

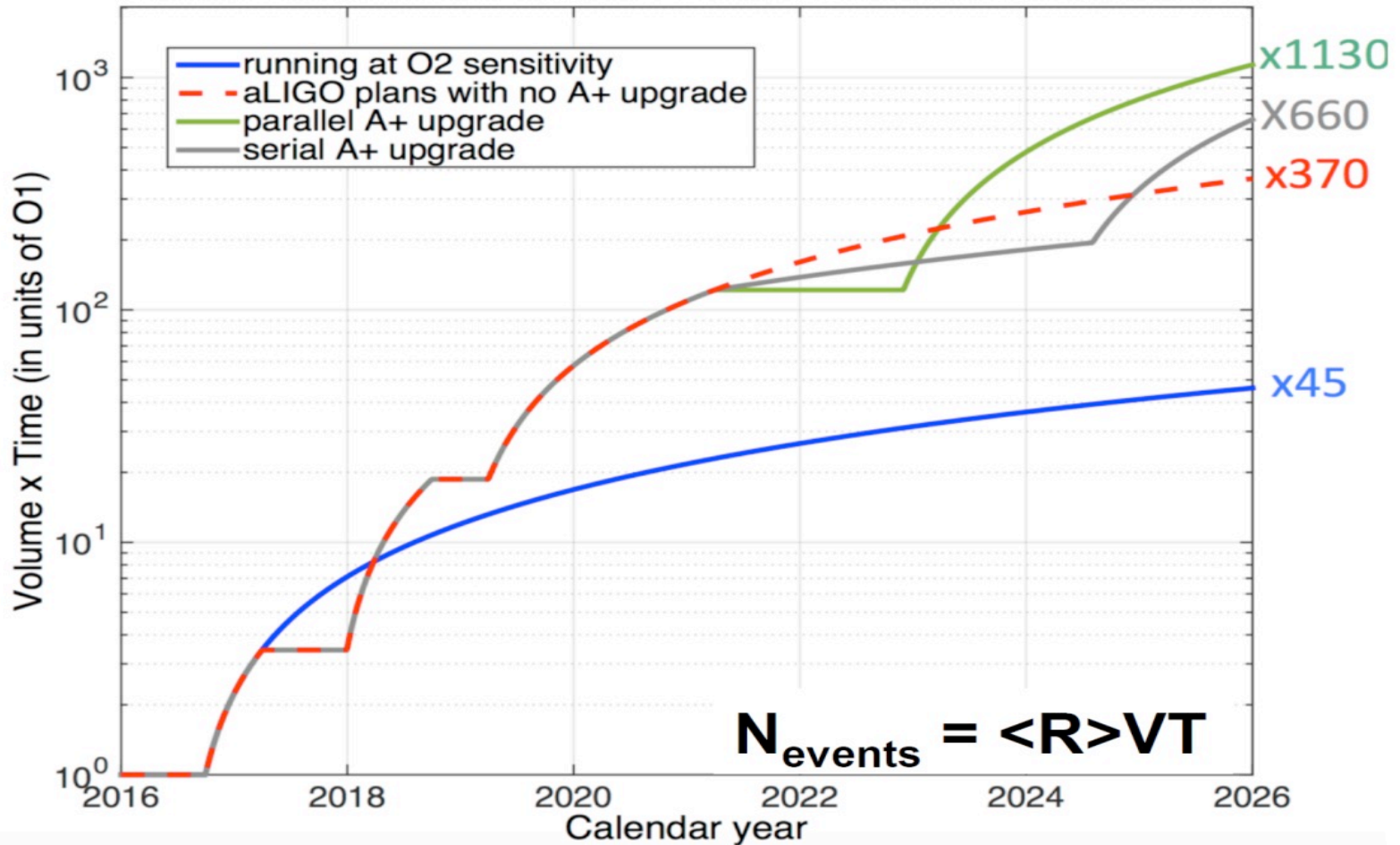
DAWN III Workshop: What's Next for Gravitational Wave Astronomy?



