Construction status and plan-2

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Outline

- Master schedule and
  subsystem bottom-up plans
- Progress evaluation
- Risk Management

Last PAB Report

PAB report (p.3)

• We believe the project needs a more systematic technique for monitoring of status and plans, in effect, some version of a performance measurement system. … We recommend that some form of baseline planning and performance assessment be added to the project.

⇨ Progress Evaluation

• A key element in this performance measurement system will be establishing an integrated schedule, built up from the individual subsystem schedules.

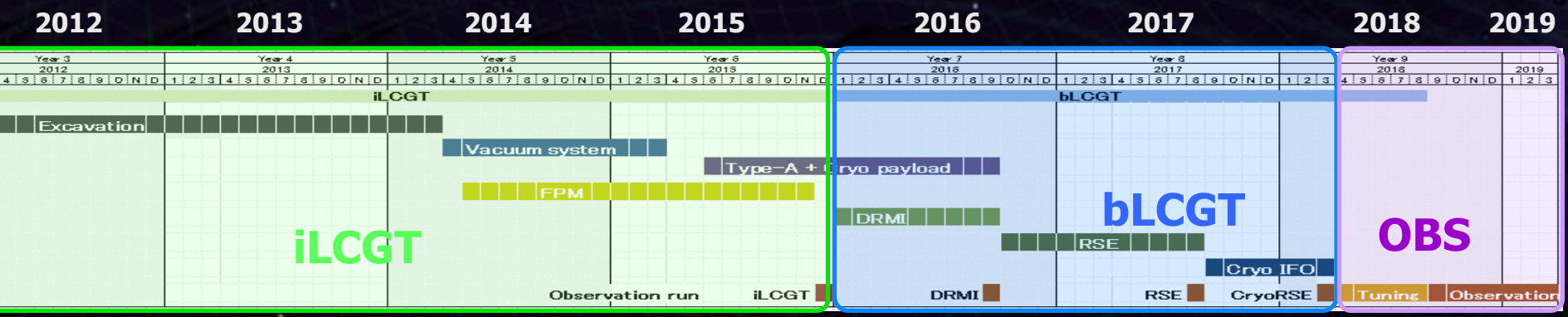
⇨ Master schedule / Bottom-up Plans

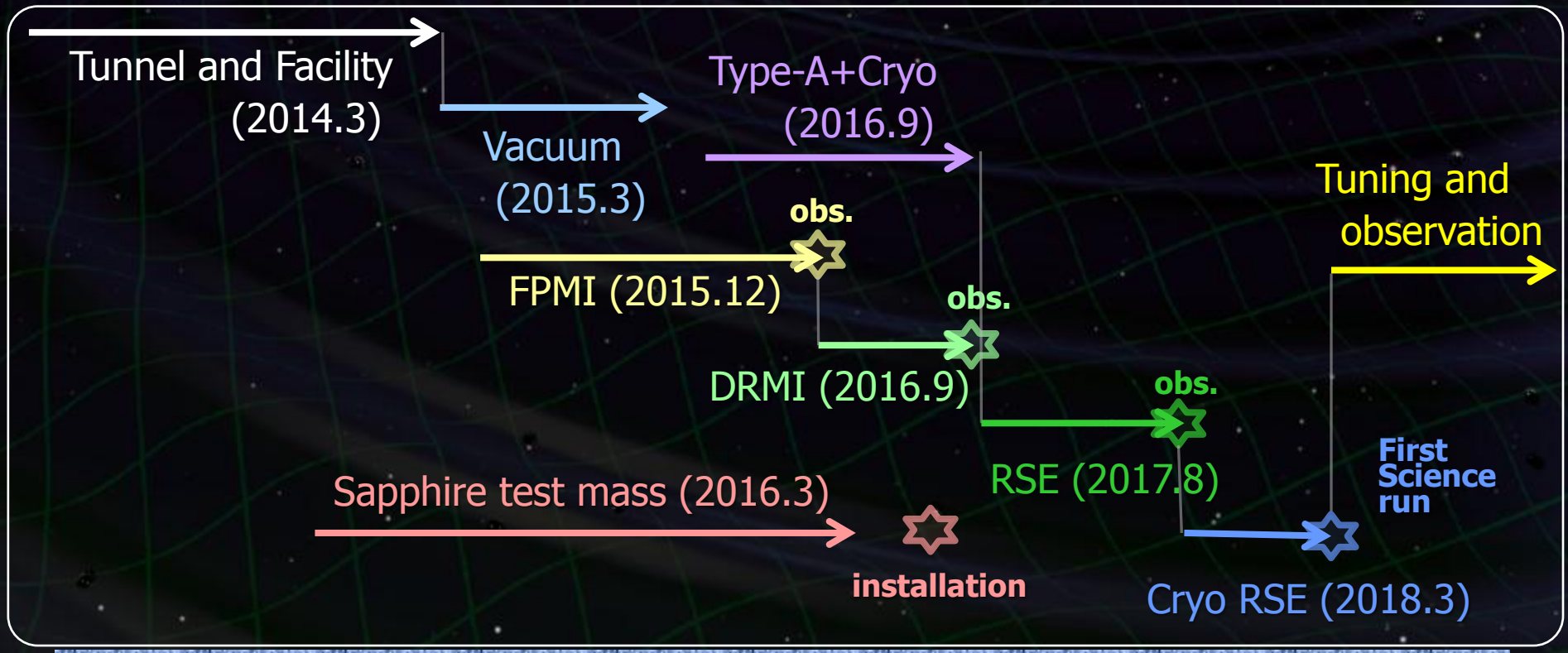
Master Schedule/Bottom-up plan

- Update of the KAGRA (LCGT) construction schedule.
  - Mainly because of delay in the excavation schedule.
  - Good chance to refine the schedule.

