

Special working group for KAGRA (LCGT) Roadmap



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On behalf of LCGT
special working group

LCGT Roadmap Special working group

Roadmap special working group

Scope

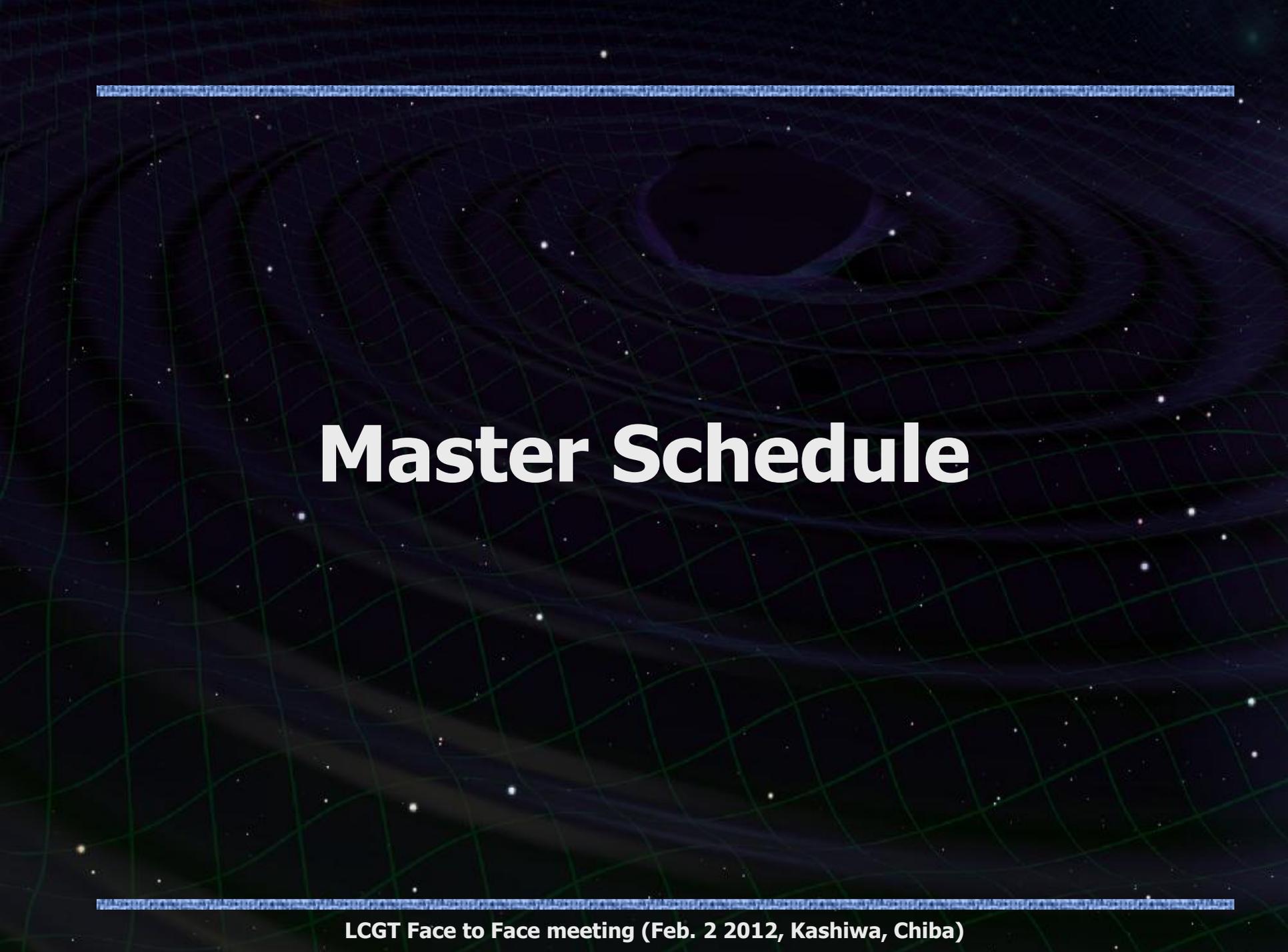
To recommend the roadmap to realize LCGT.

