

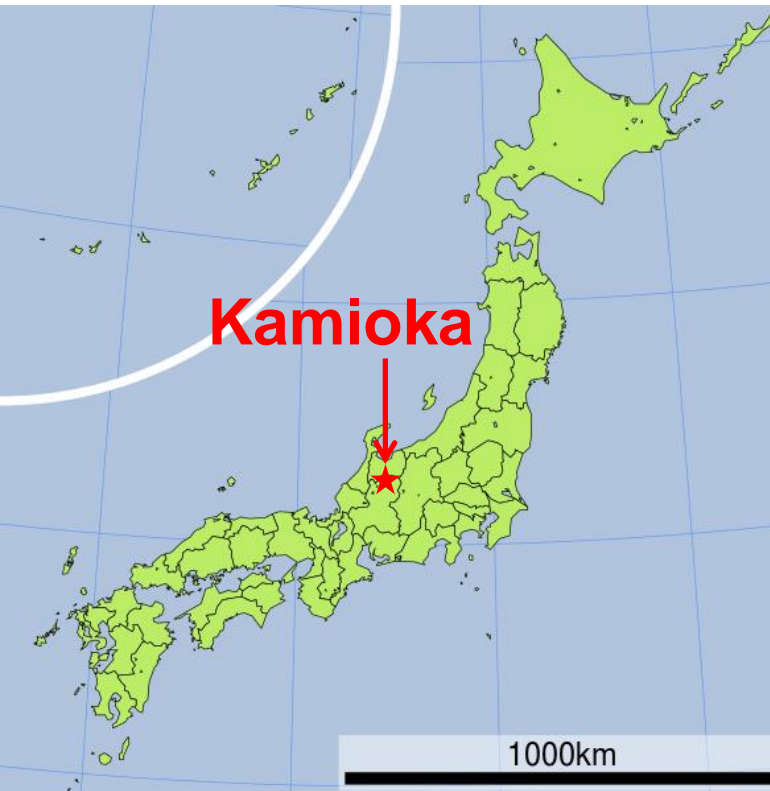
# Status of KAGRA

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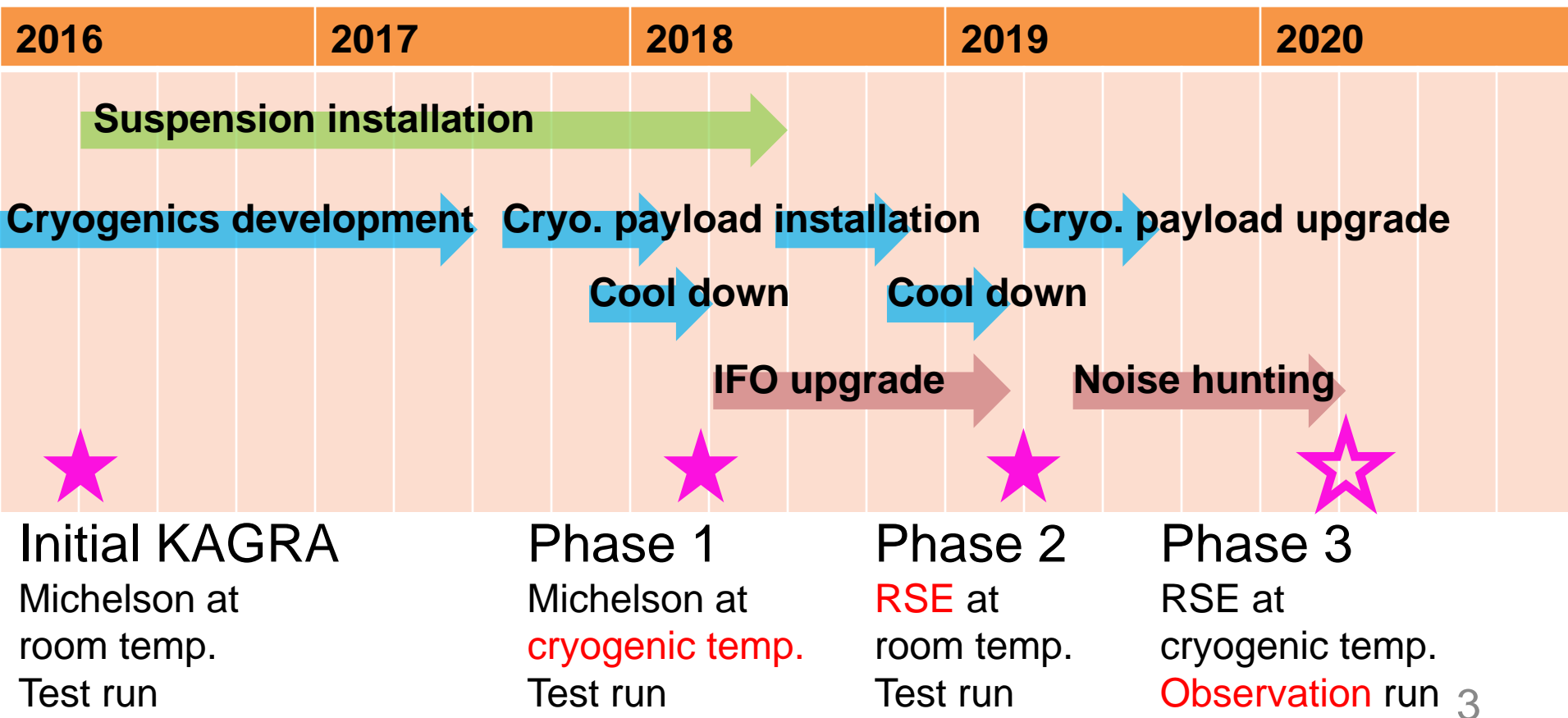
# KAGRA Project

