Current status of KAGRA:
- status of construction -

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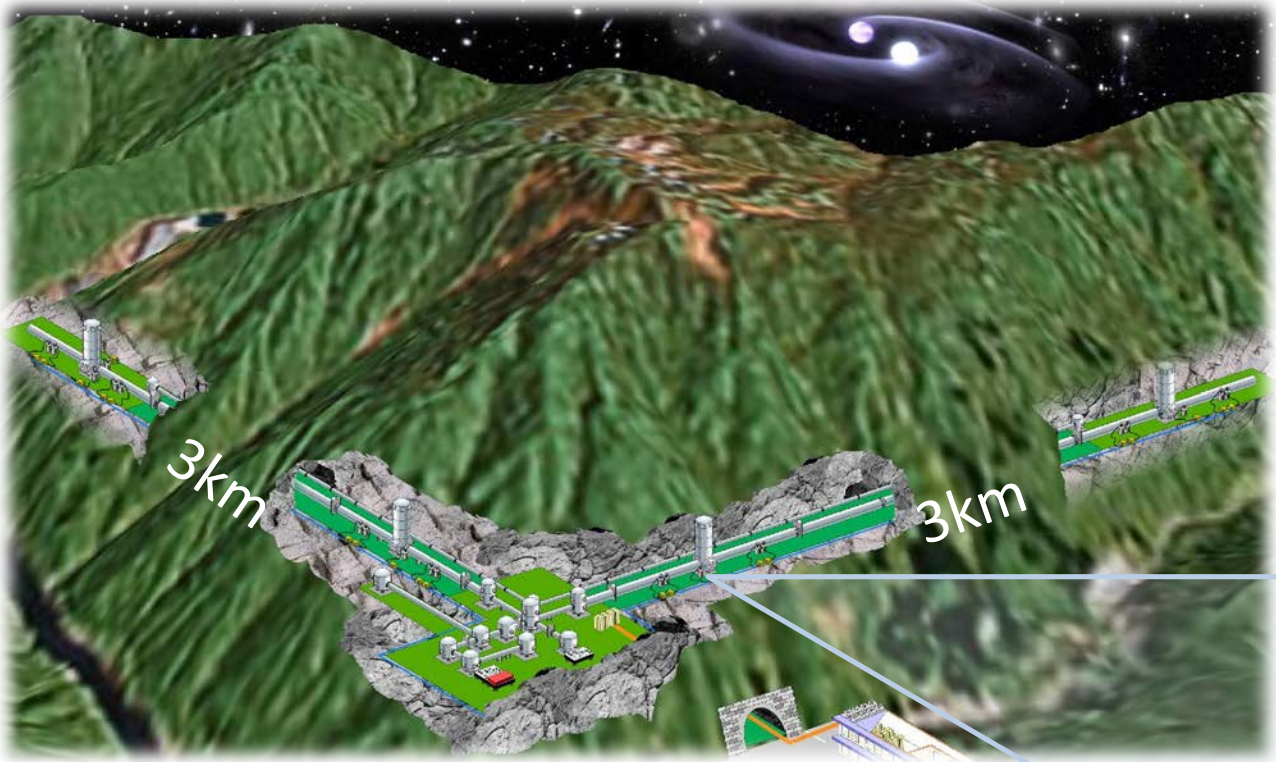
Outline

- Introduction: Overview of KAGRA
- Status of the KAGRA project
- iKAGRA construction plan/schedule
- Summary

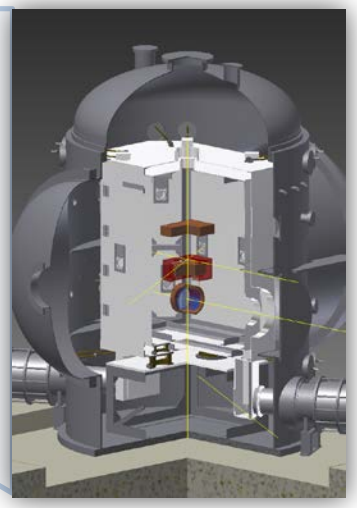
Introduction: Overview of KAGRA

Key features of KAGRA



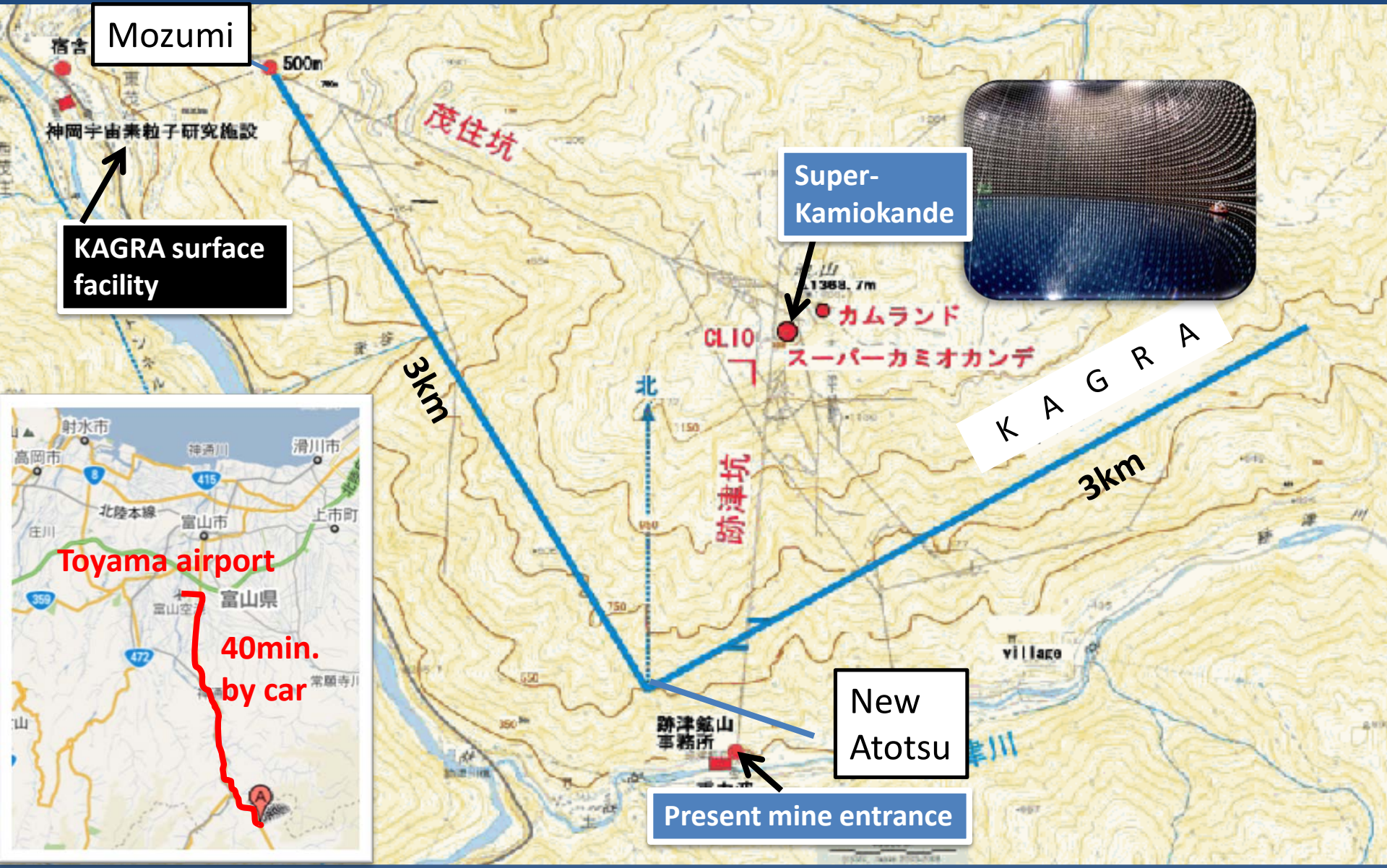
The detector will be constructed underground Kamioka.
➔ Reduction of seismic noise (to approximately 1/100).