- Make a recommendation of the master schedule,
- Summarize subsystem bottom-up plans.
- Construct a progress evaluation system.
- Summarize information of risk factors during construction.

- Open for all collaborators, nominally ~20 participants.
- Brainstorm-type meeting with free discussions.
- 20 meetings since Oct. 25, 2010.

Main topic
In this talk



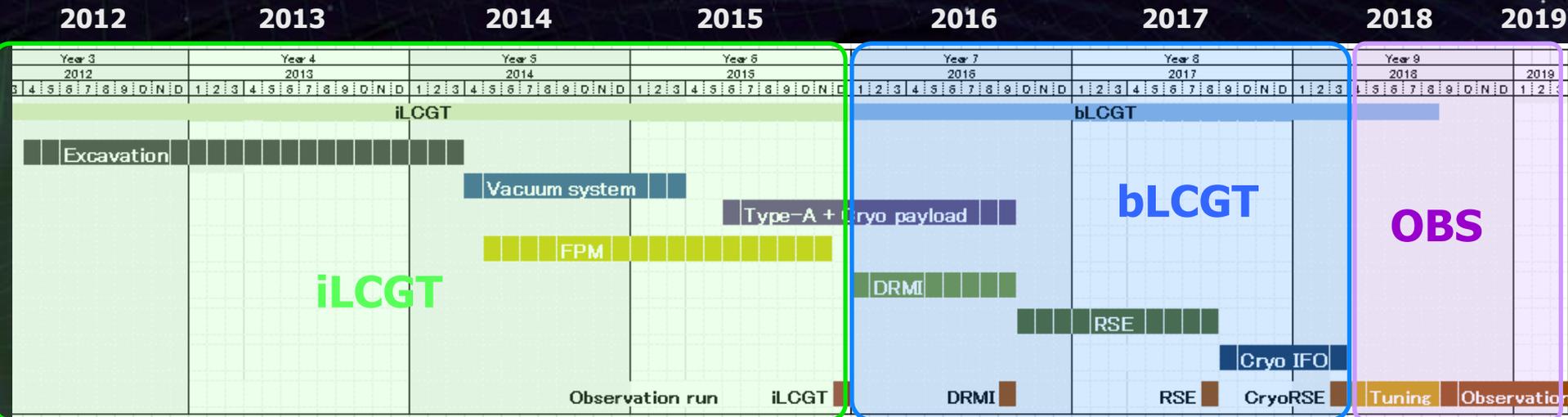


Master Schedule

Project Master Schedule

- We have updated the LCGT construction schedule.
 - Mainly because of delay in the excavation schedule.
(or financial decision of the government)
- Good chance to refine the schedule.
 - Previous schedule was not a well-defined one.
 - * Challenging and aggressive schedule.
 - * There were some inconsistencies between project master schedule and subsystem bottom-up plan.
 - We need better schedule management system.
 - * Quantitative evaluation of project progress both in project management and sub-system development.
 - * The status should be open for collaborators clearly.
 - Recommendation in the Last PAB:
Progress evaluation system, sub-system bottom-up plan.

New Constraint on the master plan



→
Tunnel and Facility
(by the end of FY2013)

→
Vacuum system
by the end of FY2014

→
Start observation run
By the end of FY2017



- * Completion the installation of the vacuum system is a strict constraint. Detailed schedule will be determined with iterations with subsystem bottom-up plans. However, Earlier start of observation run is preferable.

Timeline to decide the master plan

2011

Oct.

Call for participation to the roadmap working group.

Nov.

Collection of on bottom-up plans of subsystems.

Dec.

5 weekly meetings and

several small ones with a few subsystems.

Recommendation document on the master schedule.

Circulation to SEO and all the LCGT collaborators.

2012

Jan.

Submission to EC (Executive Committee)

→ Approval with minor revision.

Decision announced to collaborators.

Feedback to subsystem bottom-up plans

→ Checked in the series of internal reviews.

Feb.

Explanation in the face-to-face meeting (Now).

Commissioning Plan

- **LCGT schedule is extremely tight.**

- We should reduce the amount of the on-site commissioning tasks.
Intensive tests are required for each sub-system before installation.
Avoid additional tasks only for intermediate steps.
Basic policy 'Do not use LCGT as an R&D facility'.