- Constructed in Kamioka mine
- **Underground** and **cryogenic**
- 300+ collaborators from 90+ institutes



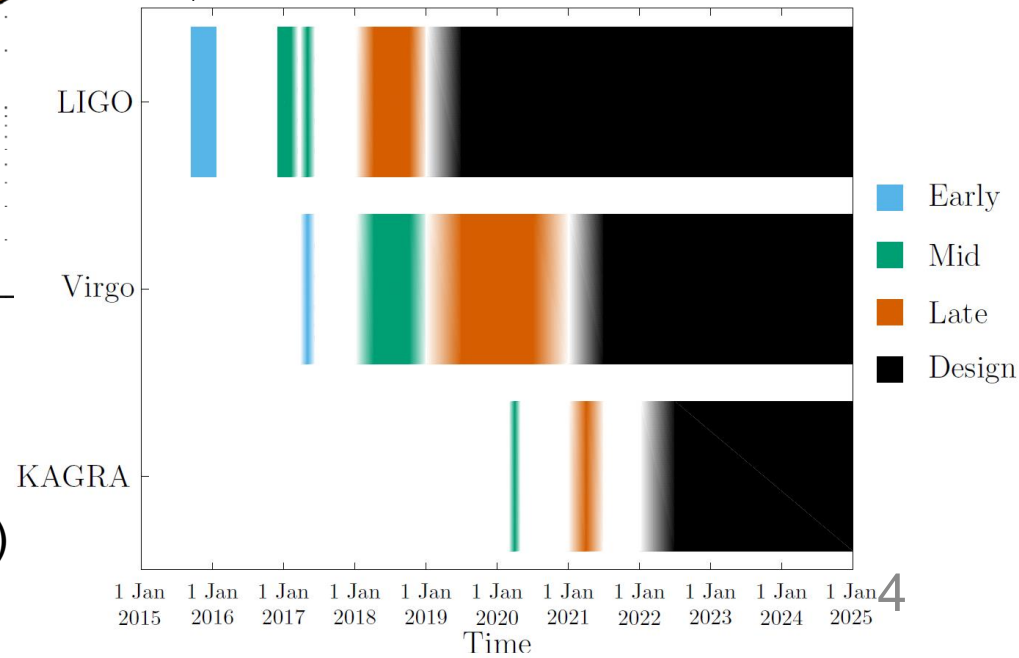
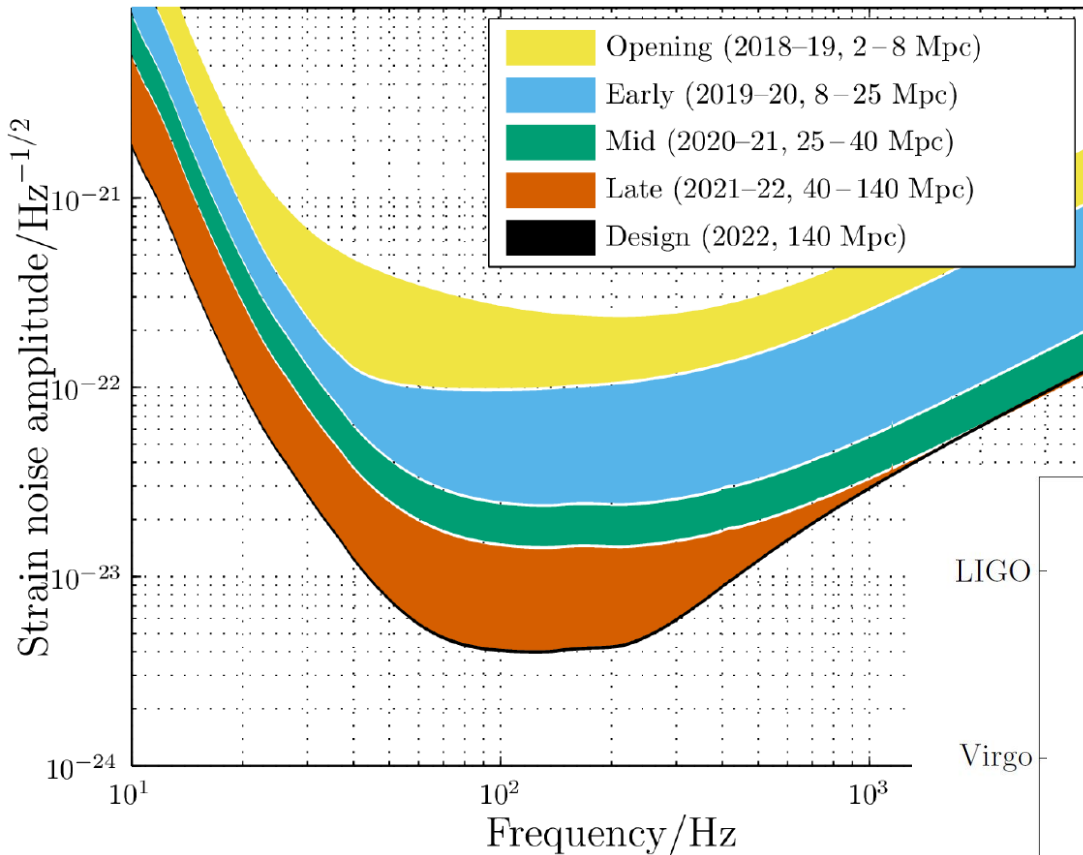
# Roadmap of KAGRA