- Roadmap special working group
  - Iteration between the project constraint and the bottom-up plan.
  - Open discussions in the collaboration
    → Recommendation approved by EC (Jan. 2012).

Major milestones of KAGRA





Important Updates

- Updates from the previous schedule.

  - Excavation end ~1 year delay
  - Longer iKAGRA commissioning term
    * 18 months after tunnel finish → 21 months
  - No Silica RSE step

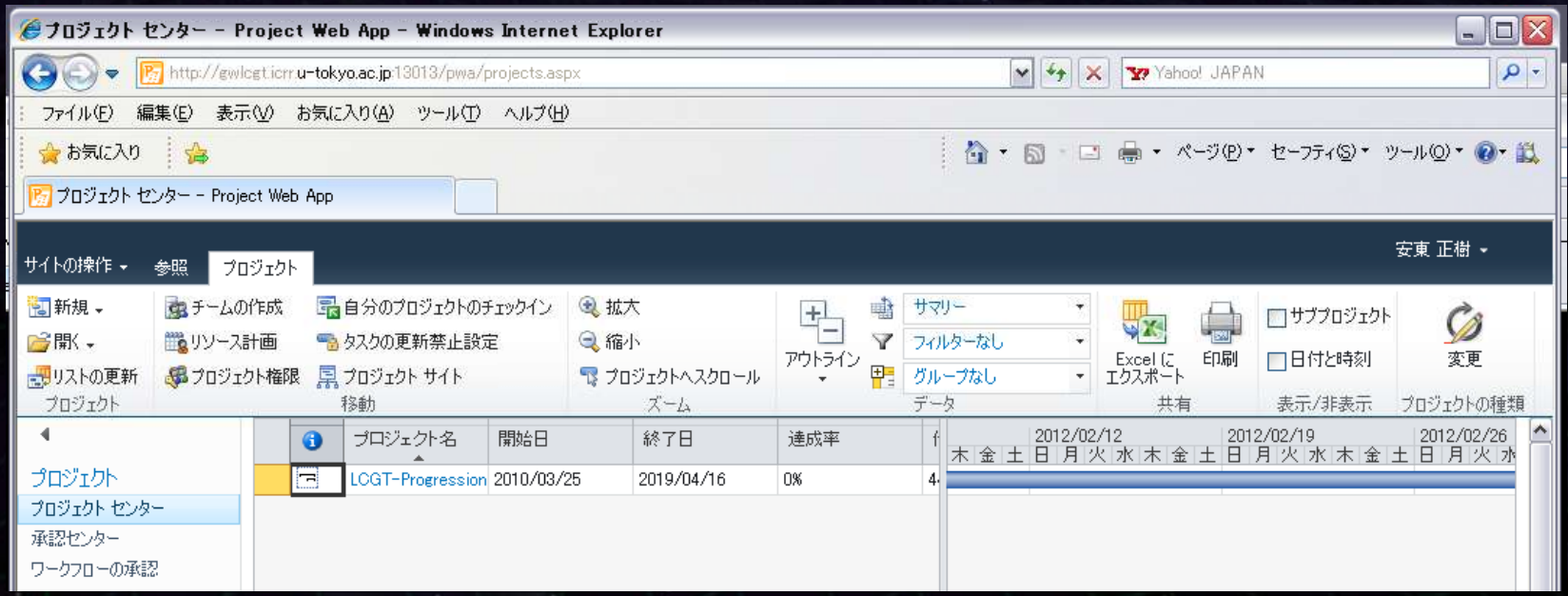
    New plan: iKAGRA → Silica DRMI → Sapphire RSE
  - Minimized delay in observation start.
    * First observation run March 2018 (end of FY2017)
      with bLCGT full configuration.
    * Noise hunting and tuning for full performance
      → Observation phase from Sept. 2018.

Progress Evaluation

- Schedule management system for quantitative evaluation of project progress.