- **It is hard to test the full cryogenic test-mass system.**

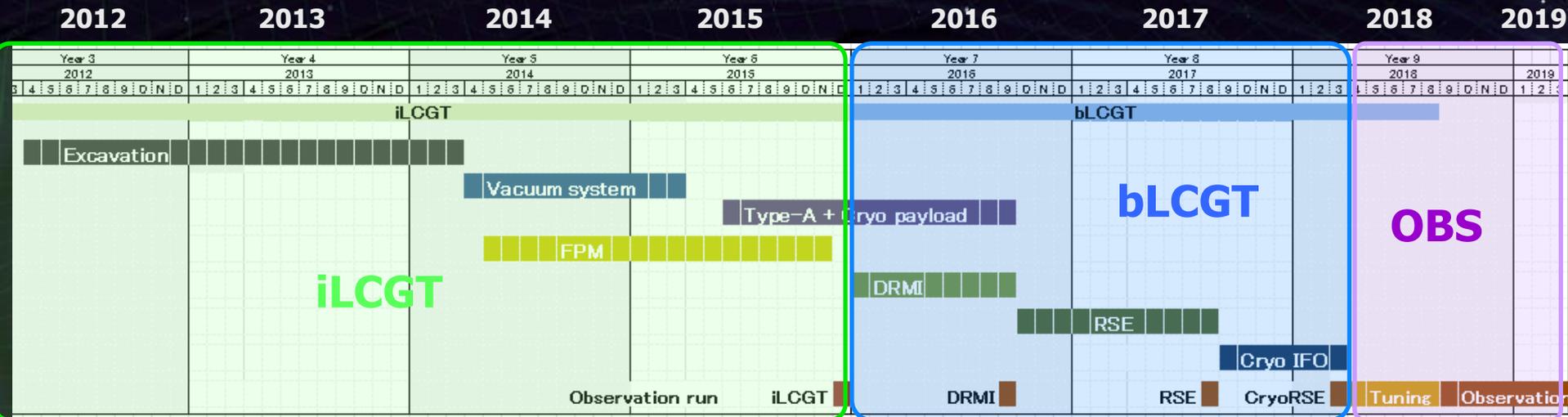
- Type-A isolator test requires a large facility and a quiet site.
- Cryogenic system requires long test time
for a cool-down and warm-up cycle.
- Hard to avoid technical and schedule risks.



- **Roadmap to solve these concerns.**

- Install ETMs in front of the original positions (by ~35 m)
for the room-temp. interferometer commissioning.
- Step-by-step commissioning for the interferometer (FPM → DRMI → RSE)
- Full test of the real VIS and cryogenic system at the end rooms.