Cryogenic mirrors will be used to reduce the thermal noise (in the 2nd phase).

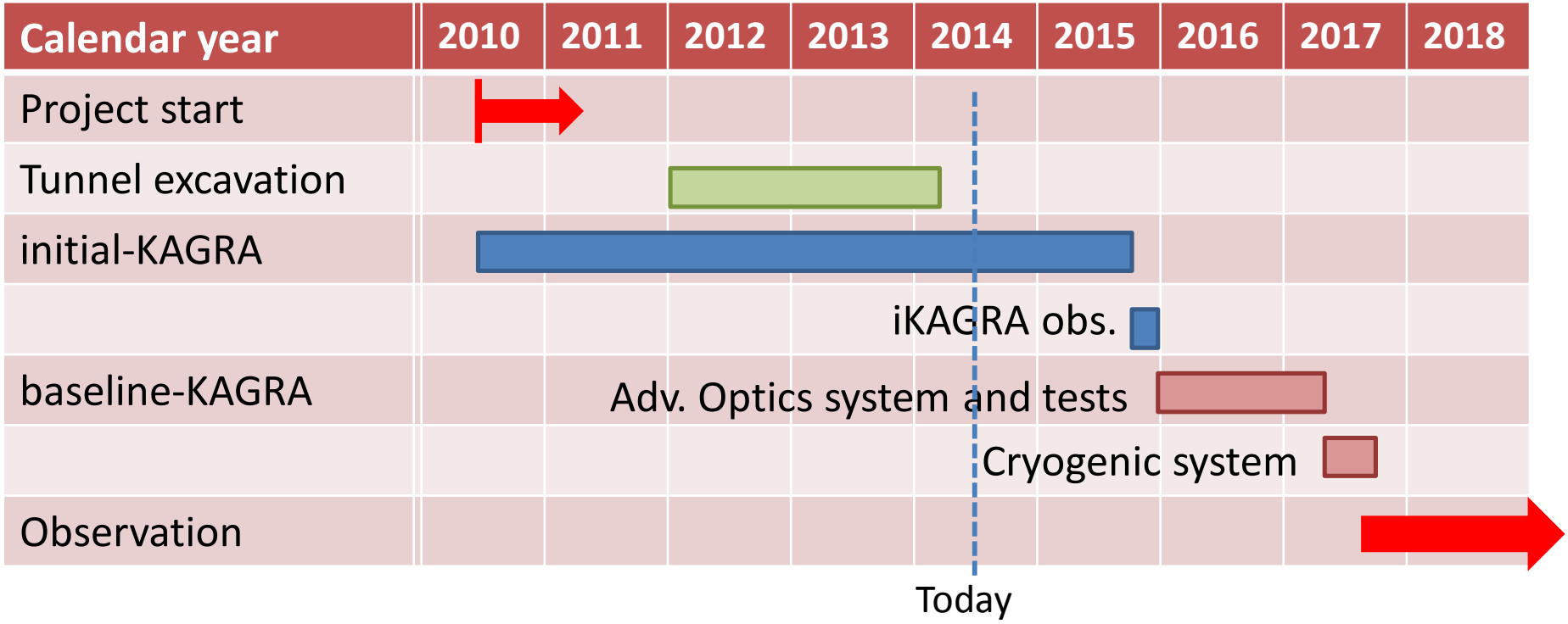


➔ Very high sensitivity.

Location


Mozumi
KAGRA surface facility
神岡宇宙素粒子研究施設
500m
茂住坑
3km
Super-Kamiokande
CLIO
カムランド
スーパーカミオカンデ
北
跡津坑
K A G R A
3km
New Atotsu
Present mine entrance
跡津鉱山事務所
village
Toyama airport
富山県
40min. by car
射水市
高岡市
滑川市
富山市
上市町
北陸本線

Time line (Construction and Observation)

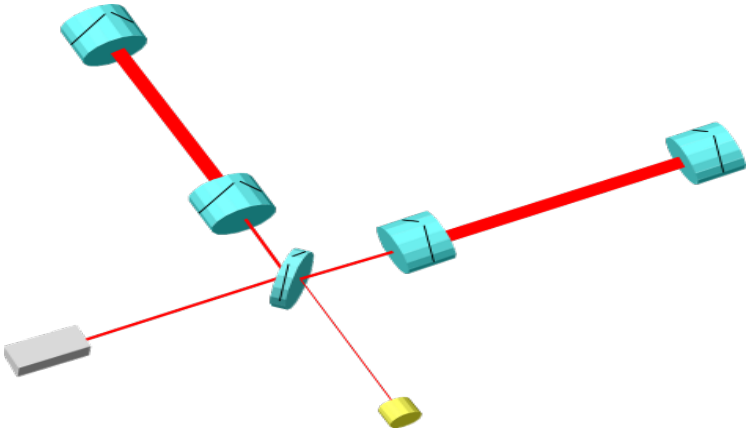


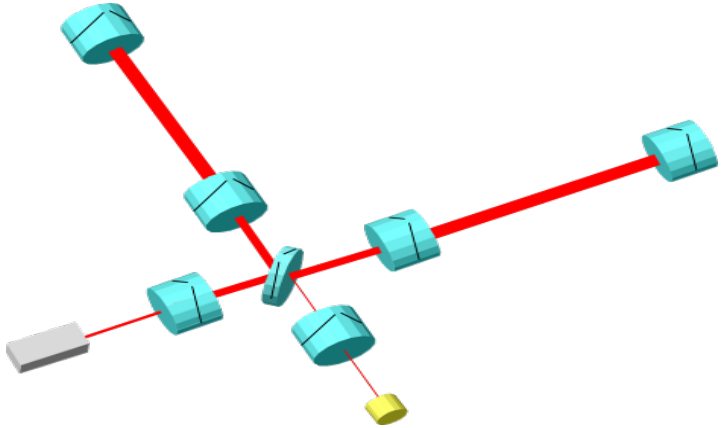
The construction/observation plan is in 2 stages:

- ✓In 2015, non-cryogenic observation (iKAGRA).
- ✓Operation with cryogenic system in 2017 (bKAGRA).
- ✓(High sensitivity operation in 2018?)

iKAGRA and bKAGRA

iKAGRA (~ 2015) → *bKAGRA (2016 ~)*





◆Simple interferometer with:
room temperature operation,
2W class laser, and
no power and signal recycling

◆ However, full end-to-end (relatively short) observation, in order to experience the operation and to understand the potential problems as soon as possible.

