Joint telecon June 2, 2016

GCN NOTICES: CONTENTS IN O1

	CBC	Burst
IVORN	`ivo://nasa.gsfc.gcn/LVC#{G,M}nnnnnn-{1,2,3}-Preliminary,Initial,Update`	
Who	LIGO Scientific Collaboration and Virgo Collaboration (lv-em@gw-astronomy.org)	
What	GraceDB ID: `{G,M}nnnnnn`	
Search Group	`CBC`	`Burst`
Pipeline	`Gstlal` or `MBTA`	`CWB`
Internal	0 or 1 (0 causes distribution to partners)	
FAR	estimated FAR in Hz	
Network	Binary flag for each detector (`LHO_participated`, etc.)	
Skymap	`SKYMAP_URL_{FITS,PNG}_{SHIB,X509,BASIC}` (not included in a Preliminary alert)	
WhereWhen	Arrival time (UTC, ISO-8601), e.g., `2010-08-27T19:21:13.982800`	

GCN NOTICES: NEW FOR O2

	CBC	Burst
...	...	
What	GraceDB ID: `{G,M}nnnnnn`	
...	...	
PROPOSED Search-specific parameters (Initial, Update)	`Distance`: *a posteriori* mean luminosity distance in Mpc	N/A
	`DistanceError`: *a posteriori* standard deviation of luminosity distance in Mpc	
	`ContainsNeutronStar`: Probability (0–1) that the less massive companion has a source-frame mass <3 $M_\odot$	
	`EMBright`: Probability (0–1) that the system ejected a significant amount of NS material, as calculated by method of Pannarale & Ohme (2014)	
...	...	

O2 GCN Alerts contents to support observing strategy

- Event **time** and **probability sky localization map** (HEALPix FITS file)
- Estimate of **False Alarm Rate** of event candidate (FAR < 1/1month)
- **Basic source classification**: found by CBC, Burst, or both pipelines;

For compact binary candidates:

- ***"EM bright" indicators:***

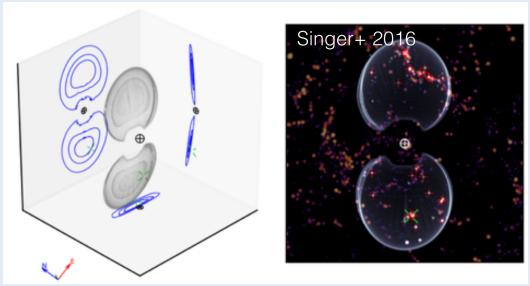
  - **Source classifier** → Probability of **presence of a NS** in the binary (object m< 3 solar mass)

  - **Remnant mass classifier** → Probability of **presence of any NS tidally disrupted mass left outside the BH**

  (Foucart 2012, PhRvD, Pannarale & Ohme, 2014, ApJ)

- ***Luminosity distance*** marginalized over whole sky (mean+/-standard deviation)

- ***3D sky maps with direction-dependent distance***
  (e.g. Singer et al. 2016, ApJL 829, L15)