Barry C Barish
LIGO Laboratory
6-July-2017

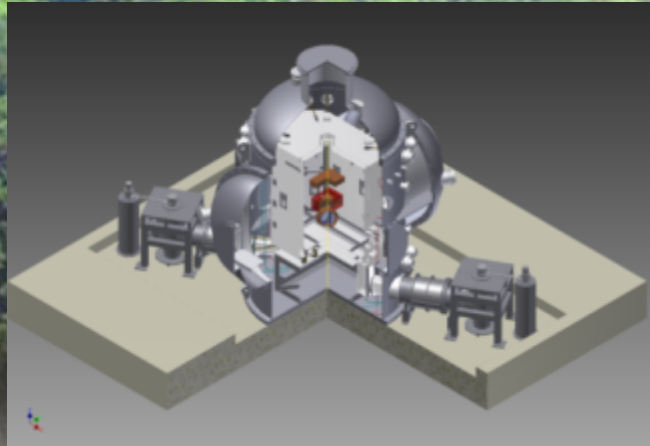
Strategic Issues

Context of G3: Where will we be?



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Cryogenic Mirror



KAGRA

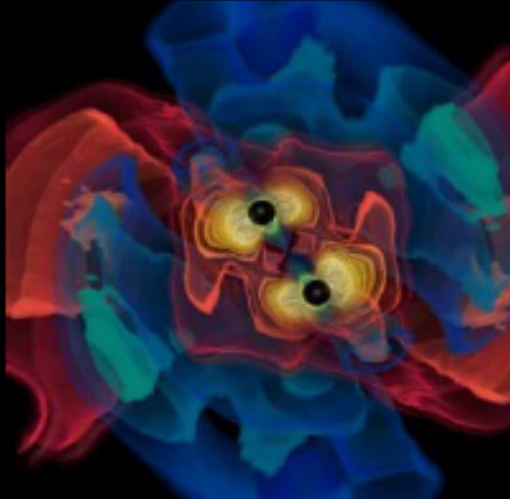
Kamioka Mine

Underground



Technologies crucial for next-generation detectors;
KAGRA can be regarded as a 2.5-generation detector.

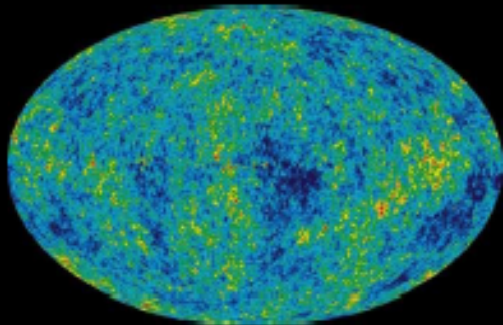
Context of G3: Where will we be?



Coalescing Binary Systems

- Neutron stars, low mass black holes, and NS/BS systems

Credit: AEI, CCT, LSU



NASA/WMAP Science Team

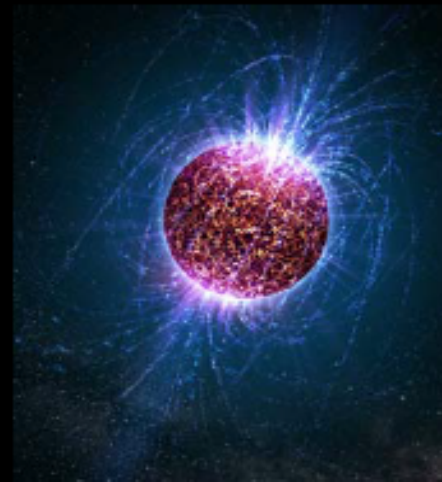
Stochastic GWs

- Incoherent background from primordial GWs or an ensemble of unphased sources
- primordial GWs unlikely to detect, but can bound in the 10-10000 Hz range



'Bursts'

- galactic asymmetric core collapse supernovae
- cosmic strings
- ???