◆Advanced interferometer with:
power and signal recycling, but still room temperature operation.

↓

◆ Full bKAGRA with;
power and signal recycling,
cryogenic sapphire mirrors,
and ~180W laser.

Status of the KAGRA Project

Tunnel excavation

New Atotsu entrance

End of April, 2012

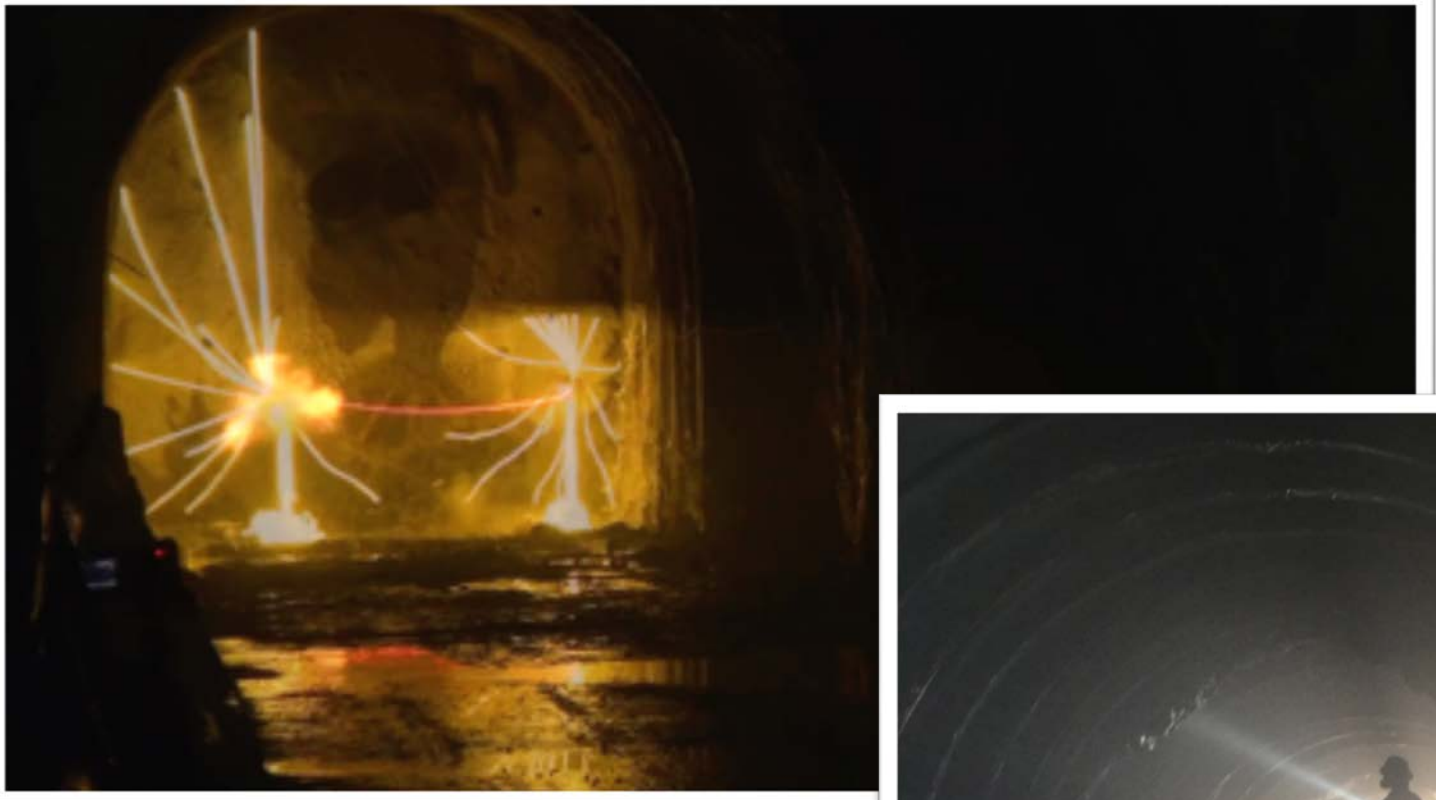
Mid June, 2012

Excavation

Y-arm tunnel
(Oct.26, 2012)

