

LVK Rapid Response Team (RRT) in ER15/O4

F. DiRenzo, K. Kawabe, B. O'Reilly, S. Sharma-Chaudhary,
P. Shawhan, H. Shinkai,

ER15: March 30 statement by Patrick Brady about public alerts



- We plan to start the observing run on 24 May 2023
 - this will be preceded by a ~ one-month engineering run.
 - The observing run will be 20 months with up to 2 months of commissioning
- Instrument updates:
 - LIGO commissioning is ongoing. Engineering run ~24 April.
 - Virgo commissioning is ongoing. Decision point in mid April about engineering run start.
 - KAGRA commissioning is ongoing. Decision point in April about engineering run start.
- Important notes:
 - Currently plan to begin streaming alerts during the engineering run
 - Date is subject to internal reviews
 - Use engineering alerts at your own risk

ER15: March 30 statement by Patrick Brady about public alerts



ER15: Apr/26 (Started!)

- The LIGO detectors joined on Apr/26 at 1500 UTC with plans to perform calibration measurements and other tests.
- Virgo joined on Apr/26 at 1500 UTC, for a limited fraction of time over the duration of the ER, giving priority to commissioning activities aiming at improving the sensitivity.
- KAGRA will continue commissioning up to one week before the start of the O4 to improve sensitivity.

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ER15: What to expect

- GW analysis pipelines WILL start uploading real event candidates, which MAY result in public alerts.
 - Start date MAY differ for different pipelines (“subject to internal reviews”).
- RRT will NOT provide human response to public alerts in ER15 (except when REALLY interesting candidates are identified, e.g. next GW170817).
- But RRT WILL pick at least one BBH candidate and perform an end-to-end test of manual procedure, including the submission of GCN Initial Circular.
 - Will append “: End-to-End Test” to the usual subject, e.g. “SUBJECT: LIGO/Virgo/KAGRA S1234: Identification of a GW compact binary : End-to-End Test”.
 - This will be a legitimate Circular, but please understand that this is only done for testing RRT procedure.

RRT in O3 VS O4

O3: LIGO/Virgo. A small group of experts. 80 public alerts over ~1 year observation. Untenable going forward.

O4: LIGO/Virgo/KAGRA. A group of (many) non-experts in addition to the expert group.

- All *Significant* ([G2300752](#), FAR<1/Mo for CBC, 1/Year for unmodeled burst, after applying trials factors) public alerts will be initially handled by non-expert members.
 - The non-expert group is expected to issue Initial Circulars for the majority of *Significant* candidates (mostly BBH) on its own after the candidates pass automated checks.
 - Only a subset of *Significant* candidates will automatically go under the highest level of scrutiny with the lowest possible latency in human vetting by the experts.
- No human response for *Low Significance* (FAR<2/Day but not *Significant*) candidates.

Cases that will automatically get higher scrutiny by RRT experts

- *Significant* (as in FAR) Multi-Messenger Counterpart coincidence, OR
- Unmodeled burst analysis has the lowest FAR, OR
- More likely to be of astronomical origin, AND ($p_{\text{BNS}} > 0.1$ OR $p_{\text{NSBH}} > 0.1$ OR $\text{HasRemnant} > 0.1$ OR $90\% \text{ Area} < 100 \text{ deg}^2$).

(There is a manual path to convene experts, too, just in case the above criteria misses something.)