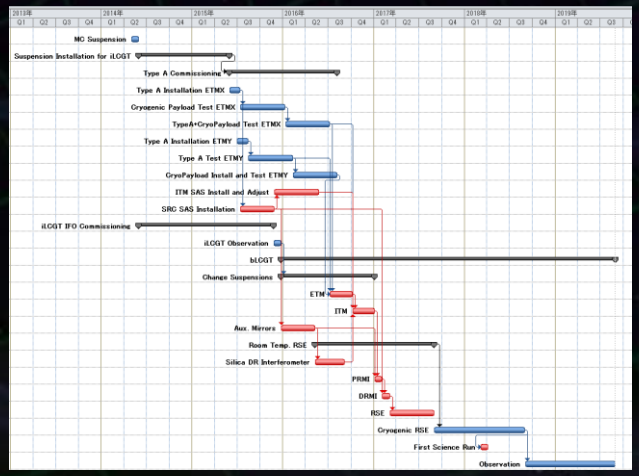
- Progress evaluation by a 'Milestone scheme'.
  - Set ~10 milestones for each subsystem, picked up from a detailed schedule of each subsystem.
  - Status for the milestones will be checked in regular meetings, progress evaluation with ~20% resolution.
  - The status will be open for all the collaborators.
  - A software and network system :
    MS Project and Web server for it.
    The system are being prepared in SEO.

Progress evaluation system



LCGT Schedule
(Microsoft Project on Web server)

Currently, SEO and Subsystem Chiefs have access accounts.



Risk Management

- Information of potential risks are being summarized as a part of schedule management.
  - Effective distribution of project resources.
  - Careful progress evaluation for major risk factors.
  - Back-up plans to Minimize project delay.

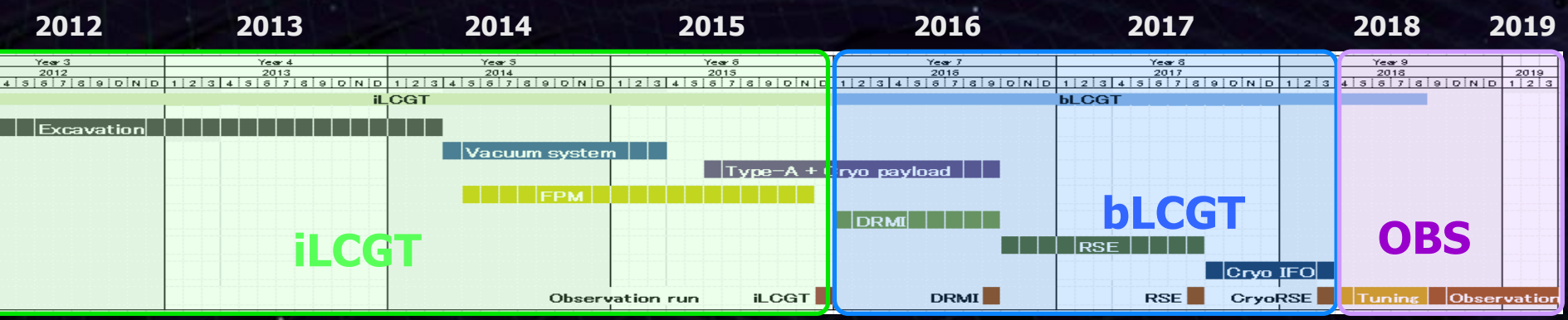
⇩

Technical and schedule risks by each subsystem

→ Being summarized up by SEO.

Appendix

Major milestones of KAGRA



Tunnel and Facility (2014.3)

Vacuum (2015.3)

Type-A+Cryo (2016.9)

obs.

FPMI (2015.12)

obs.

DRMI (2016.9)

obs.

RSE (2017.8)

