Exploring the Sensitivity of Next Generation Gravitational Wave Detectors

Why do we need this paper?

- I have received repeated requests for some published, citable, paper which contains Cosmic Explorer target curves similar to the ones available for ET. At present, we don't have any such publication. The closest we have is
  - Dwyer, S., et al. (2015). Gravitational wave detector with cosmological reach. Physical Review D, 91(8), 082001. http://doi.org/10.1103/PhysRevD.91.082001 which explores the scaling of noises with detector length. The curve presented there does not match the ISWP and is not really comparable to the ET curves presented in
  - Hild, S., et al. (2011). Sensitivity studies for third-generation gravitational wave observatories. Classical and Quantum Gravity, 28(9), 094013. http://doi.org/10.1088/0264-9381/28/9/094013
- This is the paper I would like to publish to solve this problem. It presents the curves which appear in this years Instrument Science White Paper, and will include an ASCII file containing the curves in supplementary material.

Why all LSC authors?

- There are many aspects to the design of a new detector, and thus the work of many working groups has influenced this document. It may be possible to select a subset of authors, but it is probably not worthwhile.
- The next generation of detectors will be expensive, and the GW community should be aware of what is being asked for and why. I hope that having this paper be LSC all will give it visibility within the community, and buy-in from the authors. This then lends credibility to future efforts to achieve the goals stated here.

What is in this paper?

- Principally, this paper makes public the target sensitivity of Cosmic Explorer for use in studies of the potential astrophysical output of such a detector.
- It also aims to highlight the areas of instrument science necessary to achieve the CE target.
- The paper is intended to be technology agnostic, and includes equations which describe how the fundamental noises scale with the parameters relevant to on-going R&D.

The Message

- Thanks to everyone who has helped!
- **Your** input is welcome…
  - you are an author too, so include detailed suggested fixes in your commentary!
- Please use this as the source of the CE sensitivity curve for "science case" studies involving next-gen networks of CE and ET type machines.

THANKS FOR YOU ATTENTION!