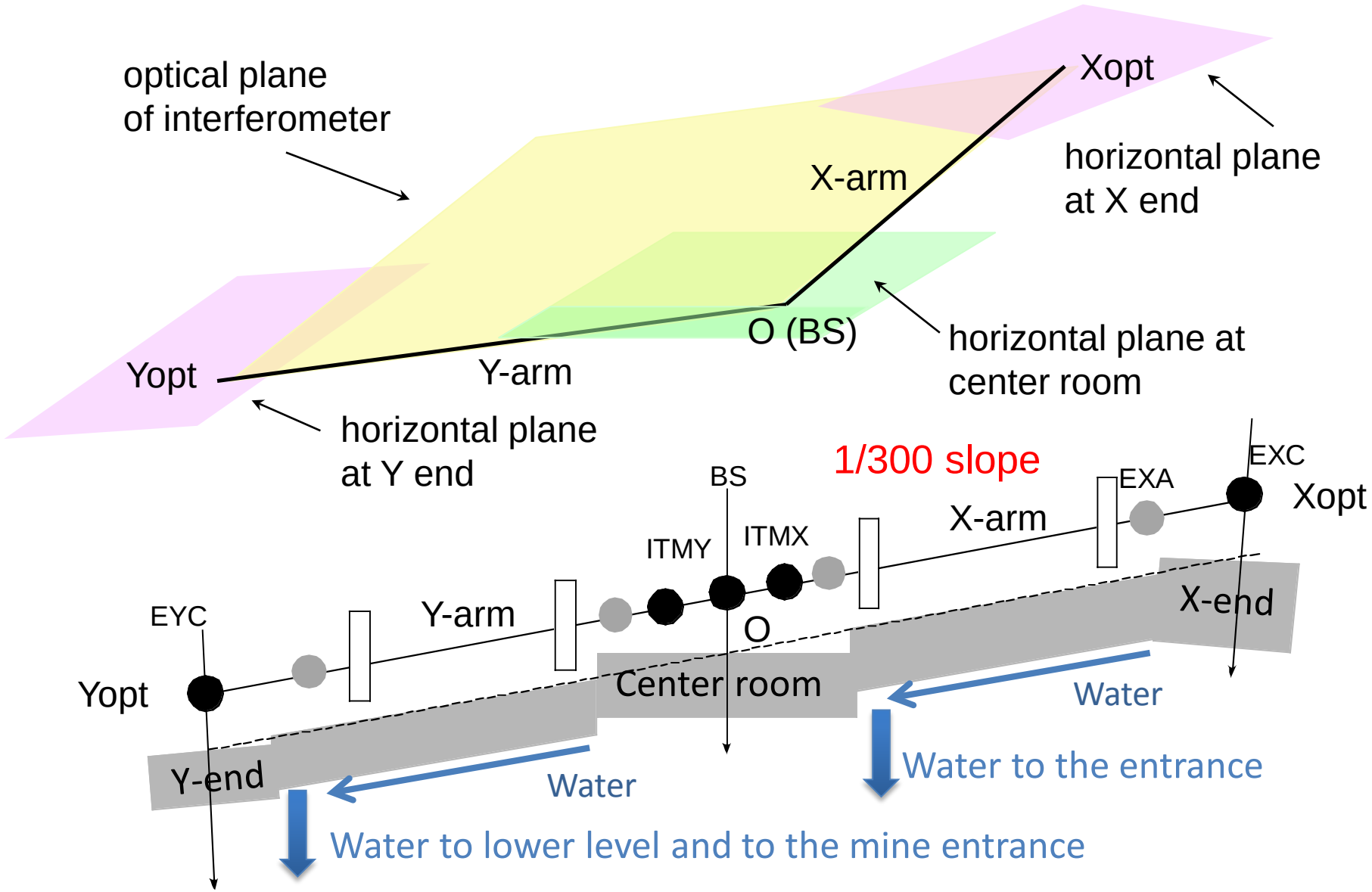
Center room
(Dec. 2012)

Excavation completed! (end of March 2014)



Blasting for Y-arm completion
(Dec. 2013)