Tuning and observation

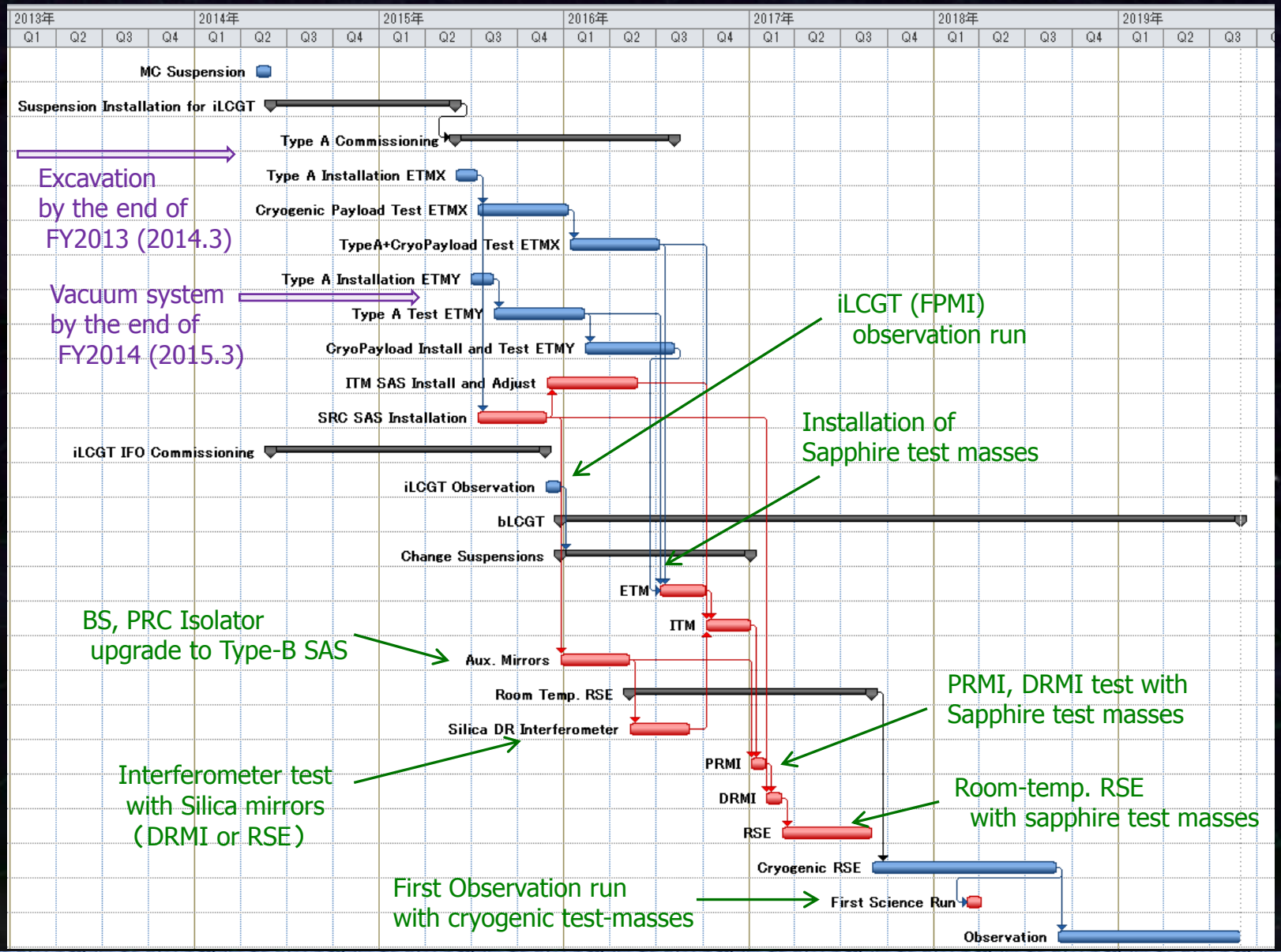
First Science run

Sapphire test mass (2016.3)

installation

Cryo RSE (2018.3)

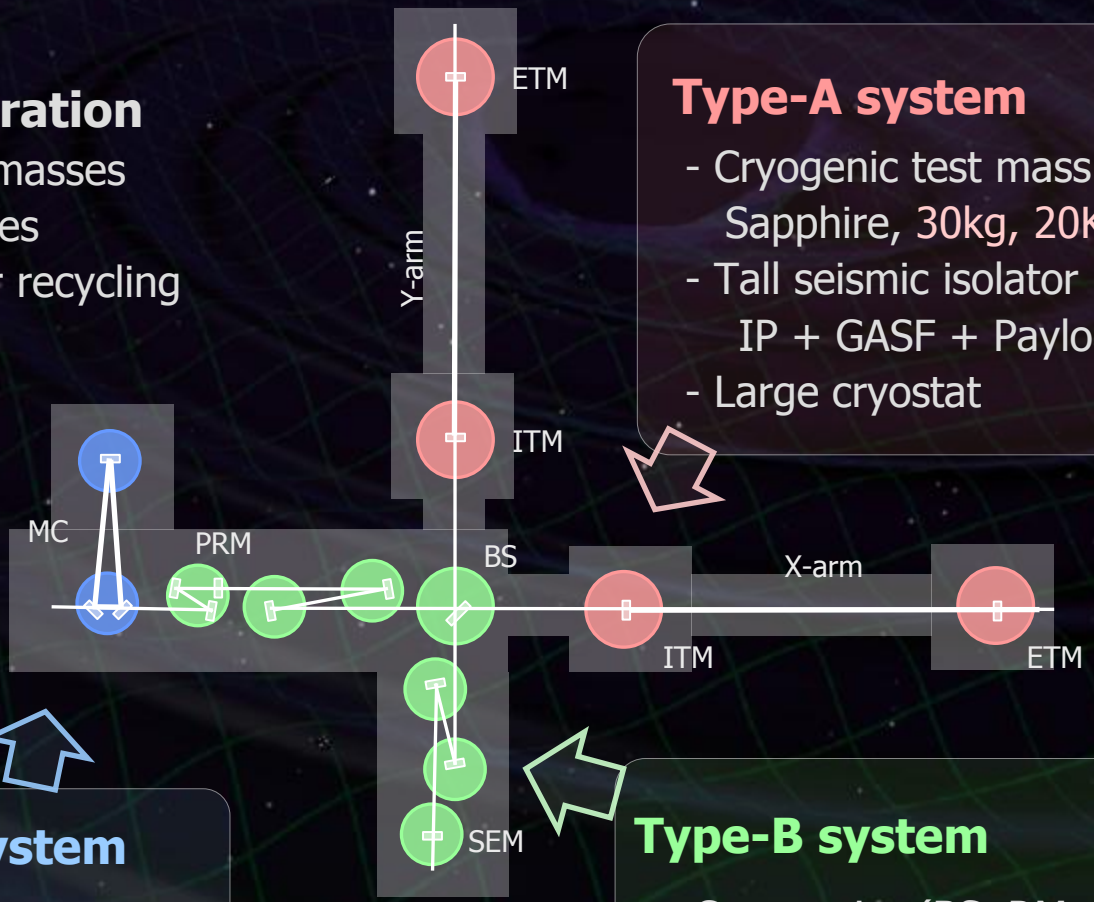
Example of Detailed Schedule



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

Vacuum systems (- 2015.3)