New Constraint on the master plan



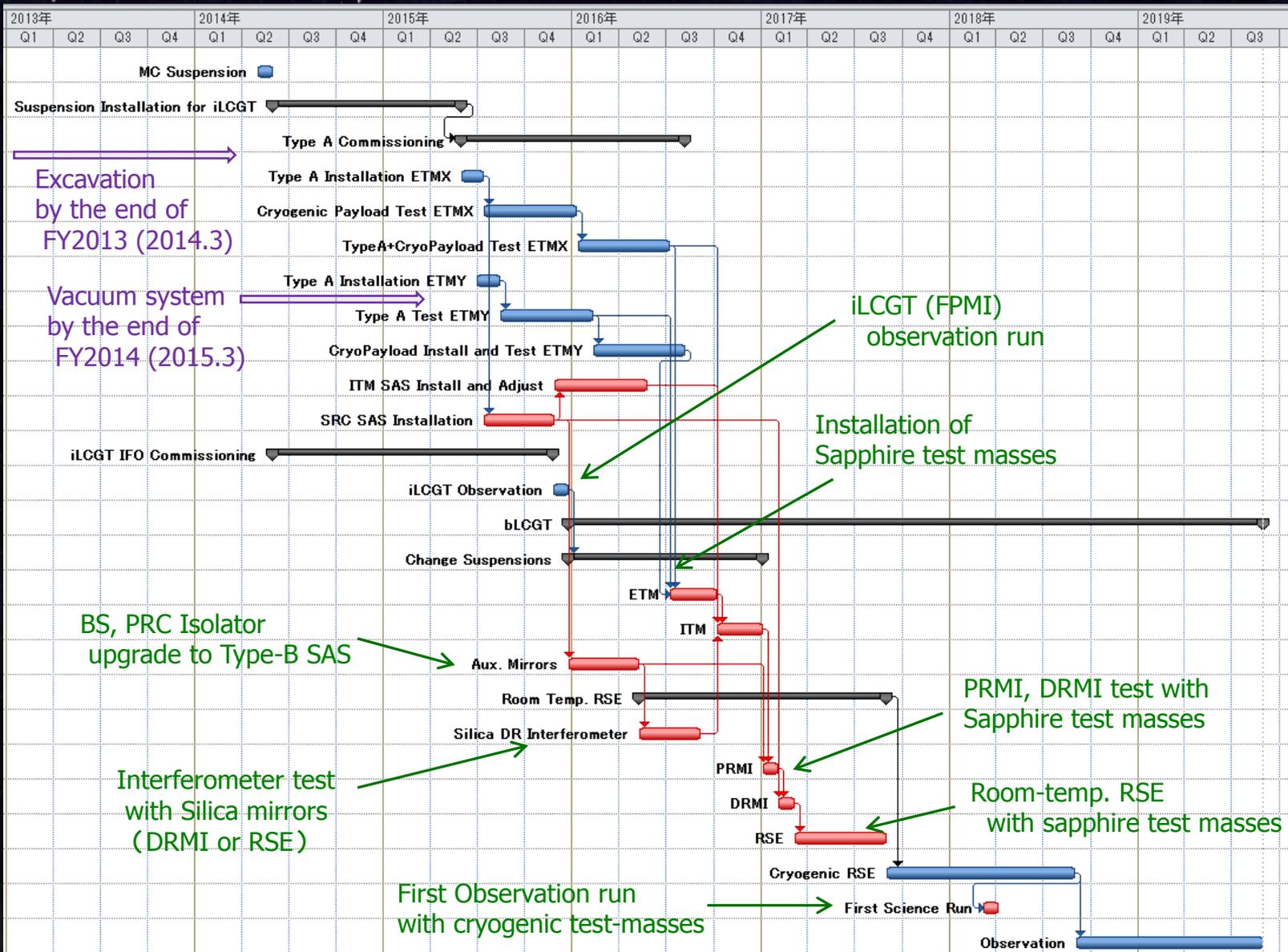
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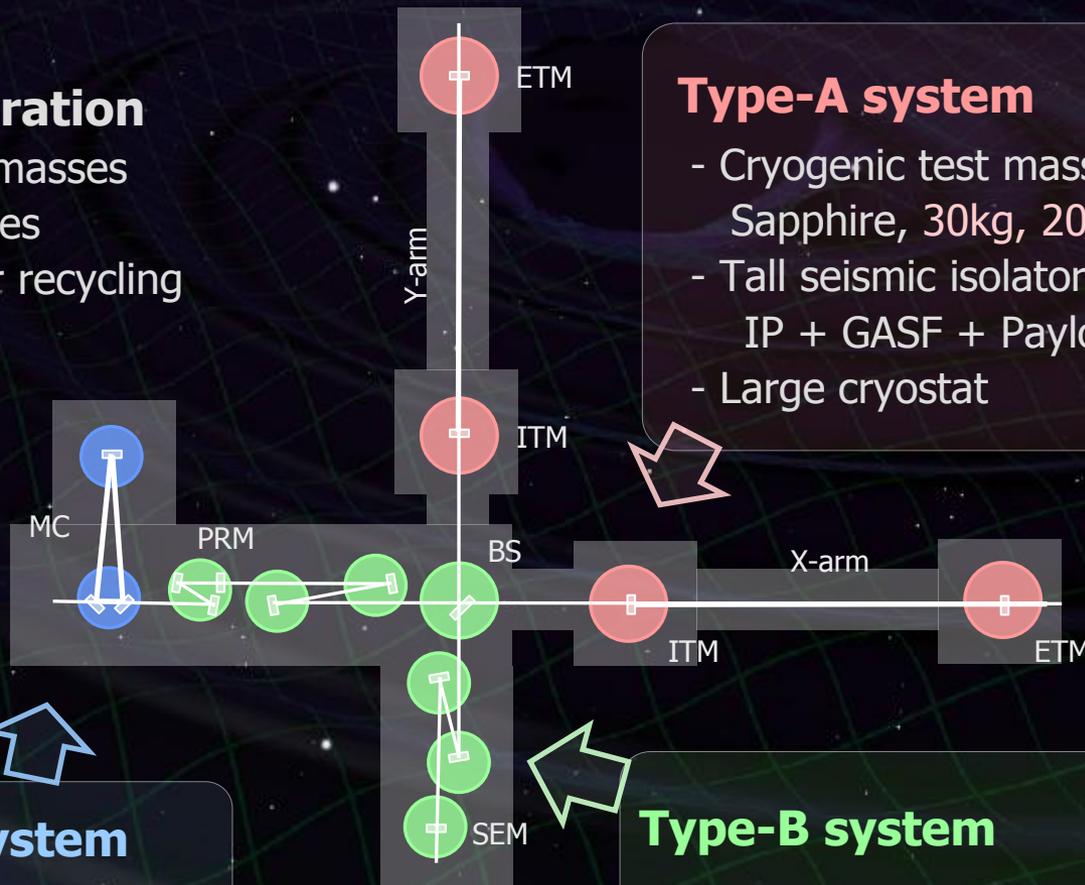