- **Completed first test run** at room temperature. Working for cryogenic test run.
- Baseline KAGRA (bKAGRA) in 3 phases.



# Observation Scenario

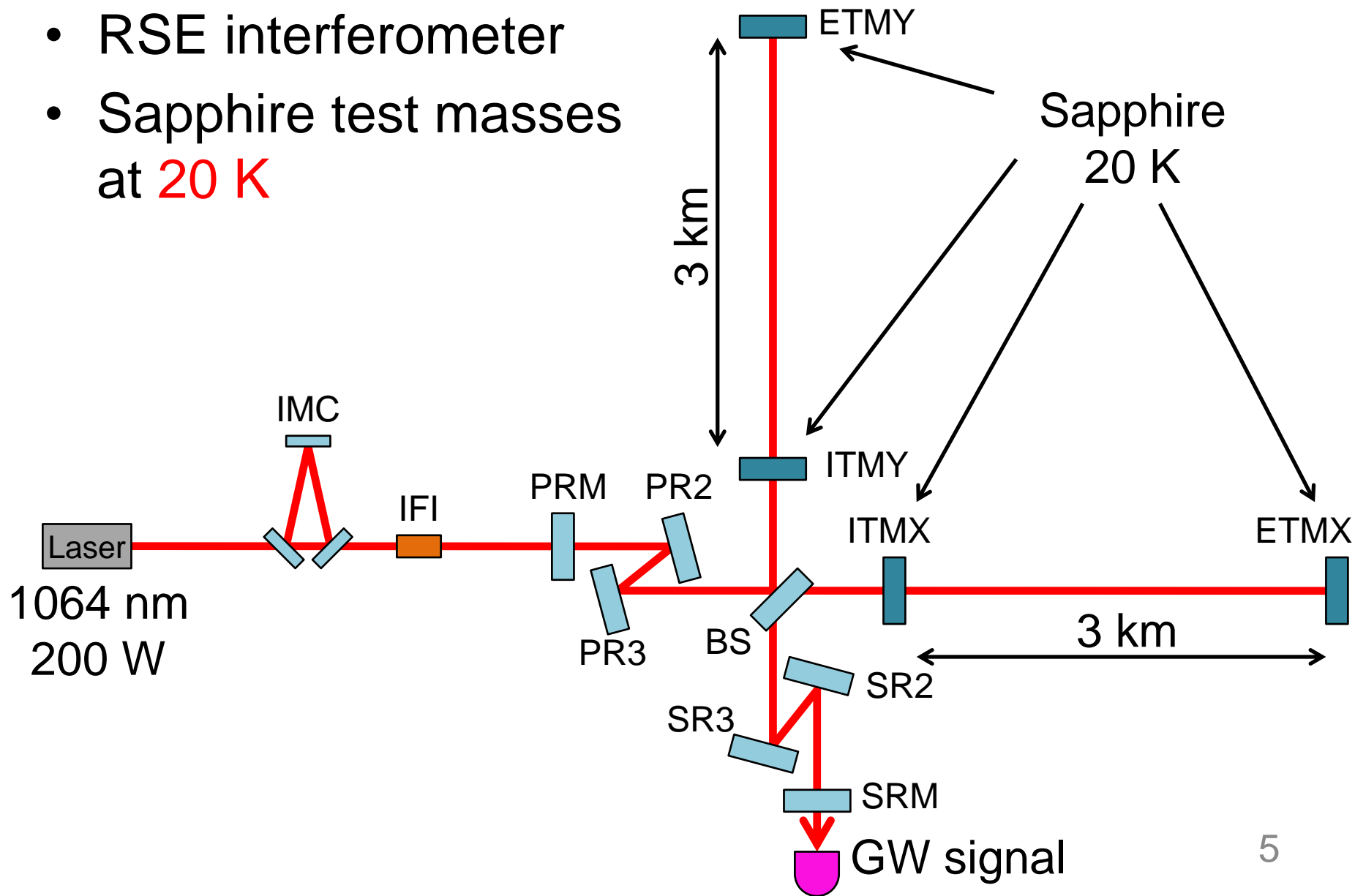
- With 25-40 Mpc in 2020, 40-140 Mpc in 2021