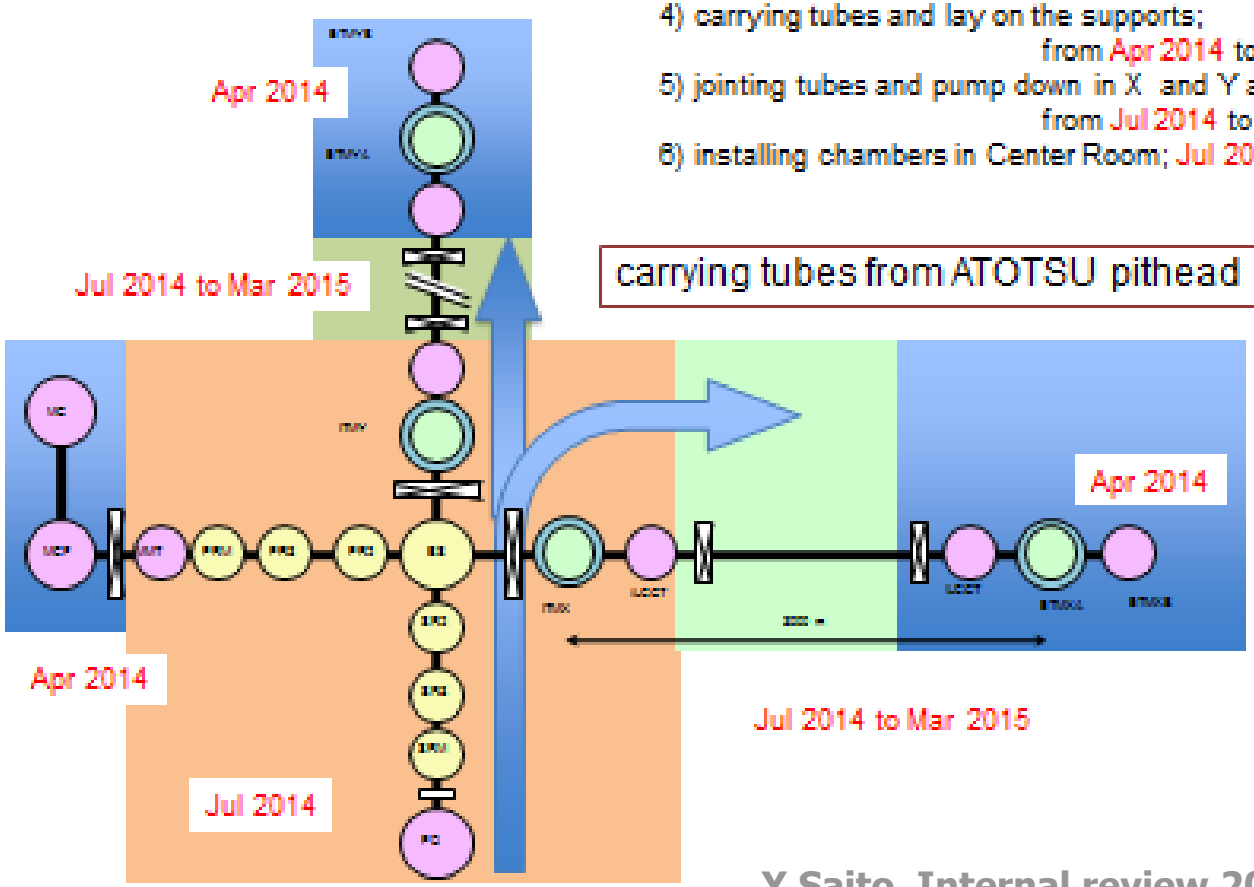
LCGT Vacuum System

120123 VAC (YS)

3. Schedule

expected schedule for installing (2)

1) manufacturing 478 of tubes; from Apr 2011 to Mar 2013
2) manufacturing chambers; from Sep 2012 to Mar 2014
3) installing chambers in X and Y ends; Apr 2014
4) carrying tubes and lay on the supports; from Apr 2014 to Jun 2014
5) jointing tubes and pump down in X and Y arm from Jul 2014 to Mar 2015
6) installing chambers in Center Room; Jul 2014