Underground water and KAGRA tunnel



Excavation and the water…

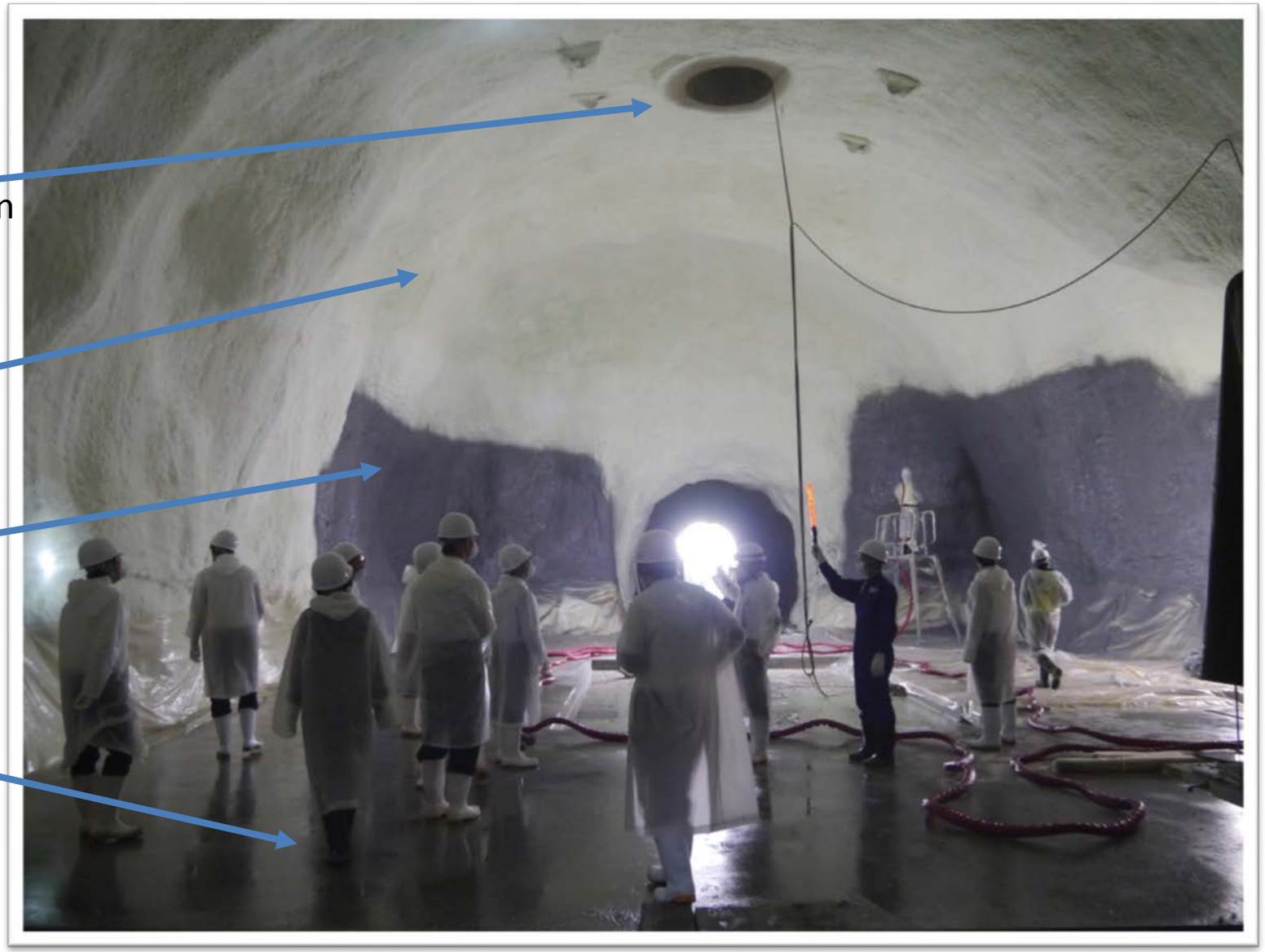
Y-arm…

Underground facility construction

Center room

June 19, 2014

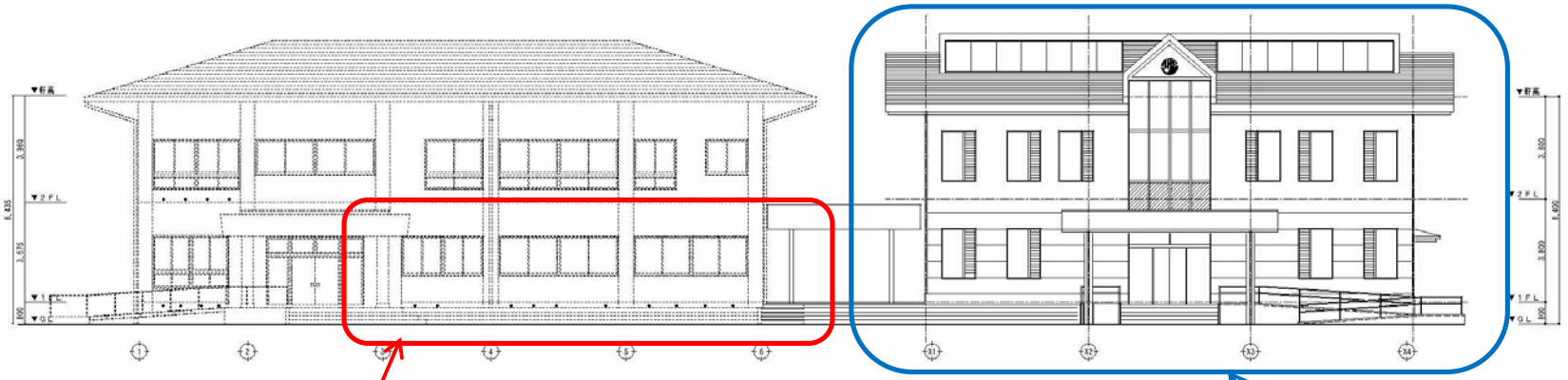
Underground facility construction



Y-end

June 19, 2014

Surface building



KAGRA office (since 2012, 140m^2)

Photo: New office building under construction.
Completed in March 2014(340m^2).

Several ICRR people moved to the new building in April, 2014

Surface building: Location

To KAGRA / Kamioka

(ICRR is going to rent a house In Kamioka)