Living Reviews in Relativity 19, 1 (2016)  
to be updated

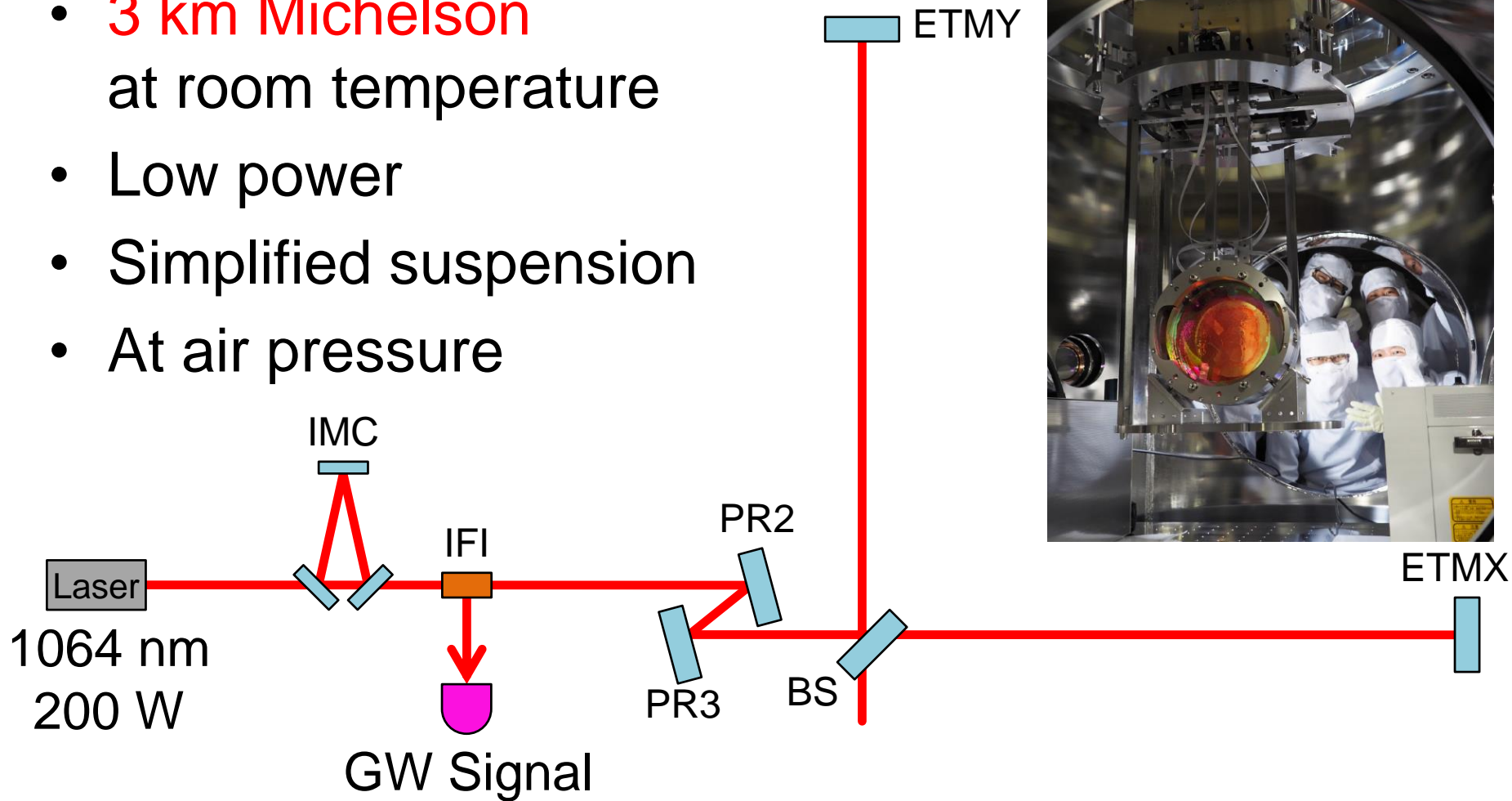
# KAGRA Full Configuration

- RSE interferometer
- Sapphire test masses at **20 K**



# Initial KAGRA Configuration

- **3 km Michelson**  
at room temperature
- Low power
- Simplified suspension
- At air pressure