Y.Saito, Internal review 2012

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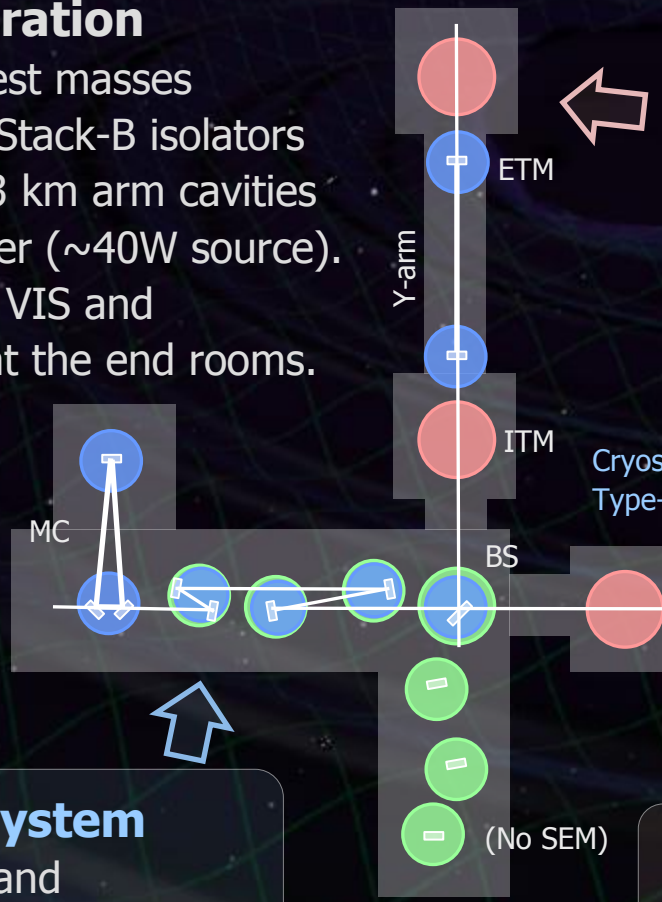
iLCGT commissioning (- 2015.12)

iLCGT configuration

- Room-temp. test masses suspended by Stack-B isolators
- FPMI with 2.93 km arm cavities
- Low laser power (~40W source).
- On-site test of VIS and Cryo-system at the end rooms.



Type-A isolator full-system test

- Room-temp. test
  Sapphire (?), 23kg, 290K
- Tall seismic isolator
  IP + GASF + Payload

iLCGT obs. run
in Dec. 2015
~1 month

Stack-B system

- Test mass and Core optics (BS, FM,..)
  Silica, 10kg, 290K
- Seismic isolator
  Stack + Type-B Payload

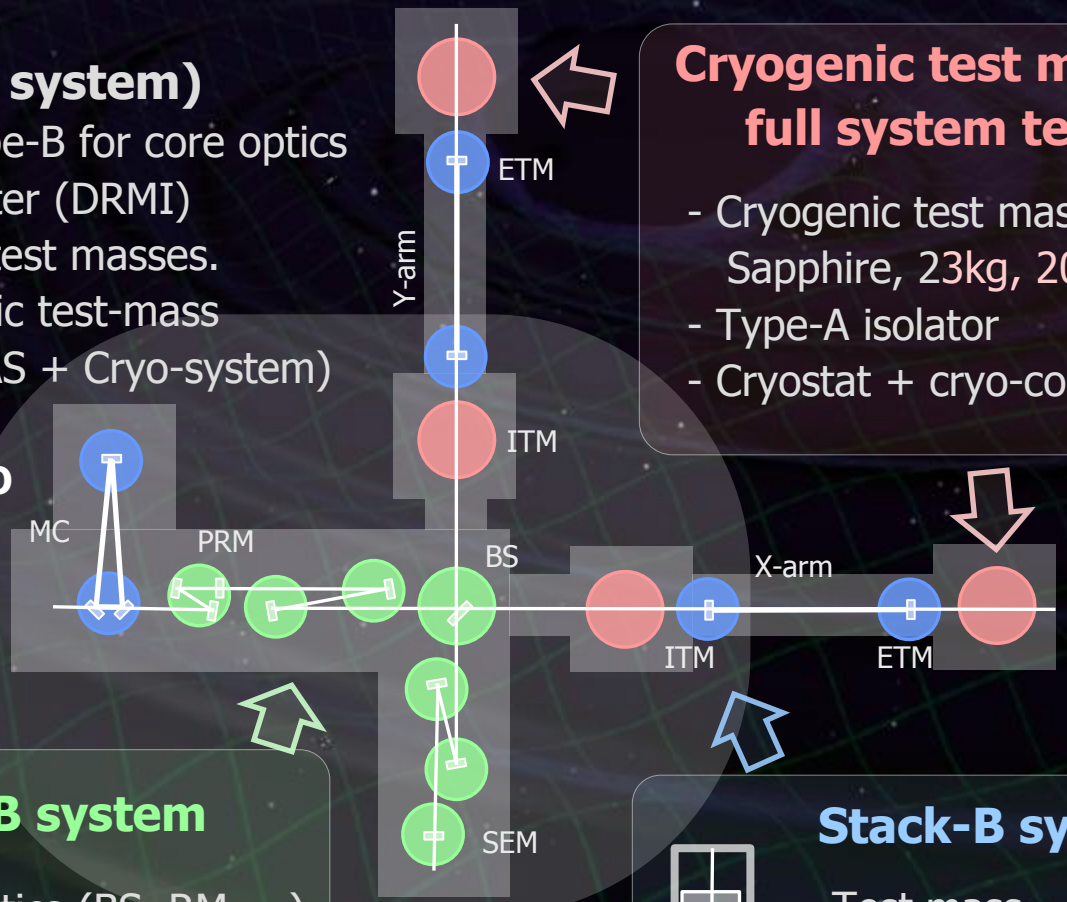
Cryogenic system test

- Cryostat + Rad. shield duct
- Cryo-cooler
- Cryogenic payload
- Fixed Type-ASAS

