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

Run plan

- 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
Run plan

- 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: 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


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 \((p_{\text{BNS}}>0.1 \ OR \ p_{\text{NSBH}}>0.1 \ OR \ Has\text{Remnant}>0.1 \ OR \ 90\% \ Area<100 \ \text{deg}^2)\).

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