

LIGO Hanford

LIGO Livingston

Operational Under Construction Planned

The Gravitational-wave Network: 2017-2020+

VIRGO

KAGRA

LIGO India

Stan Whitcomb Supernova Workshop 2017

18 March 2017

LIGO-G1700530-v1

LIGO-Virgo Observing Plans

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LIGO

at least 2 detectors operating with BNS sensitive ranges of at least 100 Mpc, while ranges approaching 200 Mpc

LIGO-Virgo Observing Plans

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LIGO-Virgo Observing Plans





Sensitivity

Lessons from LIGO O1

- Steep drop in false alarm rate versus size means edge of observable space is very sharp
 - » Very far out on tail of noise due to need to overcome trials factor



O1 BBH Search

Lessons from LIGO O1

- Steep drop in false alarm rate versus size means edge of observable space is very sharp
 - » Very far out on tail of noise due to need to overcome trials factor
- Narrow time window lowers probability of noise triggers linearly
 - » Neutrino trigger would help sensitivity a lot, optical trigger not so much



O1 Burst Search

Limitation of a 2-Detector Network



LIGO & Virgo Collaborations: Properties of the binary black hole merger GW150914, arXiv:1602.03840



Limitation of a 2-Detector Network



LIGO & Virgo Collaborations: Properties of the binary black hole merger GW150914, arXiv:1602.03840

Supernova Workshop 2017



Limitation of a 2-Detector Network



LIGO & Virgo Collaborations: Properties of the binary black hole merger GW150914, arXiv:1602.03840



LIGO-Virgo Network



Localization Capability: LIGO-Virgo Working Together



S. Fairhurst, "Improved source localization with LIGO India", J. Phys.: Conf. Ser. 484 012007

Localization--Bursts



- Two different algorithms, two different waveforms
- Effect of individual detector duty factors on network effectiveness

Living Rev. Relativity 19 (2016), 1



KAGRA

LIGO India

Localization Capability: LIGO-Virgo plus LIGO-India



S. Fairhurst, "Improved source localization with LIGO India", J. Phys.: Conf. Ser. 484 012007



- Next iteration of "Observing Scenario" paper will include KAGRA
- VERY preliminary guesses about sensitivity in different years
- Commissioning begins
 in 2018
- First observing run in 2020?





- Initial observations 2024?
- Outside the time window for this session