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

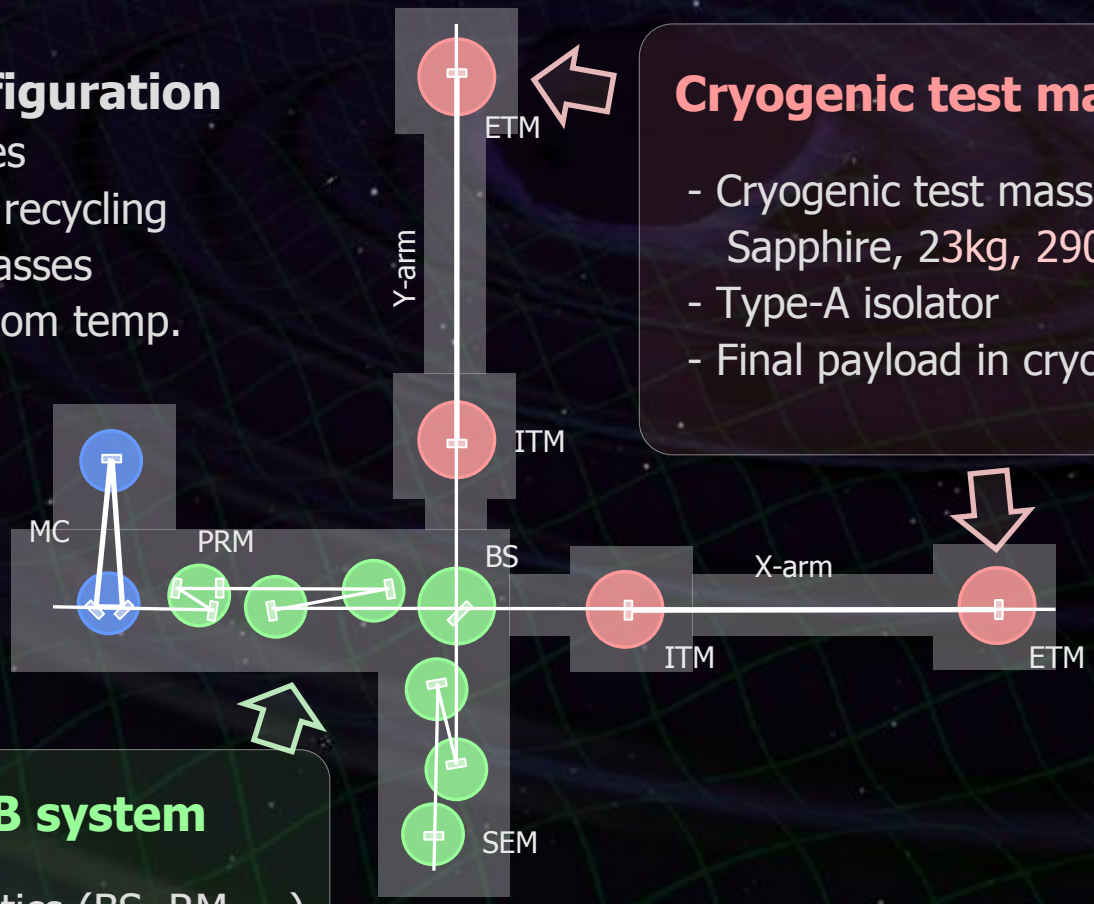
Stack-B system

- 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

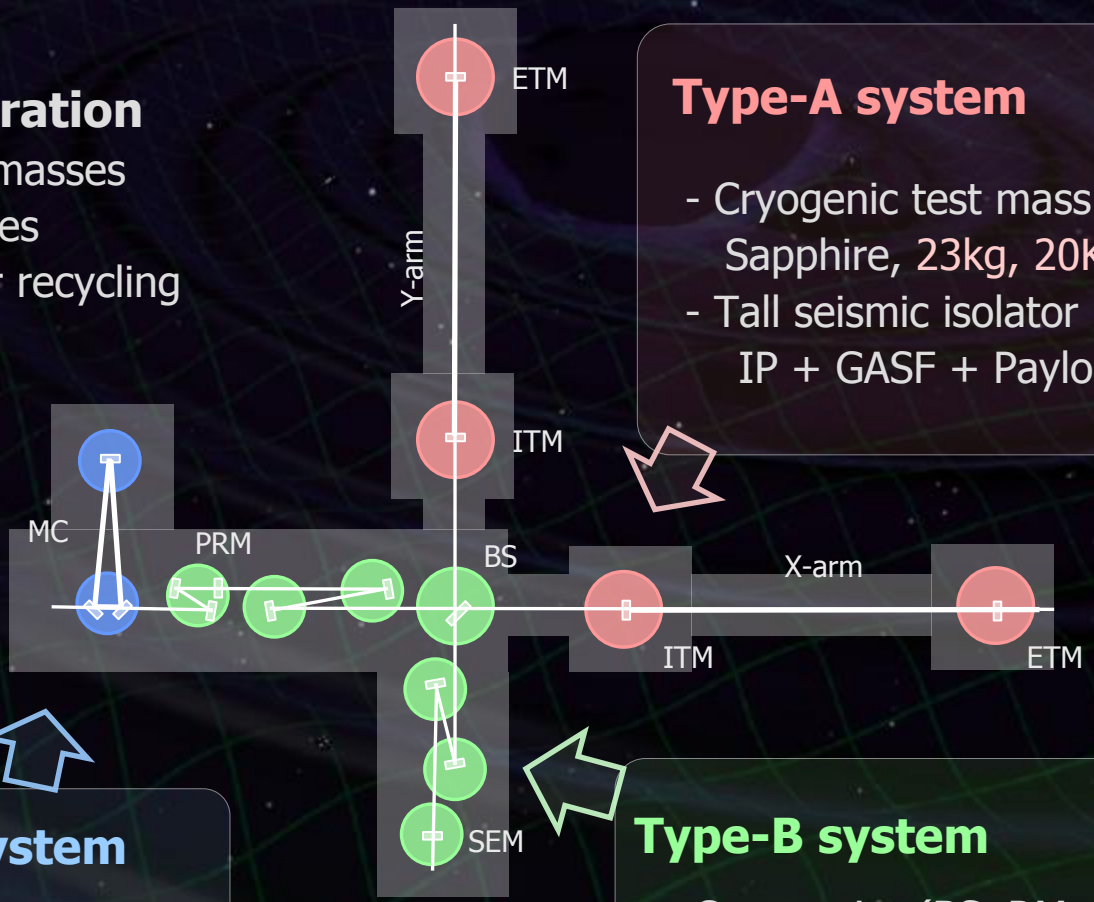
Type-B system