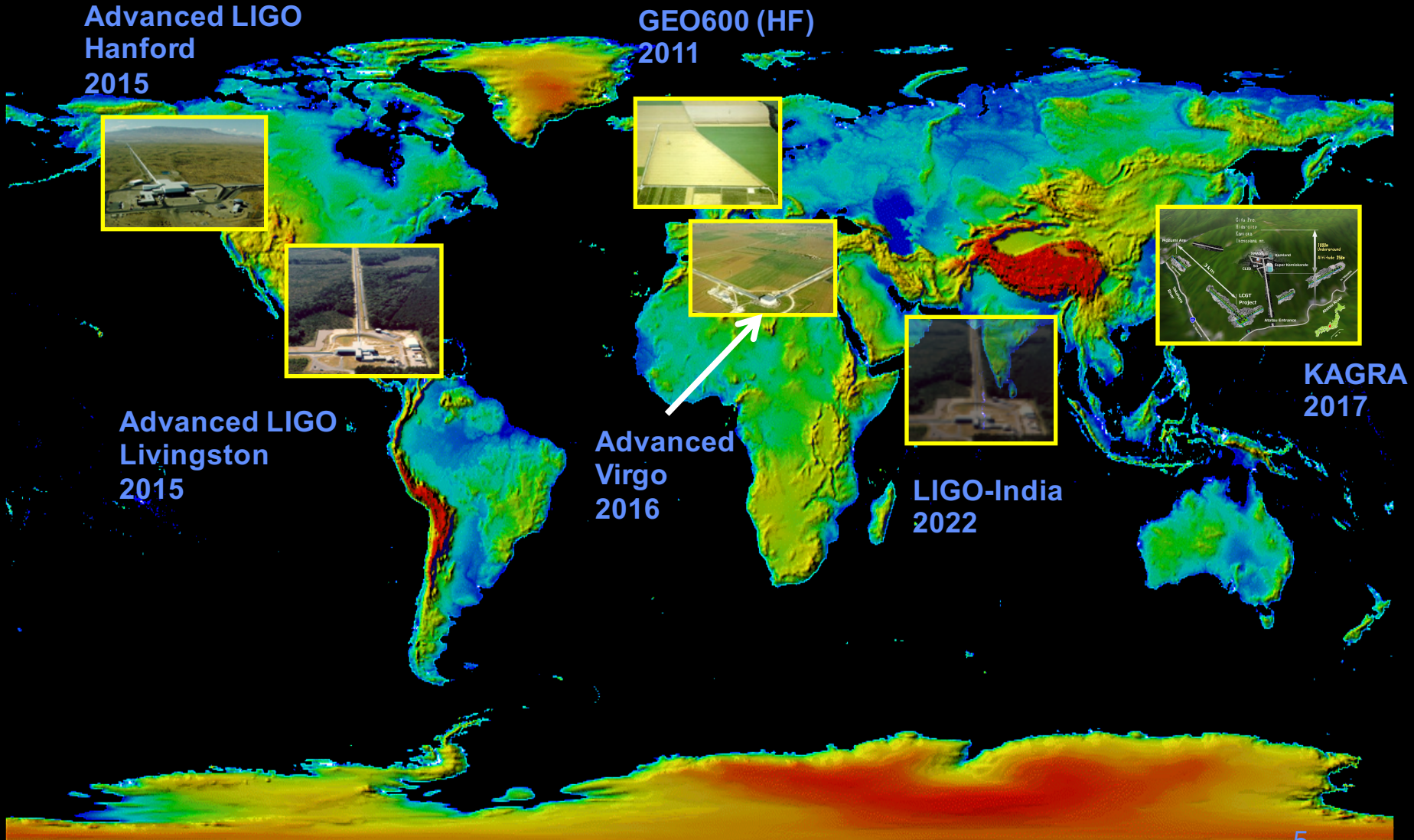


Casey Reed, Penn State

Continuous Sources

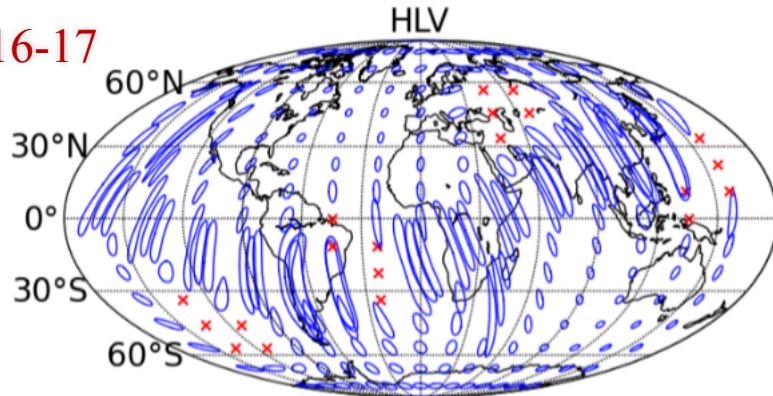
- Spinning neutron stars
- probe crustal deformations, 'EOS, quarkiness'

Context of G3: Where will we be?

