



Low Latency UPDATE

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New Threshold for alerts.

Updated Public Alert Threshold for O4 and beyond

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The false alarm rate threshold for public alerts will be lowered to **2/day** starting in O4. There will therefore be two classes of alerts:

Low Significance (“*Subthreshold*” in O3) **gravitational-wave alerts** with false alarm rate greater than **1/months for CBC** and **1/year for BURST**

Significant **gravitational-wave alerts** with false alarm rate less than **1/ month for CBC** and **1/year for BURST** that pass automated and manual verification tests.

```
{  "alert_type": "PRELIMINARY",
  "time_created": "2018-11-01T22:34:49Z",
  "superevent_id": "MS181101ab",
  "urls": { "gracedb": "https://example.org/superevents/MS181101ab/view/" },
  "event": {
    "time": "2018-11-01T22:22:46.654Z",
    "far": 9.11069936486e-14,
    "significance": "low significance" # 2/day > FAR > (1/month CBC and 1/year BURST)
    "significant" # (1/month CBC and 1/year BURST) > FAR
    "instruments": [ "H1", "L1", "V1" ],
    "group": "CBC",
    "pipeline": "gstlal",
    "search": "MDC",
    "classification": { "BNS": 0.95, "NSBH": 0.01, "BBH": 0.03, "Terrestrial": 0.01 },
    "properties": { "HasNS": 0.95, "HasRemnant": 0.91, "HasMassGap": 0.01 },
    "skymap": "U0lNUExFICA9ICAgICAgICAgICAgICAgICAgICBUIC8gY29uZm..."
  },
  "external_coinc": null }
```

The O4 system - new OPA threshold (2/day)



We will provide (Open) alerts:

- the legacy GCN/TACH
- avro of kafka (SCIMMA)
- json over kafka (GCN).

- **EarlyWaning (1)** Associated to EW pipeline

— Event time —

- **Preliminary (1)** latency < 20s with max 30s
- **Preliminary (1a)** in case of new significance
- **Preliminary (2)** final in less that 300s

— Rapid Response team decision —

- **Initial/Retraction Alert**
- **Update (1)**
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- **Update (n)**

The false alarm rate threshold for public alerts will be lowered to **2/day** starting in O4. There will therefore be two classes of alerts:

Significant gravitational-wave alerts with false alarm rate less than **1/month** for CBC and **1/year** for bursts that pass automated and **manual verification tests**.

Low Significance (Subthreshold) gravitational-wave alerts with false alarm rate greater than 1/month and less than ~2/day.



Conclusion

- We will provide open public alerts (OPA) also for:
 - * pre-merger (negative time) **early warning** alerts.
 - * alerts based on a **coincident external public trigger**.
- We **will** provide (Open) alerts using the legacy GCN/TACH infrastructure as well as on the alternative Alert channels provided by avro or kafka (SCIMMA) and json over kafka (GCN).
- Detail on the format and procedure in: <https://emfollow.docs.ligo.org/userguide/>.
Final version expected to be online for next openLVEM
- **You should expect OPA with a rate of:**
 - **one per day** (Significant gravitational-wave alerts)
 - **two per day** (Low Significance “Subthreshold” gravitational-wave alerts).