Building for Super-Kamiokande

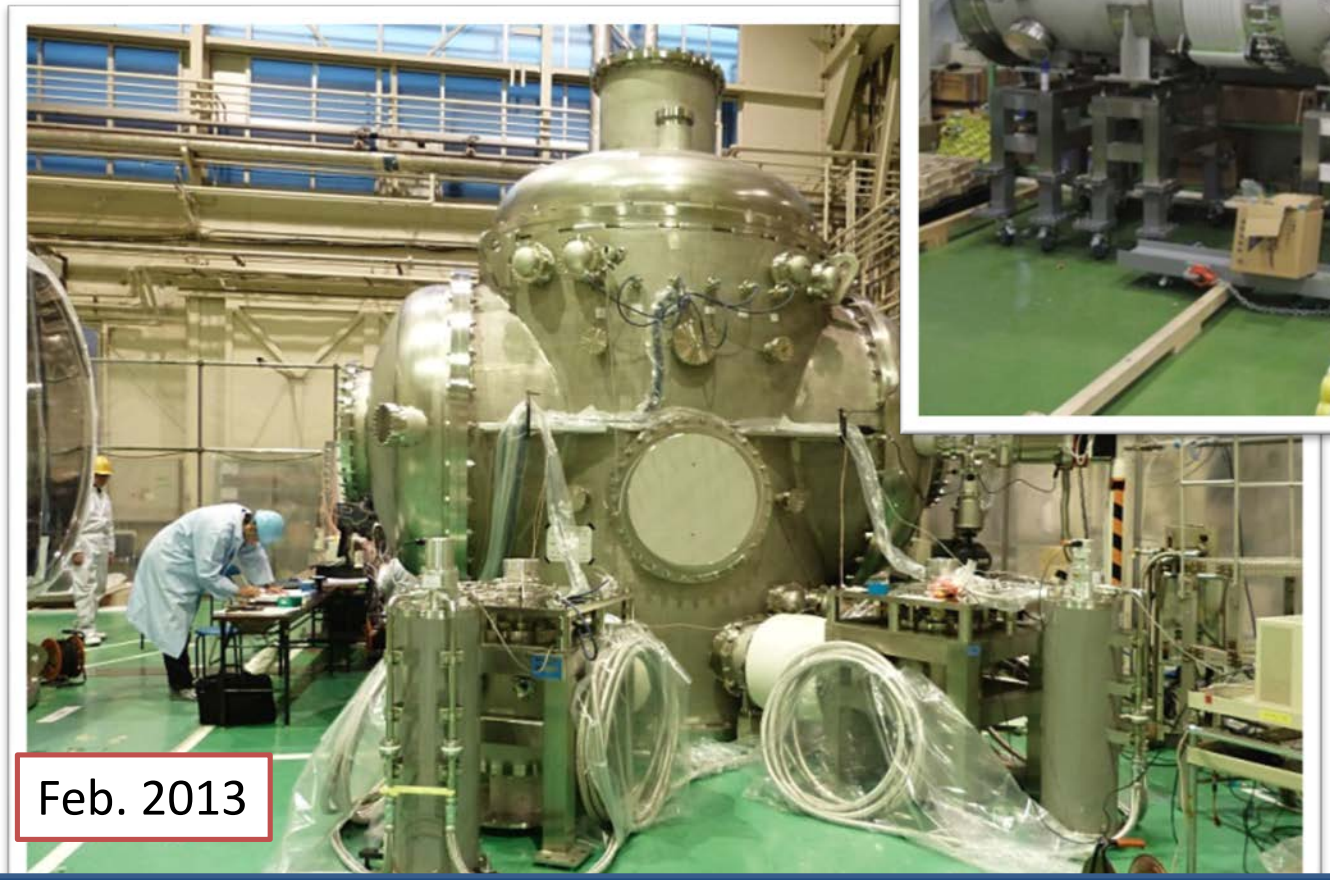
To Toyama

Status of construction: Vacuum

Waiting for the installation into the KAGRA tunnel

Status of construction: Cryogenic system

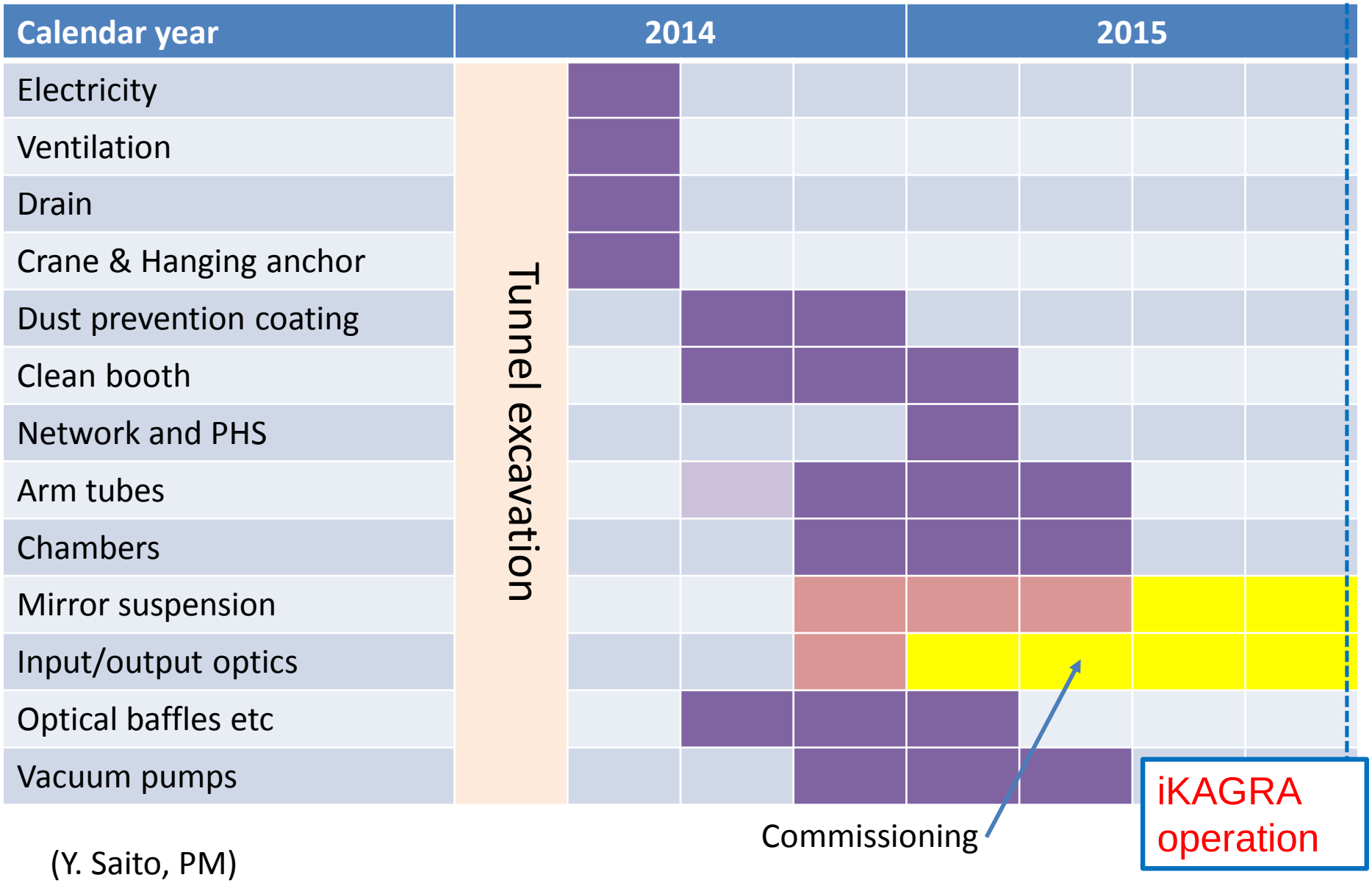
Shield duct
(5m X 80cmϕ)
(completion of 8 shield-ducts: March 2016)



Cryostat
← Waiting for the installation into the KAGRA tunnel…

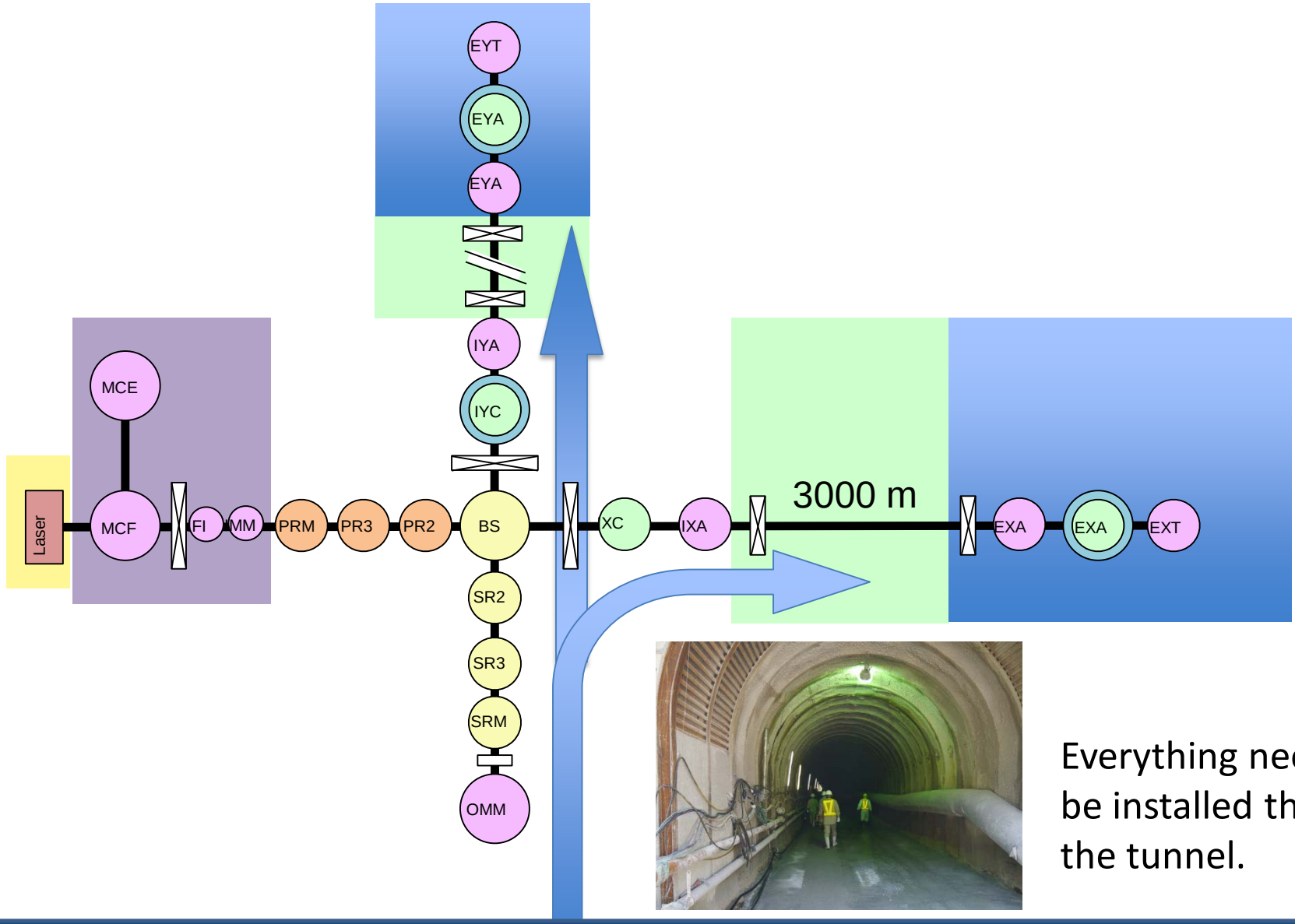
iKAGRA construction plan/schedule

iKAGRA schedule (2014-2015)



(Y. Saito, PM)

Installation: constraint



Everything needs to be installed through the tunnel.