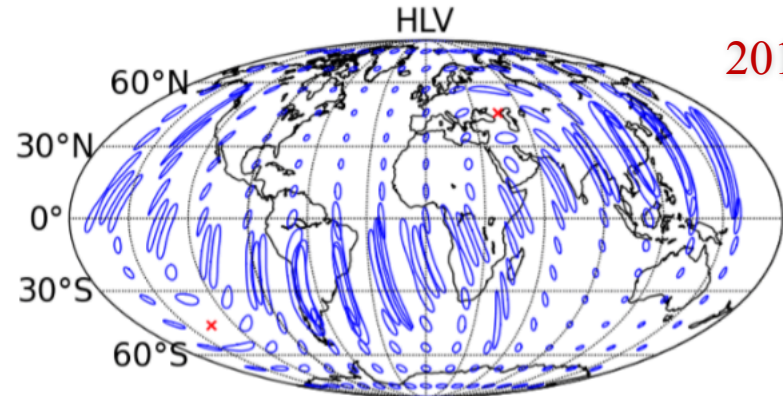


Context of G3: Where will we be?

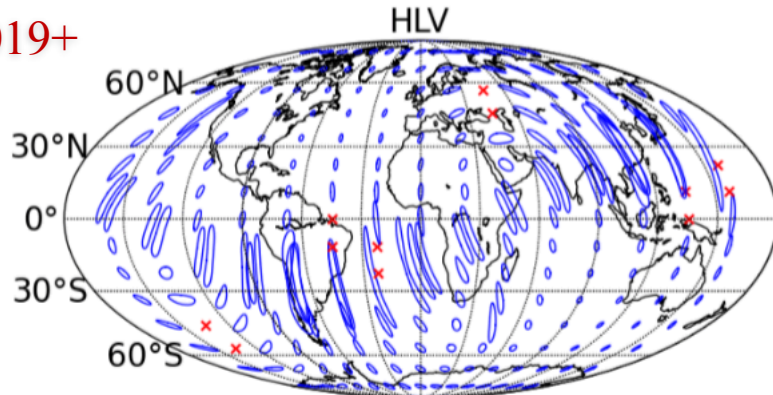
2016-17



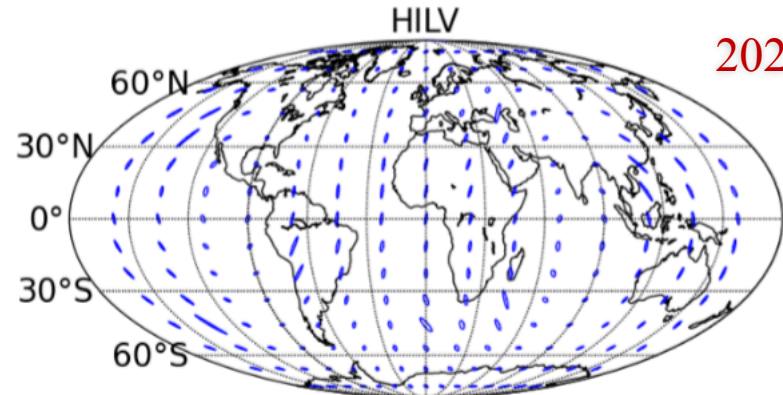
2017-18



2019+



2022+



- Adding Virgo will break the annulus
- As sensitivity progresses, so does the localization. In the design LIGO-Virgo network, GW150914 could have been localized to less than 20 deg²
- LIGO India will lead to a further impressive improvement

G3: Some Big Issues

Science Motivations and Goals

- **GWIC Committee (must be done in the context of projected G2)**



Science Goals → Technical Performance

- **Frequency vs Sensitivity Goals?**
- **Network Performance Goals (e.g. Pointing Accuracy)?**



Strategic Issues

- **How many G3 Detectors are required?**
- **G3 Detectors: Identical or Different?**
- **How Internationally Organized/Funded/Implemented?**
 - **Present GW Model: “Collaboration of Collaborations?”**
 - **Globally Organized, like ILC, SKA?**
 - **Global w/ Strong Host, like CERN LHC, DUNE?**
 - **‘Limited’ Partnerships, like ALMA, LSST, TMT?**