LCGT Face to Face meeting (Feb. 2 2012, Kashiwa, Chiba)

bLCGT configuration

bLCGT configuration

- Cryogenic test masses
- 3 km arm cavities
- RSE with power recycling



Type-A system

- Cryogenic test mass
Sapphire, 30kg, 20K
- Tall seismic isolator
IP + GASF + Payload
- Large cryostat



Type-C system

- Mode cleaner
Silica, 1kg, 290K
- Stack + Payload



Type-B system

- Core optics (BS, RM, ...)
Silica, 10kg, 290K
- IP + GASF + Payload
- Stack for aux. optics



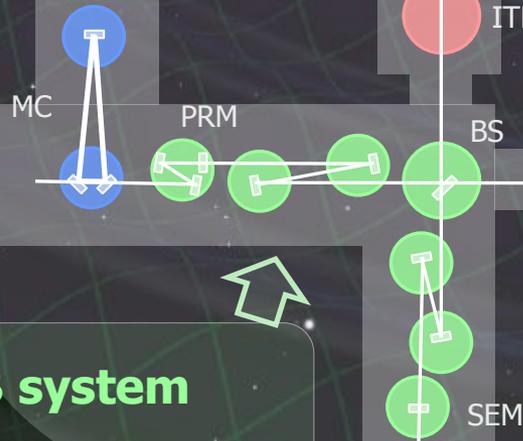
bLCGT commissioning 1 (- 2016.9)

bLCGT1

(DRMI, Cryo full system)

- VIS upgrade to Type-B for core optics
- Center interferometer (DRMI) with room-temp. test masses.
- Full test of cryogenic test-mass system (Type-A SAS + Cryo-system)

Center IFO (DRMI)



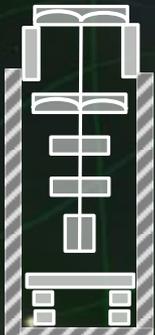
Cryogenic test mass full system test

- Cryogenic test mass
Sapphire, 23kg, 20K
- Type-A isolator
- Cryostat + cryo-cooler



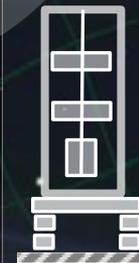
Type-B system

- Core optics (BS, RM, ...)
Silica, 10kg, 290K
- IP + GASF + Payload
- Stack for aux. optics



