

Analyzing Gravitational Wave Data From the LIGO Open Science Center

John T. Whelan `jtwsma@.rit.edu`

CCRG & School of Mathematical Sciences, Rochester Institute of Technology

for the LIGO Scientific Collaboration & the Virgo Collaboration

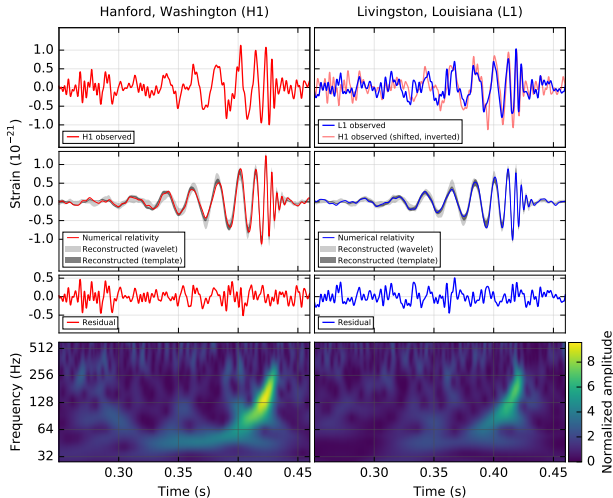


UP-STAT 2017

2017 April 21

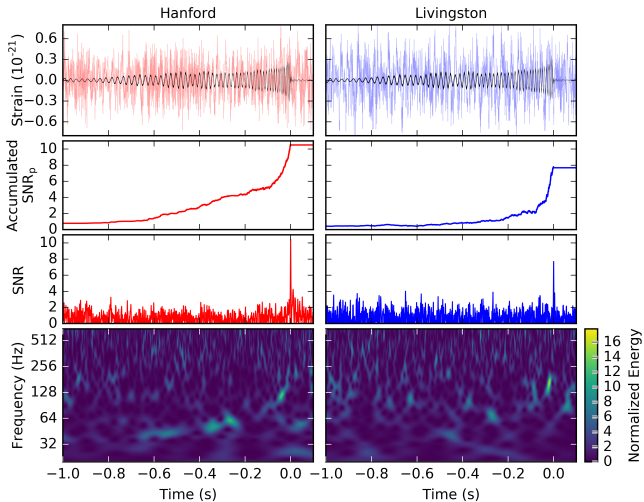
LIGO-G1700118-v2

GW detected 2015 September 14



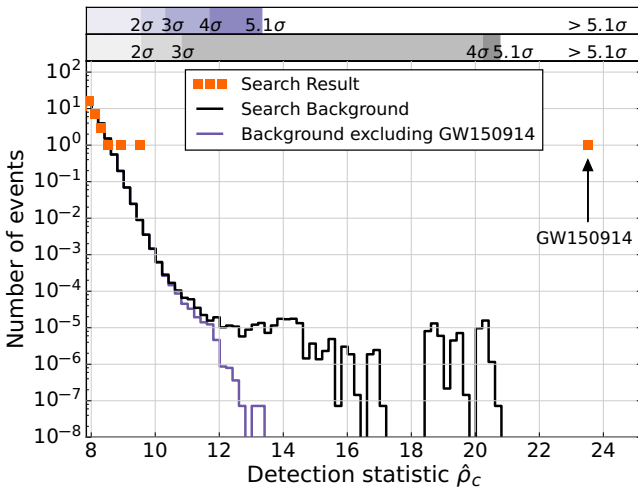
LVC, <http://arxiv.org/abs/1602.03837>; *PRL* **116**, 061102 (2016)

GW detected 2015 December 26



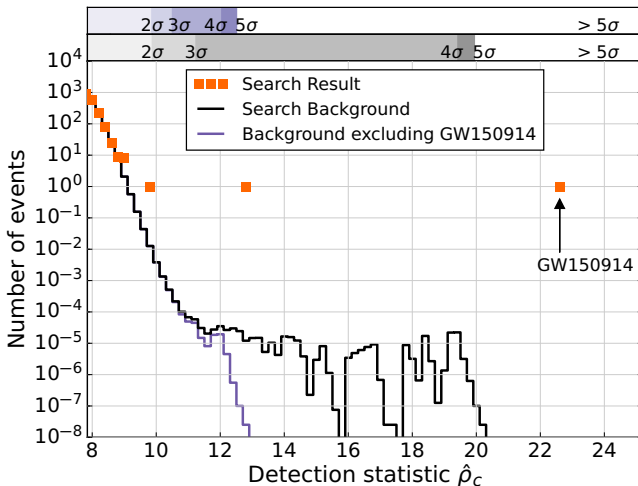
LVC, <http://arxiv.org/abs/1606.04855>; *PRL* **116**, 241103 (2016)

Matched Filter Detection of GW150914



LVC, <http://arxiv.org/abs/1602.03839>; *PRD* **93**, 122003 (2016)

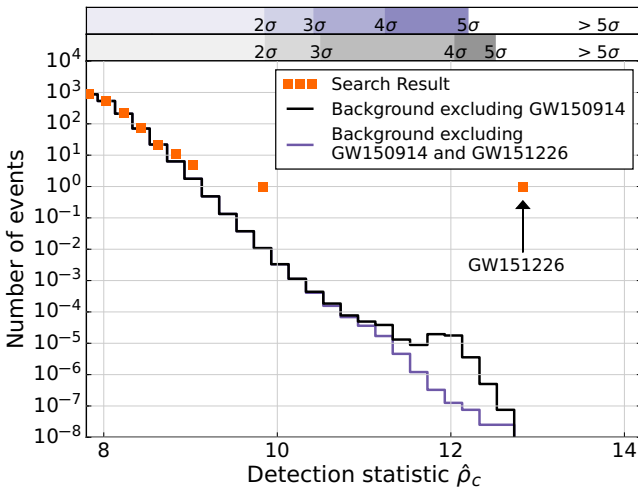
Matched Filter Detection of GW150914



LVC, <http://arxiv.org/abs/1606.04856>; *PRX* **6**, 041015 (2016)