Schedule outline (ver. 2014/06/11, Y. Saito)

Others
Electricity: 14/06/09-24
Ventilation: 14/06/15-11/21
DGS timing: 14/12/15-21

Center (Laser+MC)
Floor concrete: 14/06/10-06/17
Anti dust painting: 14/06/18-07/05
Laser booth construction: -14/10/30
Clean booth: 14/12/01-15/01/31

Preparation: 14/07/08-07/15
Vacuum chamber & GV: 14/07/16-07/22

Laser table install: 14/10/01-12/29

Stack install: 14/10/01-30
Suspension install: 14/11/01-12/30
View port install: 14/11/01-05, 12/01-05
Op. lev. install: 14/11/01-12/30
MC, IMMT integration: 15/01/01-03/31

MC coating: -14/03/31
MMT coating: -15/03/31

Center
(chamber & GV)
Preparation: 14/11/12-15/11/29
IYV install: 14/12/01-02
IYA, IYC, GV install: 14/12/03-09
PRM, PR3, GV install: 14/12/10-11
Cryostat construction:??

Yarm
Floor concrete: 14/04/26-07/10
Electricity: 14/07/29-09/30
DGS rack install: 14/8/20-09/10
DGS network: 14/12/08-14

Lining: 14/07/18-09/12
Support install: 14/09/06-11/06
Fix support: 14/09/09-11/08
Duct install: 14/09/11-11/11
Connect ducts: 14/09/13-15/03/31

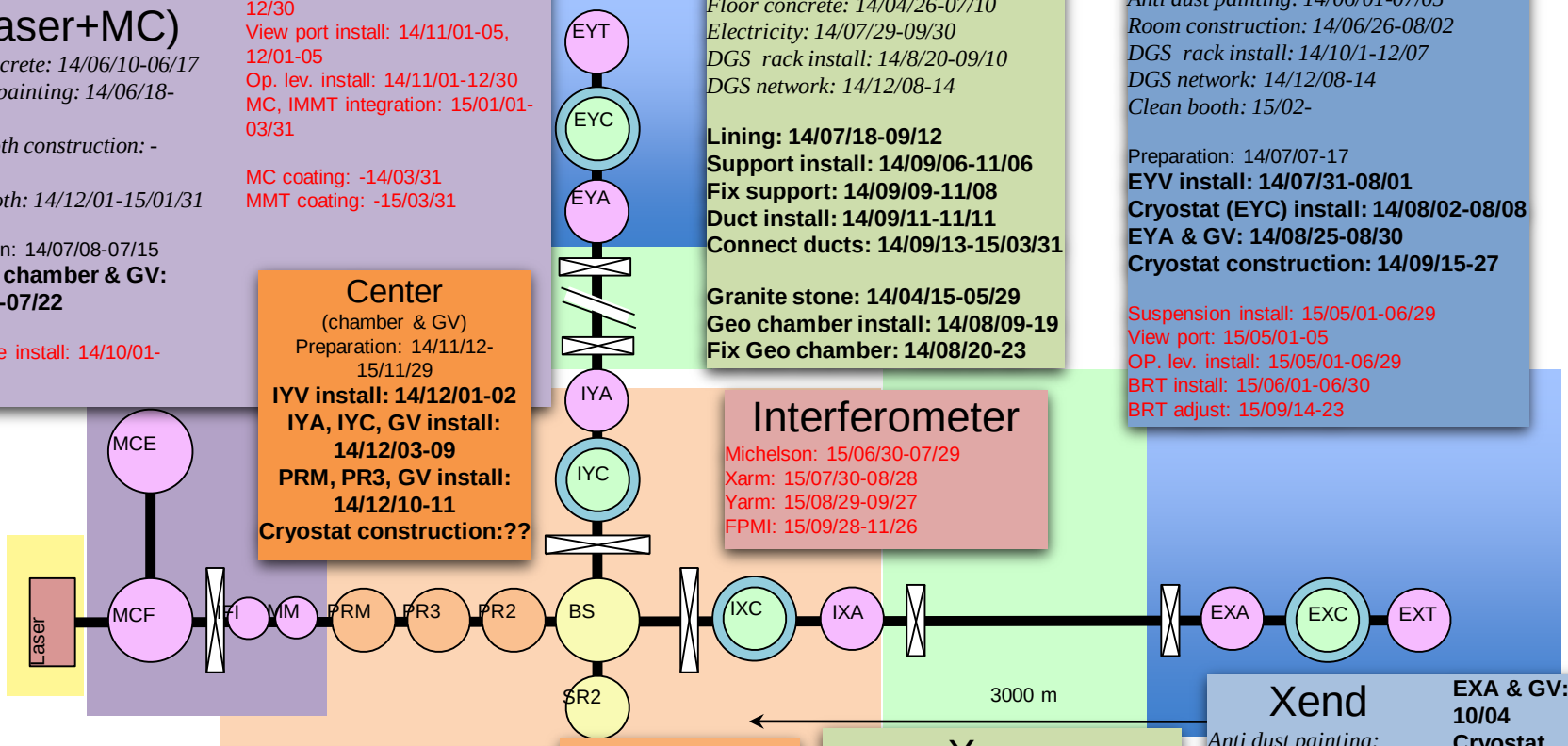
Granite stone: 14/04/15-05/29
Geo chamber install: 14/08/09-19
Fix Geo chamber: 14/08/20-23

Yend
Anti dust painting: 14/06/01-07/05
Room construction: 14/06/26-08/02
DGS rack install: 14/10/1-12/07
DGS network: 14/12/08-14
Clean booth: 15/02-

Preparation: 14/07/07-17
EYV install: 14/07/31-08/01
Cryostat (EYC) install: 14/08/02-08/08
EYA & GV: 14/08/25-08/30
Cryostat construction: 14/09/15-27

Suspension install: 15/05/01-06/29
View port: 15/05/01-05
OP. lev. install: 15/05/01-06/29
BRT install: 15/06/01-06/30
BRT adjust: 15/09/14-23

Interferometer
Michelson: 15/06/30-07/29
Xarm: 15/07/30-08/28
Yarm: 15/08/29-09/27
FPMI: 15/09/28-11/26



Center
PR2, PR3 install: 15/01/01-03/01
IXA, IYA install: 15/03/01-04/29
BS install: 15/04/01-06/29
Op. tables: 15/02/01-04/01
View port install: 15/01/01-05, 15/03/01/-05, 15/04/01-05
Op. Lev install: 15/03/01-05/30
AS BRT install: 15/06/01-10
AS BRT adjust: 15/07/14-23

BS coating: -14/03/25
PR2, PR3 coating: -14/12/31

Floor concrete: 14/06/12-07/01
Anti dust painting: 14/08/25-10/18
Clean booth: 14/12/01-15/01/31
Clean booth for cryo.: ?
Crane: 14/08/15-08/29
Room construction: 14/09/01-11/20
Electricity: 14/09/16-27
DGS rack install: 14/10/01-11/16
DGS network: 14/11/17-28

Center
(chamber and GV)
Preparation: 15/01/14-02/10
IXV install: 15/02/11-12
IXA, IXC, GV install: 15/02/13-19
BS, PR2, SR2, SR3, SRM GV install: 15/02/20–28
Cryostat construction:??