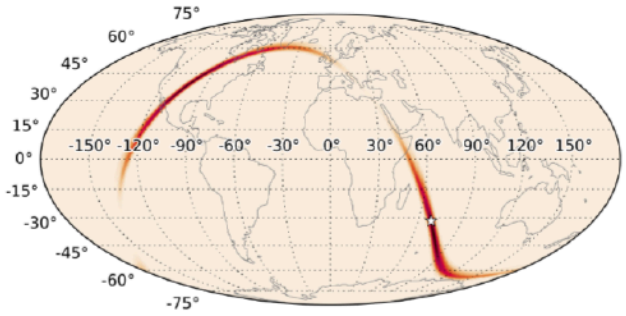


CBC Sky localization map

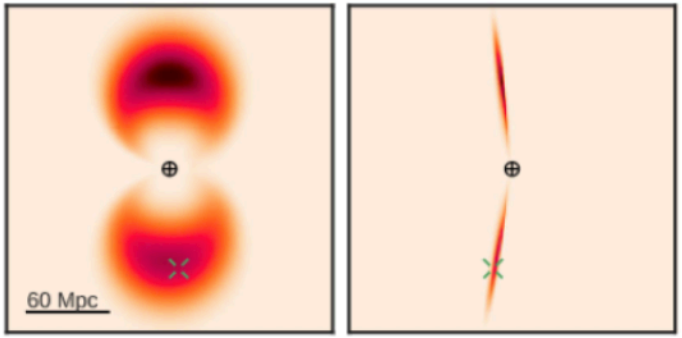
Arrival time
Amplitudes
Phase

→ sky location
→ distance to the source

Sky location also in 3 D



Sky direction



Projections of 3d location

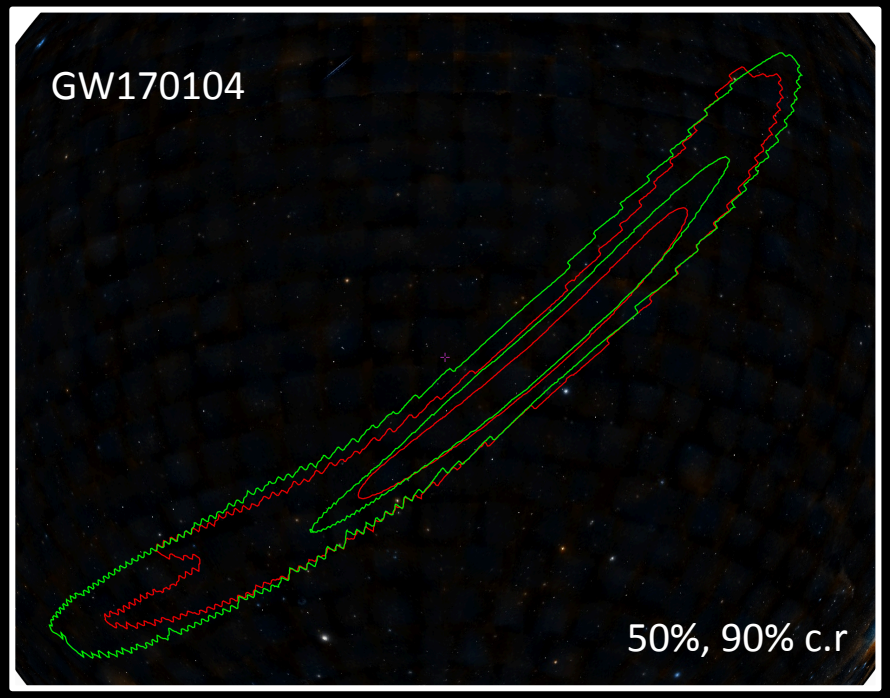
Online pipelines estimate → arrival time, phase, signal amplitude at each detector

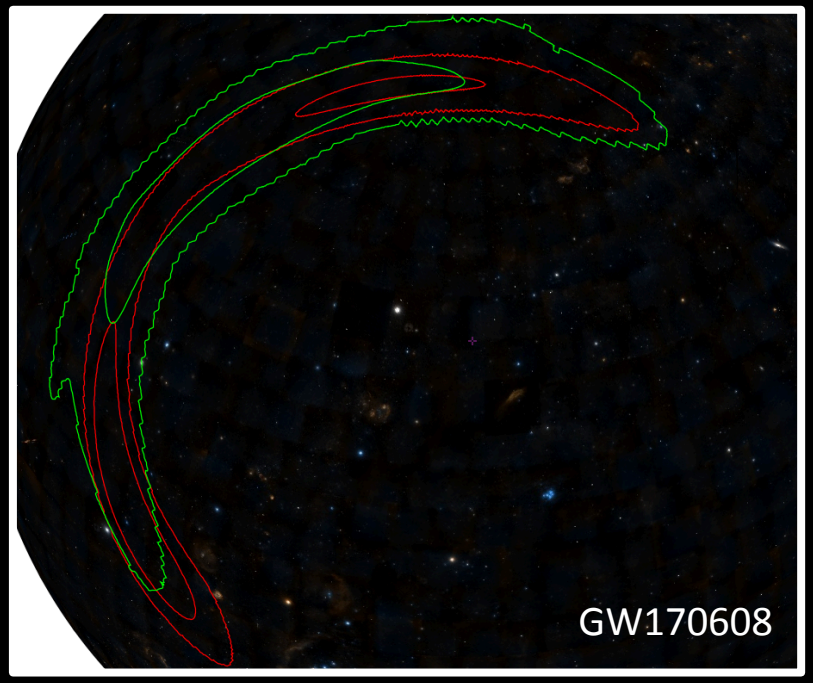
These estimates + template masses constrain direction of GW arrival and distance to the source

→ **BAYESTAR** (Singer et al 2014, ApJ, 795, 2016 ApJL, 829): estimate 3D location in <1 minute

→ **LALInference**, **full PE Bayesian MCMC** (Veitch 2015; Berry et al. 2015), modeling the inspiral-merger-ring down phase and taking into account the calibration uncertainty

Initial skymaps: BAYESTAR → LALinference





→ Median latency
BAYESTAR/LALinference
5 days, for GW170817 6 hours!