Stack-B system

- Test mass
Silica, 10kg, 290K
- Seismic isolator
Stack + Type-B Payload



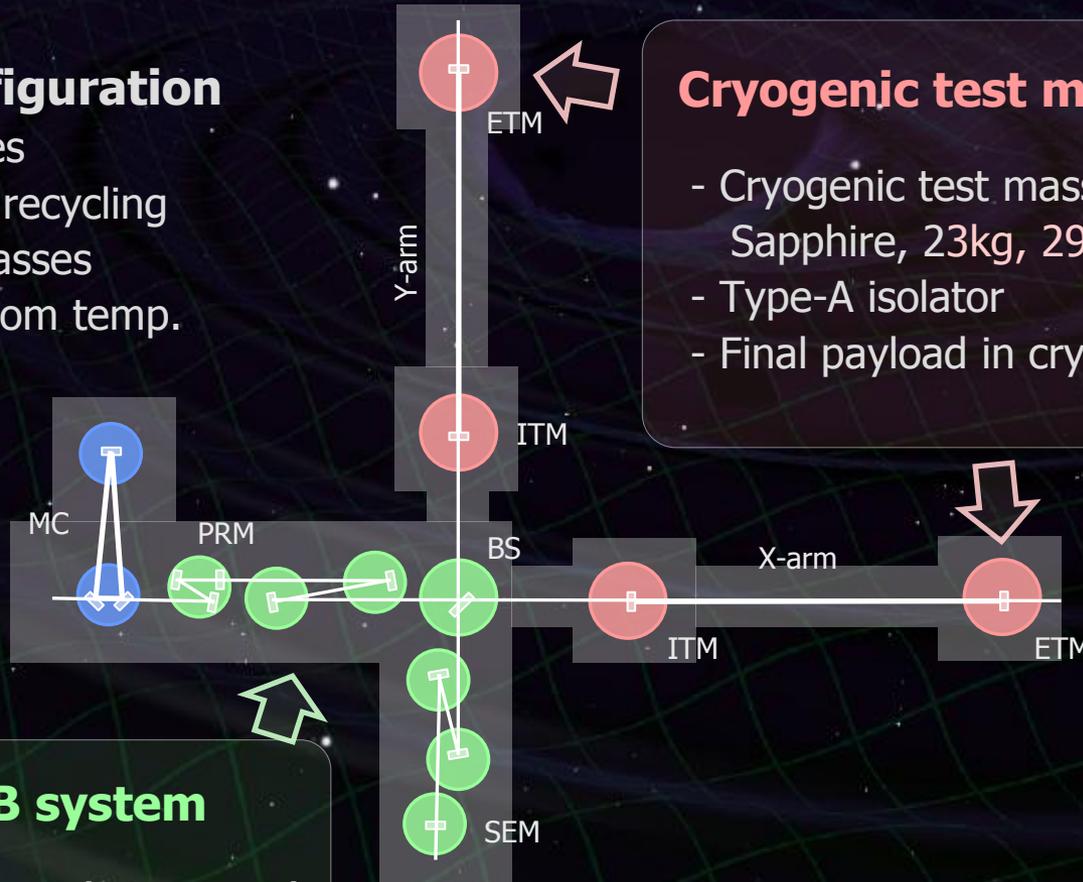
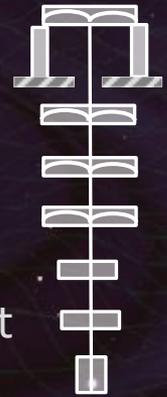
bLCGT commissioning 2 (- 2017.8)

bLCGT full configuration

- 3 km arm cavities
- RSE with power recycling
- Sapphire test masses operated at room temp.

Cryogenic test mass

- Cryogenic test mass
Sapphire, 23kg, 290K
- Type-A isolator
- Final payload in cryostat



Type-B system

- Core optics (BS, RM ,...)
Silica, 10kg, 290K
- IP + GASF + Payload
- Stack for aux. optics