Xarm
Floor concrete: 14/05/17-07/31
Electricity: 14/08/01-11/04
DGS rack install: 14/10/01-20
DGS network: 14/12/01-07

Lining: 14/09/05-10/30
Support install: 14/10/11-15/01/07
Fix support: 14/10/15-15/01/09
Duct install: 14/10/17-15/01/13
Connect ducts: 14/10/20-15/03/30

Granite stone: 14/05/15-06/28
Geo chamber install: 14/09/16-22
Fix Geo chamber: 14/09/24-27

Xend
Anti dust painting: 14/07/20-08/23
Room construction: 14/07/17-08/30
DGS rack install: 14/10/1-20
DGS network: 14/12/01-07
Clean booth: 15/02-

Preparation: 14/08/25-09/04
EXV install: 14/09/05-06
Cryostat (EXC) install: 14/09/08-13

EXA & GV: 14/09/29-10/04
Cryostat construction: 14/09/29-10/08

Suspension install: 15/05/01-06/29
View port: 15/05/01-05
Op. lev. install: 15/05/01-06/29
BRT install: 15/06/01-06/30
BRT adjust: 15/08/14-23

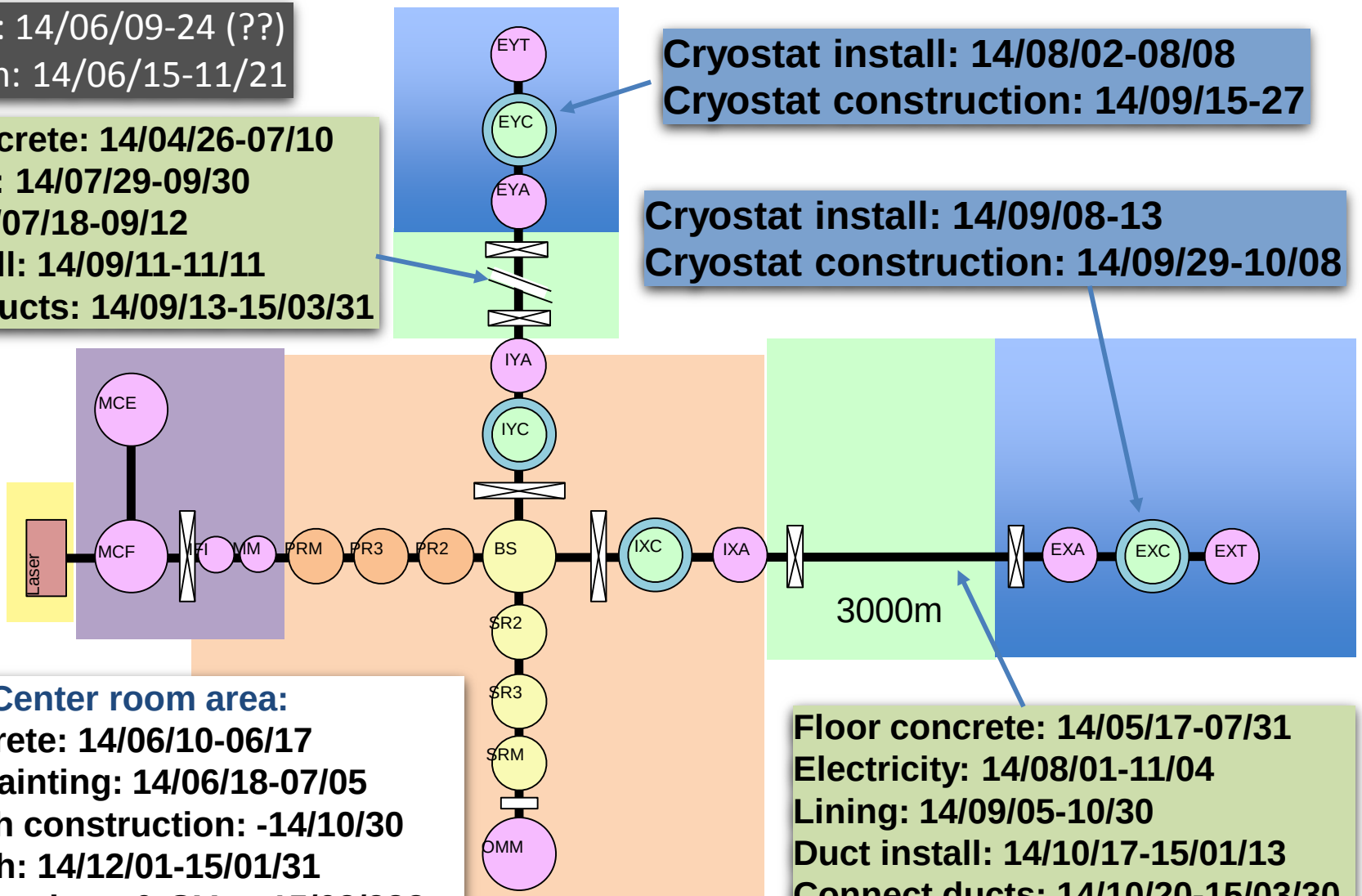
Installation of tubes and chambers: outline of outline

Electricity: 14/06/09-24 (??)
Ventilation: 14/06/15-11/21

Floor concrete: 14/04/26-07/10
Electricity: 14/07/29-09/30
Lining: 14/07/18-09/12
Duct install: 14/09/11-11/11
Connect ducts: 14/09/13-15/03/31

Cryostat install: 14/08/02-08/08
Cryostat construction: 14/09/15-27

Cryostat install: 14/09/08-13
Cryostat construction: 14/09/29-10/08



Center room area:
Floor concrete: 14/06/10-06/17
Anti dust painting: 14/06/18-07/05
Laser booth construction: -14/10/30
Clean booth: 14/12/01-15/01/31
Vacuum chambers & GVs: -15/02/28?

Floor concrete: 14/05/17-07/31
Electricity: 14/08/01-11/04
Lining: 14/09/05-10/30
Duct install: 14/10/17-15/01/13
Connect ducts: 14/10/20-15/03/30

Summary

- KAGRA is a unique GW interferometer with the underground site and the cryogenic technology.
- The KAGRA detector construction is in progress essentially as scheduled.
- Initial operation (iKAGRA) in late 2015. We have to work hard!
- We plan to start the full cryogenic observation in 2017, and to play an important role as a member of the GW network.
- KAGRA would like to thank NAOJ and KEK and UTokyo for their strong supports.