

Quickly Assembled
Recommendations from
the Multi-Messenger
Astronomy Panel

Neil Gehrels, Jonah Kanner, Mansi Kasliwal,
and Peter Shawhan

Things that are already on track to happen with currently available (or expected) resources*

- A global GW network
- Optical Wide-Field Surveys
 - e.g. ZTF, BG, DECam, HSC, LSST
- Radio Surveys
 - e.g. VLASS, LWA, MWA, LOFAR, Apertif, ASKAP, Meerkat
- High energy/GRB missions
 - e.g. SVOM

** Not “actions”, but good to know there will be facilities with good capabilities for multi-messenger observations*

Things we should do that don't require additional resources (from the GW program)

- Provide support for development of EM capabilities that will benefit gravitational wave astrophysics
 - NASA space-based missions such as the proposed Lobster Explorer mission, GRB Cubesats
- Provide support for rapid and numerous Target of Opportunity observations
 - Including major facilities: JWST, WFIRST, LSST?
- Provide support for global follow-up telescope networks on the ground (e.g. PIRE GROWTH)
- Encourage data mining / candidate follow-up for large optical/NIR surveys
 - DECam, LSST, etc.
- Tune EM observing strategies based on detections

Things that an influx of additional money could enable, independent of what signals we detect

- Improvements GW detector sensitivities → more GW events to do multi-messenger astronomy with
- A LIGO data center to produce community-friendly data sets and software, and provide support to community users
- A validated, public galaxy catalog to ~ 200 Mpc
 - Would have other science benefits as well
- Additional ground-based EM observing capabilities, especially wide-field infrared imaging
 - e.g. Gattini-IR camera, Dupont Fly's Eye camera

Ways we could use additional resources, depending on what signals we detect

- Strategic improvements to detector noise curves
 - A low BNS detection rate (<5 per year) suggests more detections are needed, so low freq. noise (20-300 Hz) is a priority
 - A high BNS detection rate (>5 per year) suggests improving high freq. to pursue better localization, NS EOS, and testing GR
 - Improving the weakest detector in the network can benefit sky localization
 - Improving the strongest detector in the network can benefit parameter estimation
- Specialized, possibly dedicated EM telescopes or instruments

Multi-Messenger Astronomy

Suggested Discussion Topics

- GW detectors
 - Better sensitivity – maybe strategic focus on freq. band
 - Better network
- EM observing
 - Instrument capabilities
 - Good coverage (availability, promptness)
 - Observing strategies (galaxy targeting, etc.)
- Modeling
 - For strategizing
 - For interpreting observations
- Improved coordination of GW and EM observing

?