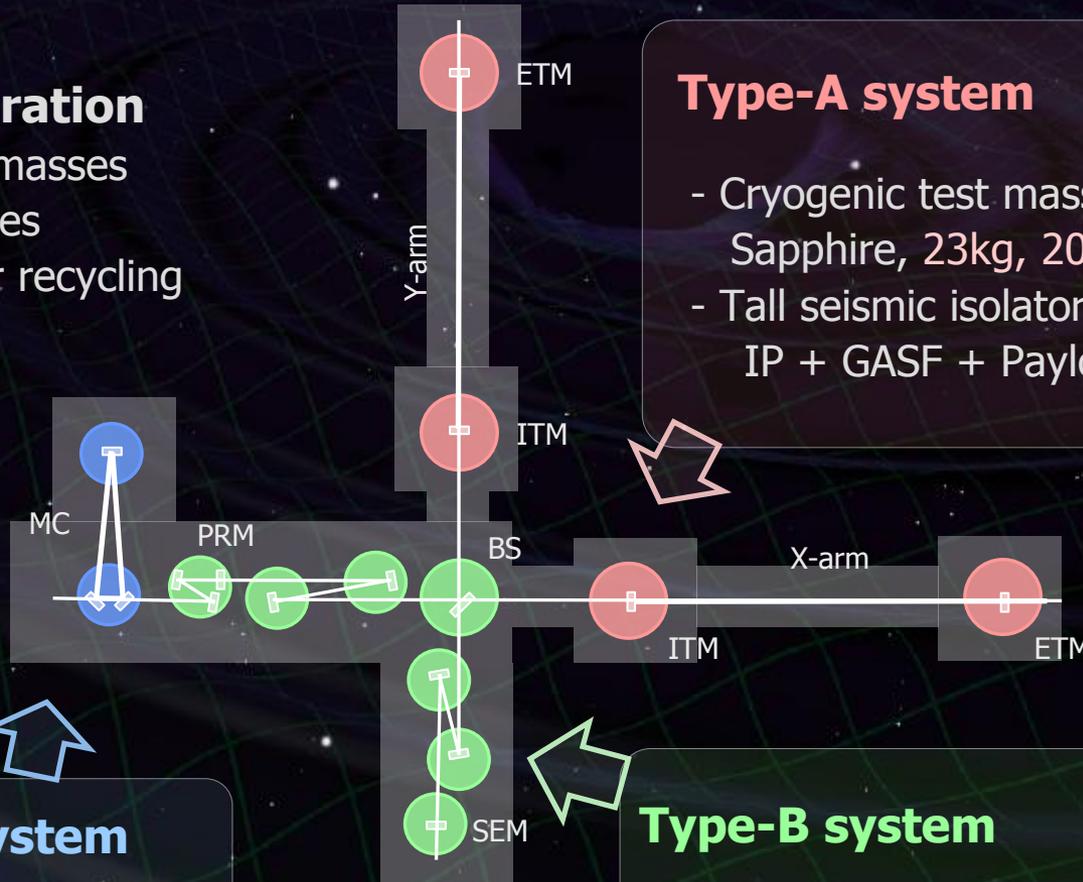


Cryogenic operation (- 2018.3)

bLCGT configuration

- Cryogenic test masses
- 3 km arm cavities
- RSE with power recycling

first science run
in Mar. 2018
~1 month



Type-A system

- Cryogenic test mass
Sapphire, 23kg, 20K
- Tall seismic isolator
IP + GASF + Payload