- 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

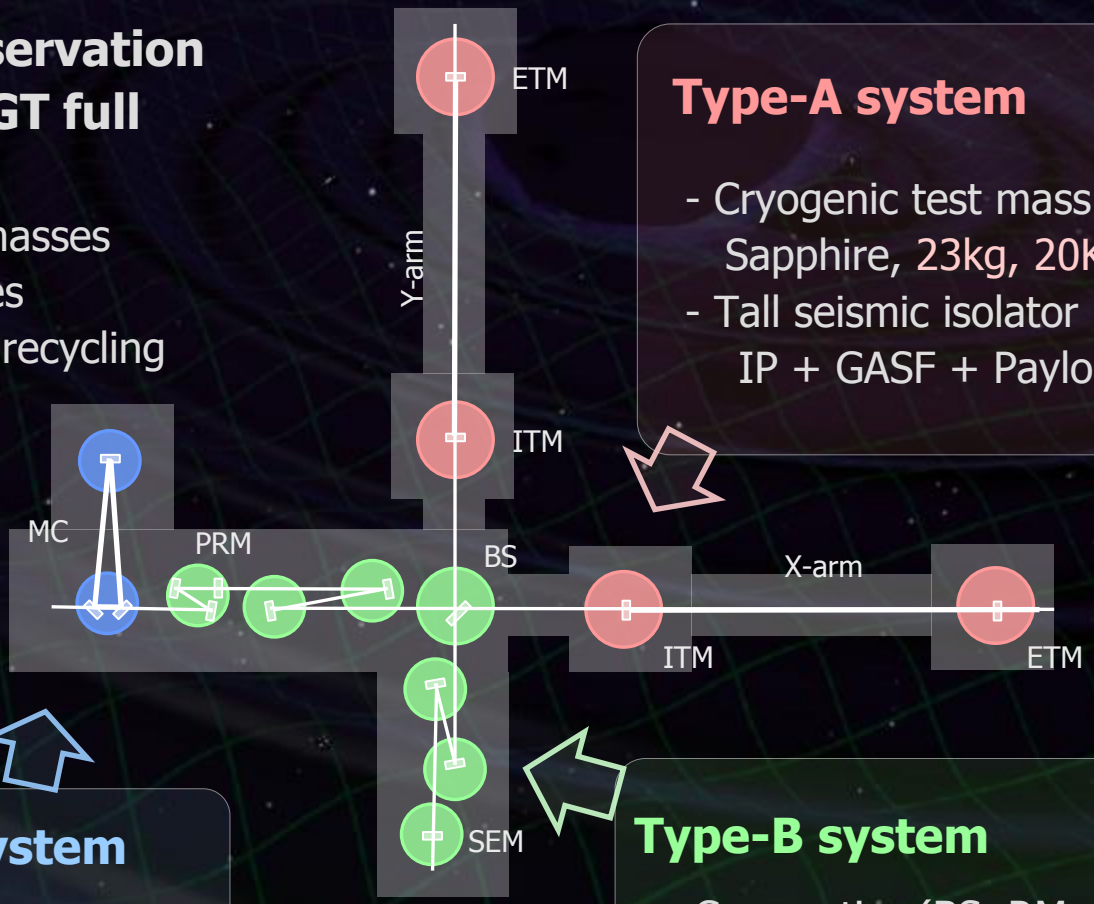
- Mode cleaner
  Silica, 1kg, 290K
- Stack + Payload

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



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