Estimate coincident false alarm rate w/time shifts: $\lesssim 1/1,600,000$ yr

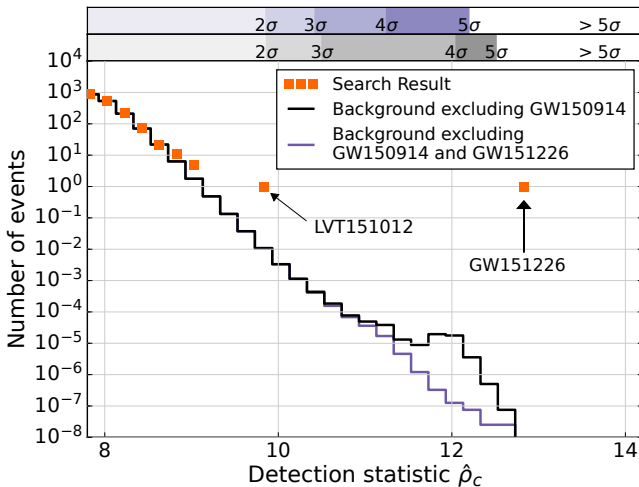
Matched Filter Detection of GW151226



LVC, <http://arxiv.org/abs/1606.04856>; *PRX* **6**, 041015 (2016)

Estimate coincident false alarm rate w/time shifts: $\lesssim 1/1,600,000$ yr

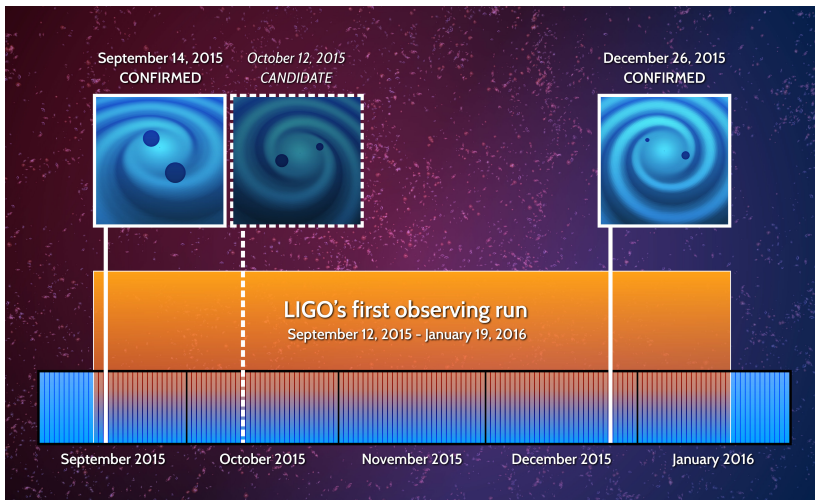
Detection Candidate LVT151012



LVC, <http://arxiv.org/abs/1606.04856>; *PRX* **6**, 041015 (2016)

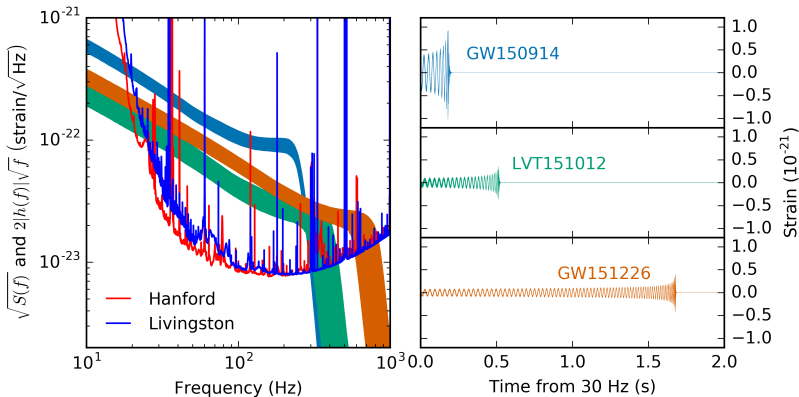
Estimate coincident false alarm rate w/time shifts: $\approx 1/3$ yr

Timeline of Binary Black Hole Events



Credit: LIGO

Best-Fitting Template Waveforms



LVC, <http://arxiv.org/abs/1606.04856>; *PRX* **6**, 041015 (2016)

LIGO Data Releases

- 4096s of Advanced LIGO data around each event
- Released by LIGO Open Science Center, <https://losc.ligo.org/>
- <https://losc.ligo.org/events/GW150914/>
Permanent link <http://dx.doi.org/10.7935/K5MW2F23>
- <https://losc.ligo.org/events/LVT151012/>
Permanent link <http://dx.doi.org/10.7935/K5CC0XMZ>
- <https://losc.ligo.org/events/GW151226/>
Permanent link <http://dx.doi.org/10.7935/K5H41PBP>
- Also releases of initial LIGO data from 2005-2011
Other releases to come

Preparation and Downloads

- Software stack: <https://lsc.ligo.org/tutorial00/>
- UP-STAT 2016 Notebook:
<https://dcc.ligo.org/LIGO-G1600266/public>
- Updated event tutorials: <https://lsc.ligo.org/tutorials/>