Ideas for 2.5G and 3G interferometric Detectors

TOC:

Intro

Motivation for upgrades; distinguish upgrades that can be done in existing infrastructures and new ones. Exception KAGRA, 3G Infrastructure 2G instrument.

Explain distinction between 2.5G and 3G: explain that 2.5G is in existing infrastructure and 3G in new Infrastructure able to host >=3G instruments; observatory concept.

Technologies and design

List technologies (starting with “2.5G” ones), describe impact on 2G detectors, finances, limitations from existing infrastructures etc.

Talk about realism of implementing the individual techniques; cost functions

1. quantum noise, link to squeezing, stress that squeezing is a low risk low impact improvement; needs filter cavities
2. High power laser (1064nm and 1550nm, solid state and fibre)
3. cryogenics in 2.5G detectors; potential and challenges (link to cryo-chapter); cryo in 3G
4. larger beams (delay lines, HOM,…)
5. New coatings
6. Change suspensions, e.g. longer fibres, silicon, sapphire fibres.
7. Heavier mirrors; Alternative optics (Silicon, Sapphire)
8. Seismic and GGN, starting with GGN subtraction for 2.5G; improvement in duty cycle due to lack of weather; include examples of 1G influenced by weather
9. Need for >1 collocated detectors to resolve polarization
10. Xylophone
11. QND readout

Scenarios; scientific impact of different number of 3G detectors.