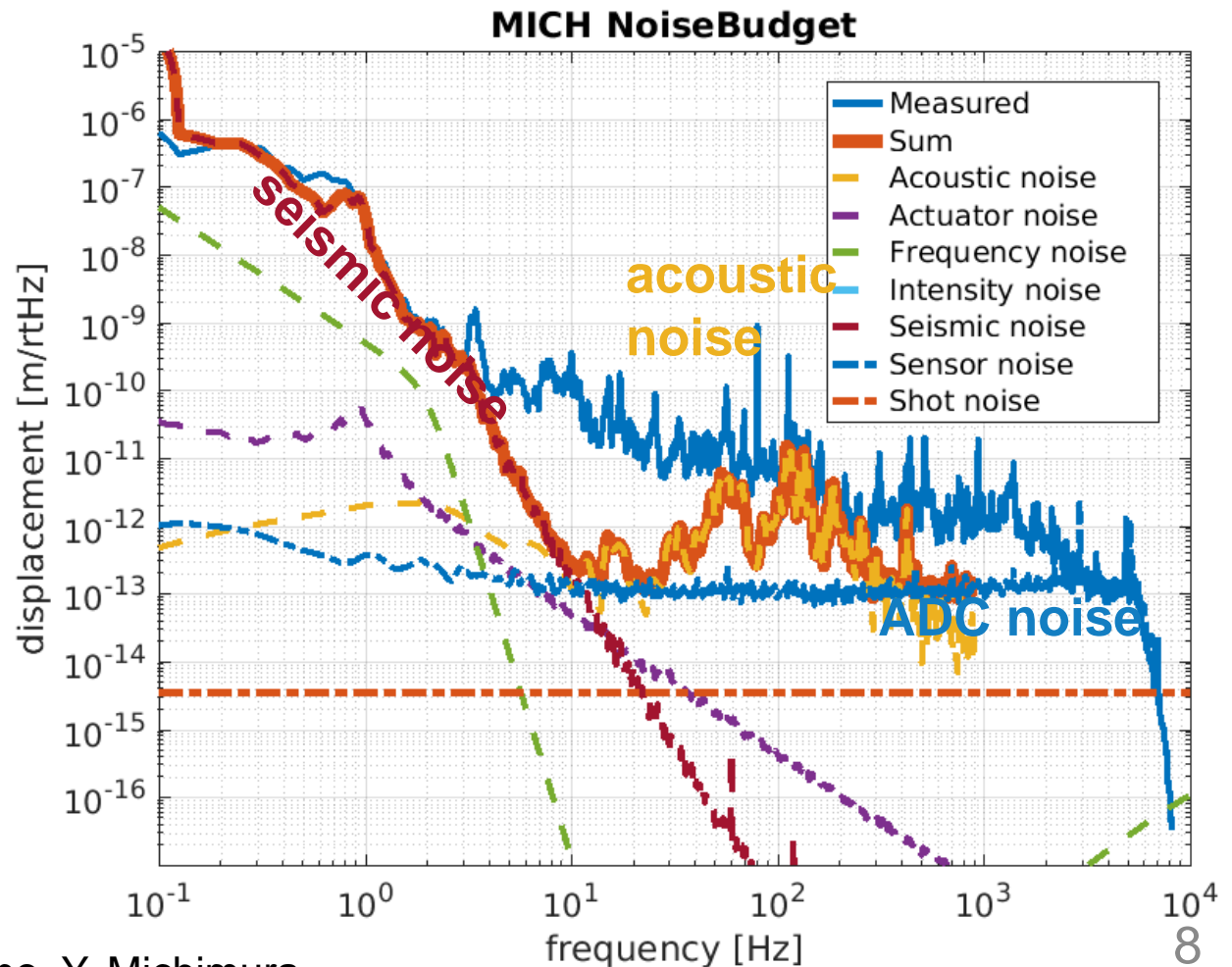
# iKAGRA Test Run in 2016

- Period
  - March 25 to 31
  - April 11 to 25
- Purpose
  - confirm layout of the 3 km vacuum ducts
  - test controls, data transfer, observation shift, etc.
  - get environmental data
  - **obtain experiences** of the management and operation of the km-class interferometer



