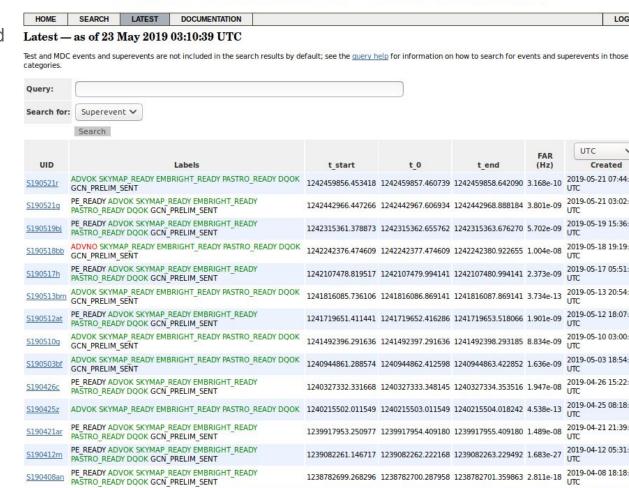
2019-04-21 21:39:16

2019-04-12 05:31:03

2019-04-08 18:18:27

2019-04-05 16:01:56

- Compact binary and unmodeled burst pipelines are running
  - Background estimation is reasonably stable.
- Robust identification of candidates according to false-alarm-rate criteria.
- https://gracedb.ligo.org/latest/
  - 1 sent in error and immediately retracted (S190405ar)
  - 1 attributed to noise and retracted (S190518bb)
  - 13 remaining events of interest



ADVNO SKYMAP READY EMBRIGHT READY PASTRO READY DOOK 1238515307.863646 1238515308.863646 1238515309.863646 2.141e-04



# Current status of low-latency analysis system

- System encountered additional technical issues that prevented automatic generation of alerts.
- Many of the detection candidates (and public alerts material) involve multiple individual "triggers" corresponding to a combination of multiple search pipelines and how templates/signal parameter space are treated by them.
- Timing (time stamp of notifications within our system) and additional analysis
  tasks required to be completed before alerts can be sent out automatically
  may result to race conditions and overall stability issues that proved to be
  complex and unlike what we have seen in previous testing.
- End-to-end system continues to operate under human supervision with people on-shift and experts typically responding to (internal) notifications within O(1min).





#### S190518bb -- First automated GCN Notice (retracted later)

- S190518bb
  - https://gracedb.ligo.org/superevents/S190518bb/
  - https://gcn.gsfc.nasa.gov/other/GW190518bb.gcn3
- Notes:
  - An automated GCN Notice went out in ~5 minutes
  - Event retracted within ~30 minutes following manual inspection (H1 displayed noise over tens
    of seconds prior to candidate's merger time)

### S190521g and S190521r -- Also automated GCN Notices





# Event updates: S190510g and S190426c

- Updated information on skymaps and classification for previous alerts follows as soon as it is vetted by the search groups
- S190510g:
  - https://gracedb.ligo.org/superevents/S190510g/
  - https://gcn.gsfc.nasa.gov/other/GW190510g.gcn3
  - https://gcn.gsfc.nasa.gov/notices\_I/S190510g.lvc
  - P\_astro calculation shifted from 98% to 42% for p(BNS)
- S190426c:
  - https://gracedb.ligo.org/superevents/S190426c/
  - https://gcn.gsfc.nasa.gov/other/GW190426c.gcn3
  - https://gcn.gsfc.nasa.gov/notices\_I/S190426c.lvc
  - Initial P\_astro calculation updated from parameter-estimation samples





# **Compact Binary Publication Plans**

Paper releases in 2<sup>nd</sup> and 4<sup>th</sup> quarter of 2020 for O3a and O3b respectively.

#### CBC Catalogs & Companions, including

(O3a: 2<sup>nd</sup> quarter 2020; O3b: 4<sup>th</sup> quarter 2020)

- Compact binary catalog
- Tests of GR
- H<sub>0</sub> measurement
- Characterization of astrophysical distributions
- GRB follow-up

#### Exceptional events, including

(4 months after detection)

- New classes (e.g., NSBH)
- Outside previously observed region, e.g.,
  - High spins
  - Spin precession
  - Large mass ratio
  - Large/small component masses





#### Outlook

- Ongoing work to allow single interferometer triggers to create public alerts
- Automated response to external triggers (GRBs) still in the works
- LIGO-Virgo Public Alerts User Guide & Support
  - https://emfollow.docs.ligo.org/userquide/
  - Feedback or requests for information to: <a href="mailto:emfollow-userguide@support.ligo.org">emfollow-userguide@support.ligo.org</a>
- Mailing list
  - Please sign up to the public openlyem mailing list; anyone can subscribe
  - Instructions at <a href="https://wiki.gw-astronomy.org/OpenLVEM">https://wiki.gw-astronomy.org/OpenLVEM</a>
  - We will use it to announce changes of configuration, plans, etc