Type-C system

- Mode cleaner
Silica, 1kg, 290K
- Stack + Payload



Type-B system

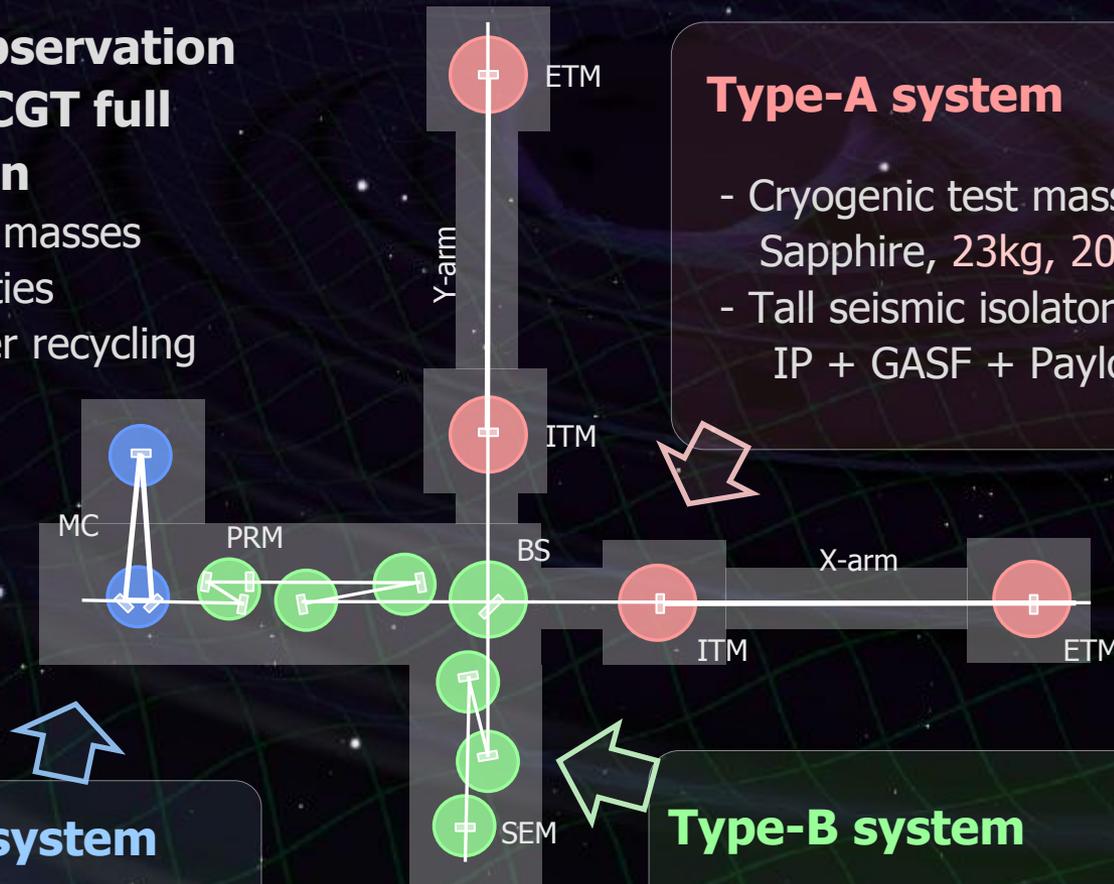
- Core optics (BS, RM, ...)
Silica, 10kg, 290K
- IP + GASF + Payload
- Stack for aux. optics



Tuning and observation (2018.4 -)

Tuning and observation run with bLCGT full configuration

- Cryogenic test masses
- 3 km arm cavities
- RSE with power recycling



Type-A system

- Cryogenic test mass
Sapphire, 23kg, 20K
- Tall seismic isolator
IP + GASF + Payload



Type-C system

- Mode cleaner
Silica, 1kg, 290K
- Stack + Payload



Type-B system

- Core optics (BS, RM, ...)
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Subsystem

Bottom-up plans

Progress evaluation

Risk management

Subsystem Plans

- Subsystem bottom-up schedule
 - Detailed subsystem schedule
(Development, Prototype test, Quality insurance, Installation,...)
 - Should be consistent with the project master plan.
 - Also include risk factors and back-up plans.
- Progress evaluation
 - Evaluated by a 'milestone scheme'
 - * Set ~10 milestones for each subsystem
(subset of subsystem bottom-up plan)
 - * Status for the milestones -- checked in regular meetings.
 - The status will be open for all the collaborators.
 - System: Microsoft Project + Network access.

Current status/Next steps

- Internal reviews (~Jan. 2012)
 - Subsystem bottom-up plans with the newly decided master plan.
 - Consistencies with the master plan have been checked.
 - Basic information have been presented on the milestones, risks of each subsystem.
- Upcoming tasks (by the next PAB).
 - Summarize the bottom-up plans and milestones for the project management (scheduling and progress evaluation).
 - ← Require a help of each subsystem.
 - Update and summarize the risk factors.
 - ← Also need a help of all the collaborators.

Summary

Roadmap special working group

- Master schedule has been decided.
- Detailed tasks to be finished:
 - Subsystem bottom-up plans
 - Milestones and progress evaluation
 - Risk factors