# iKAGRA Sensitivity

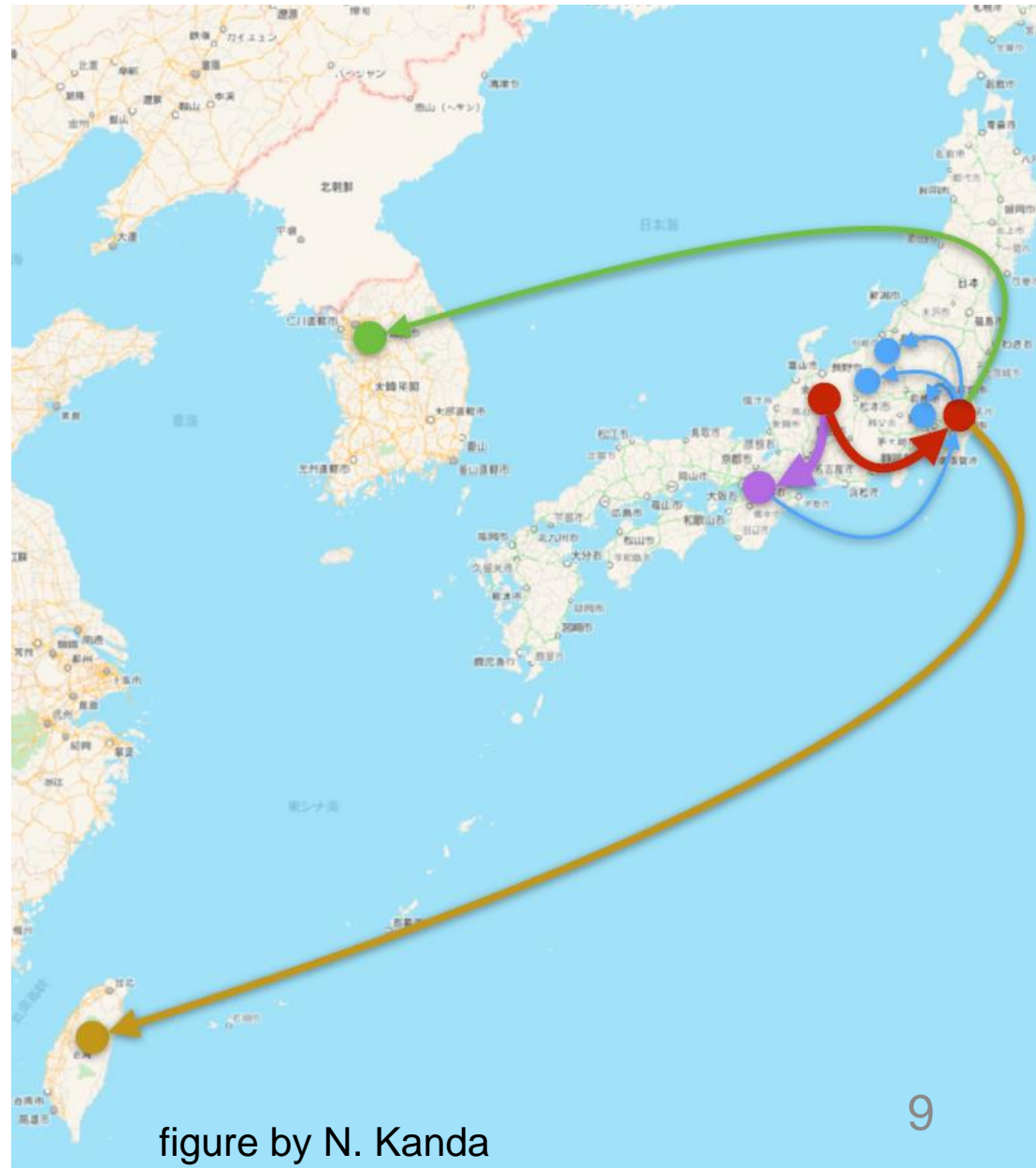
- $\sim 3e-15$  /rtHz @ 100 Hz
- Limited by **seismic noise**, **acoustic noise** and **ADC noise**
- Reduction possible in bKAGRA