→ BAYESTAR/LALinference typically consistent, except in the case of calibration/glitch issues

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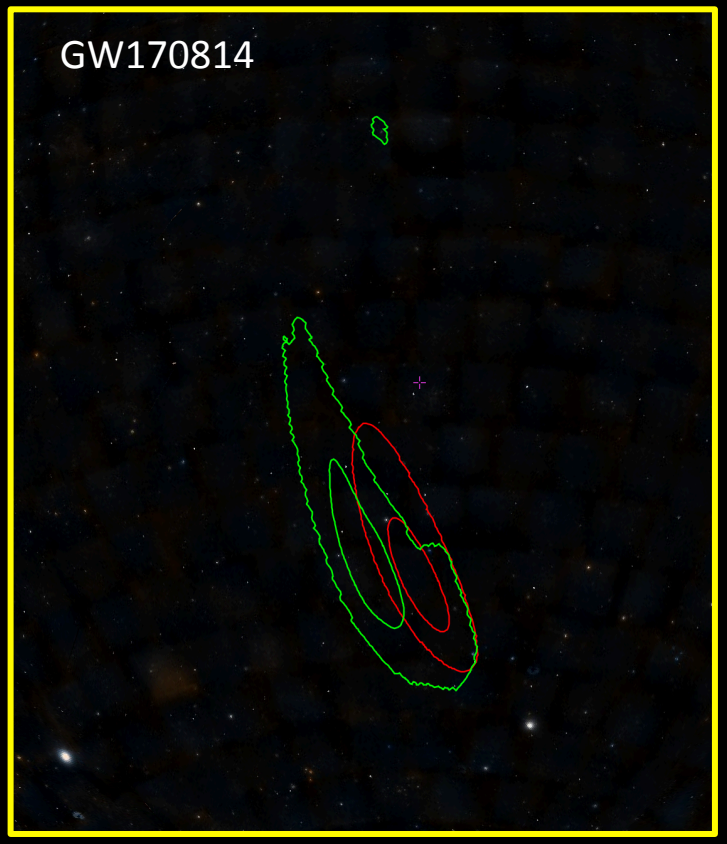

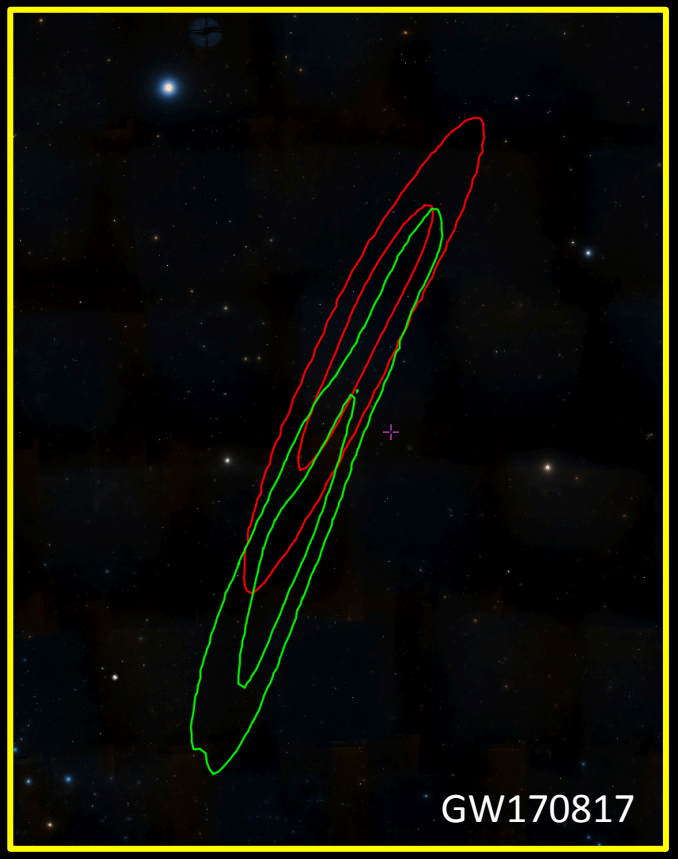

O3 Warning: data quality flag? OBs flexibility?

Providing error ellipses for sufficiently well-localized events?