

### **Commissioning work**

KAGRA face to face meeting @NAOJ 2018/12/5(Wed.)

O. Miyakawa and KAGRA Collaboration

JGW-G1809374

2018/12/5 KAGRA f2f meeting at NAOJ

# **KAGRA** Stages in Phase II

- HPL: High Power Laser
- XA stage: X arm commissioning.
  - Alignment was well done. (September ~ mid October)
  - Green was locked very soon. (October 19)
  - Transition from Green to IR was done on Sunday!.
- YA stage: Y arm commissioning.
  - Alignment will start in <del>December</del> January.
- FPM stage: Fabry-Perot Michelson lock.
- RSE stage: RSE lock.
  - Needs to pass check points.

# **KAGRA** Achievements for X arm commissioning

- X arm alignment (2018 September ~ middle of October)
  - Green and IR
  - Optimization for VIS
  - Vacuum
- Lock green laser to X arm lock (October 19~)
  - By feed back to green frequency
  - ~2hours lock achieved!
- IR frequency followed to X arm fluctuation.
- Lock IR laser to X arm
  - Fluctuation of fiber was a serious problem. -> turned off all the air filters.

1.5month

## KAGRA X arm servo topology



### **KAGRA** Large fluctuation than cavity frequency









# **KAGRA** Improved fluctuation



#### **IR transmittance**



#### 1 second

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# Locked for 15 minutes!

Signal transition from Green to IR



#### 1000 second



- 2018/11/26 Plan B schedule was proposed.
  - Needs more time for Xarm commissioning.
    - Original finish date; 12/9(sun).
    - Proposing finish date; 1/6(sun).
    - 1 month longer
- Impact on other commissioning date
  - Y arm alignment 11/26 -> 1/18
  - Lock try of Yarm cavity: 2/11 -> 2/18 (1 week delay).
  - Lock try of DRMI: 1/28 -> 2/4 (1 week delay).
  - Lock try of FPMI: 3/25 -> 3/18 (1 week earlier).
- Risks
  - Optimizing closing the Xend chambers may introduce some risk of leakage.
  - Commissioning time for Yarm & DRMI are roughly 2 weeks shorter than before.
  - Schedule of AOS is tight. Commissioning of BRT-Y will be possible after the week of March 11 by AOS.

### See JGW-G1809310 for detail.









# KAGRA Schedule of Y arm

- Schedule of Yfront (WAB & NAB have been installed.)
  - Yaw FR install. Close chambers & pumping: 12/10-17
  - Leak test, venting, open 800 flanges: 12/17-21
  - IYC finalize: 12/24-1/11
  - BS alignment to ETMY: 1/21-23
  - Close 800 flanges & pumping: 1/28-2/1
  - Leak test: 2/4-8
  - Cooling start: 2/11
- Schedule of Yend (WAB & NAB have been installed.)
  - Yaw FR install: 12/10-17
  - Close chambers & pumping: 1/7-11
  - Leak test, venting, open 800 flanges: 1/14-18
  - ETMY alignment to center: 1/24-25
  - Pcal & EYC finalize: 1/28-2/8
  - Close 800 flanges & pumping: 2/11-15
  - Yarm commissioning start: 2/18
  - Leak test: 2/18-22
  - Cooling start: 2/25

### KAGRA Schedule for Central area

- End of Xarm commissioning: 1/6
- Open chambers. IMC, BS & PR2 recovery works: 1/7-11
- Install beam damps@PRM: 1/17-18
- Beam alignment of BS & SRs: 1/18-23
- Green beam alignment: 1/23-24
- Beam alignment of OMMT, OMC: 1/23-25
- Close chambers & pumping: 1/28-2/1
- DRMI start: 2/4
- IMC high power, Leak test: 2/4-8

### **KAGRA** Prospect for after X arm commissioning

- Y arm commissioning and DRMI commissioning will be proceeded in parallel.
  - Needs careful time sharing.
  - No night work in the mine during this term.
- Shall we go ahead to DRFPMI?
  - depends on how we proceed by each check point.
  - 3~4 more months are expected to establish DRFPMI compared with FPMI.
- Joining O3 run
  - Needs noise hunting time to establish the suitable sensitivity to contribute scientifically in O3 run.
  - We need careful consideration how many months remaining before finishing O3 run of LIGO/VIRGO.