# Data Transfer

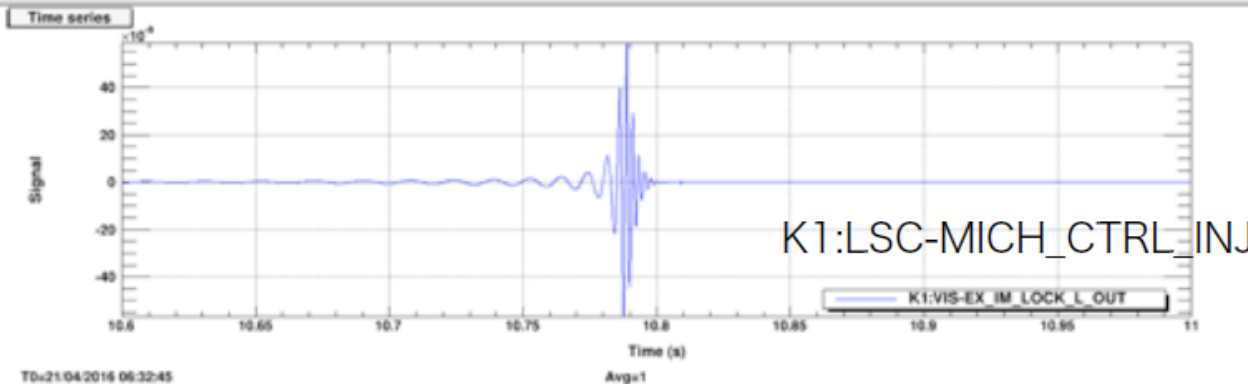
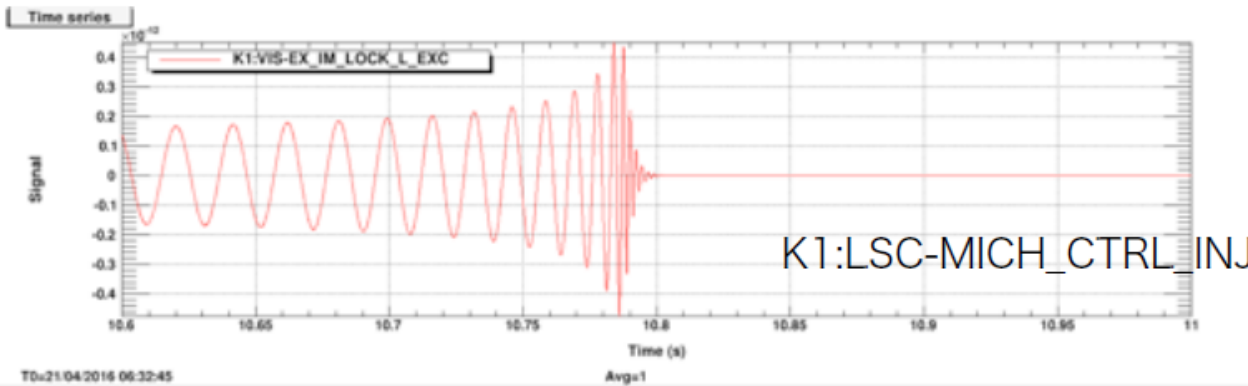
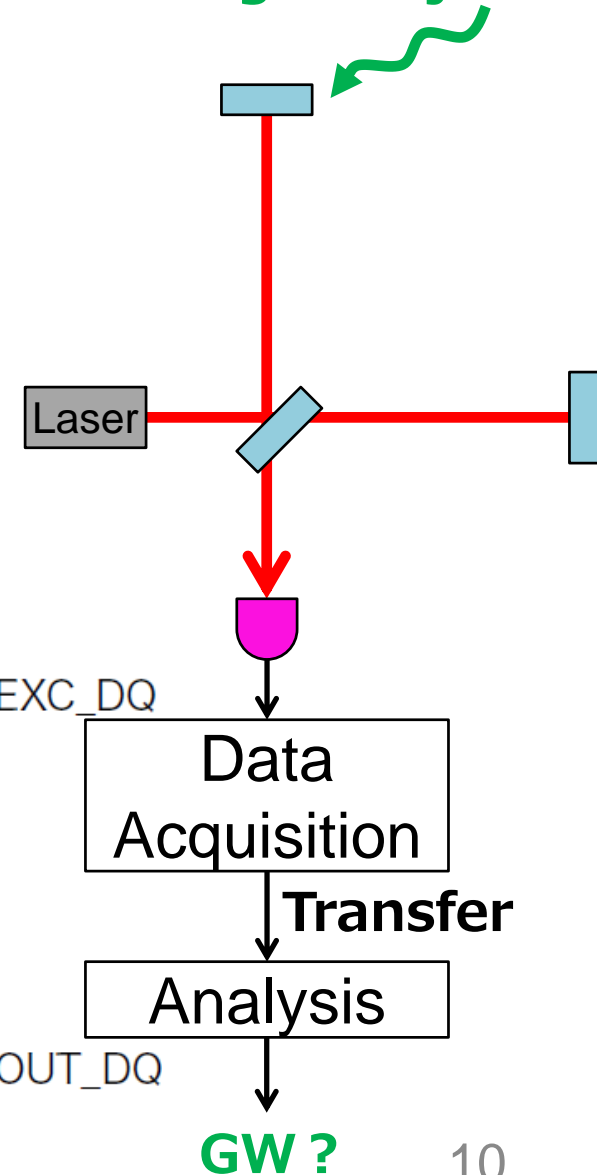
- Real time transfer to **ICRR Kashiwa** and **Osaka City Univ.**  
(~3 sec latency, ~ 200 MB/sec)
- Delayed mirroring at **Academia Sinica, Taiwan** and **KISTI, Daejeon**
- 7.5 TB in total



