



GWIC's role

GWIC Subcommittee on Third Generation Ground-based Detectors Formed July 2016

GWIC subcommittee purpose and charge:

With the recent first detections of gravitational waves by LIGO and Virgo, it is **both timely and appropriate to begin seriously planning for a network of future gravitational-wave observatories**, capable of extending the reach of detections well beyond that currently achievable with second generation instruments.

The GWIC Subcommittee on Third Generation Ground-based Detectors is tasked with **examining the path to a future network of observatories/facilities**

Co-Chairs: **Michele Punturo, Dave Reitze**



GWIC's role

1) **Science Drivers for 3G detectors:** *Chairs: Kalogera, Sathyaprakesh*

commission a study of ground-based gravitational wave science from the global scientific community, investigating potential science vs architecture vs. network configuration vs. cost trade-offs, recognizing and taking into account existing studies for 3G projects (such as ET) as well as science overlap with the larger gravitational-wave spectrum.

2) **Coordination of the Ground-based GW Community:** *Lueck, McClelland*

develop and facilitate coordination mechanisms among the current and future planned and anticipated ground-based GW projects, **including identification of common technologies** and R&D activities as well as **comparison of the specific technical approaches to 3G detectors**. Possible support for coordination of 2G observing and 3G construction schedules.

3) **Networking among Ground-based GW Community:** *Puntaro, Reitze*

organize and facilitate links between planned global 3G projects and other relevant scientific communities, including organizing:

- town hall meetings to survey the community
- dedicated sessions in scientific conferences dedicated to GW physics and astronomy
- focused topical workshops within the relevant communities



GWIC's role

4) **Agency interfacing and advocacy:** *Rowan*

identify and establish a communication channel with funding agencies who currently or may in the future support ground-based GW detectors; communicate as needed to those agencies officially through GWIC on the scientific needs, desires, and constraints from the communities and 3G projects (collected via 1) – 3) above) structured in a coherent framework; serve as an advocacy group for the communities and 3G projects with the funding agencies.

5) **Investigate governance schemes:** *Ferrini, Marx*

by applying knowledge of the diverse structures of the global GW community, propose a sustainable governance model for the management of detector construction and joint working, to support planning of 3rd generation observatories"

The subcommittee should provide a preliminary report and set of proposed actions recommendations to GWIC no later than the 2017 GWIC meeting.

Subsequent reports should be delivered future GWIC meetings.



GWIC
Gravitational Wave International Committee

GWIC

R&D coordination

for advanced and 3G detectors

subgroup of GWIC 3G subgroup



Intention & Scope of the working group

- Lots of R&D required for future GW detectors (A++ & 3G)
- Limit scope to ground based Ifos
- Needs to define R&D demands & timelines within GWIC 3G working
- Needs global coordination & harmonisation to cover all aspects and avoid unnecessary redundancy (sometimes desired)
- No R&D work done in this sub-group but monitoring/advisory function





R&D topics (as a start...)

- What are the big instrument issues that must be addressed where the R&D will be expensive, thereby demanding a combined joint globally funded effort:
 - Coatings (amorphous, crystalline, other, @ RT and cooled);
 - substrates (silicon, sapphire, fused silica, other, @ RT and cooled);
 - cooling (124 K and cryogenic);
 - Facilities (above/below ground, size, vacuum, cost)
 - Newtonian Noise cancellation (more generally low frequency noise).
-
- Then there are secondary issues which will benefit greatly from coordinated R&D but not necessarily requiring combined resources:
 - suspensions, lasers and auxiliary optics, squeezers, configurations, simulation etc.



The R&D committee then might:

- determine ‘design independent’ R&D – outcomes applicable/needed for any likely design; common elements
- design dependent R&D
- how to bring about joint efforts
 - how to set up global WGs across the big areas,
 - what quantum of funding might be needed, timescale etc.
- how far should it go (or not go) in making observations and recommendations about coordination avenues and paths.
 - Consider a common design approach for example



Funding of R&D

- NSF indicates willingness to fund 3D conceptual design study if balanced on ET side
 - Approach European funding agencies through APPEC?
 - Will arrange a meeting to discuss this with APPEC soon