# Hardware Injection

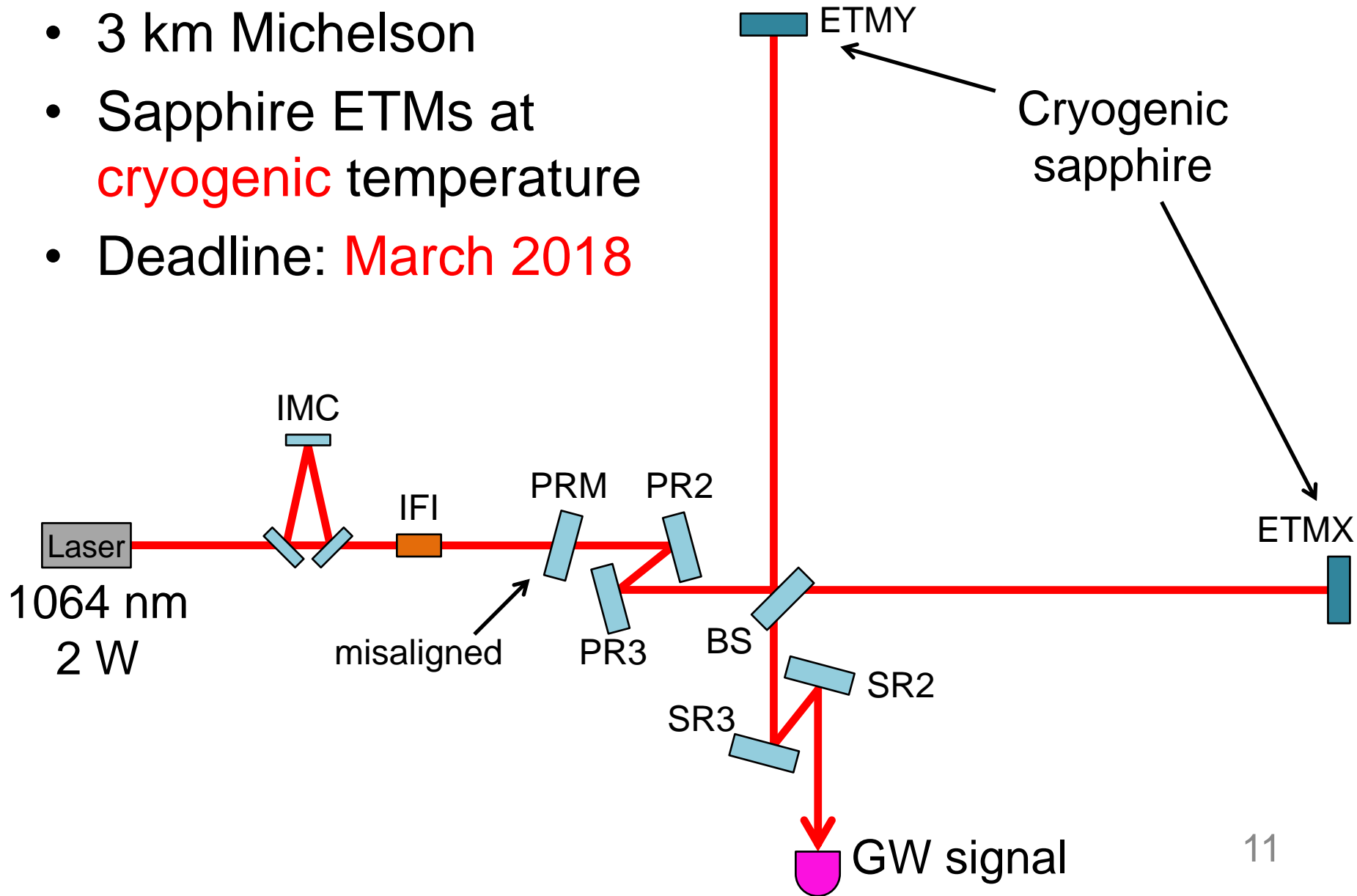
- Right after 2nd iKAGRA run
- Gravitational waveforms of CBC, Supernovae, etc.
- Important **end-to-end test**

signal injection



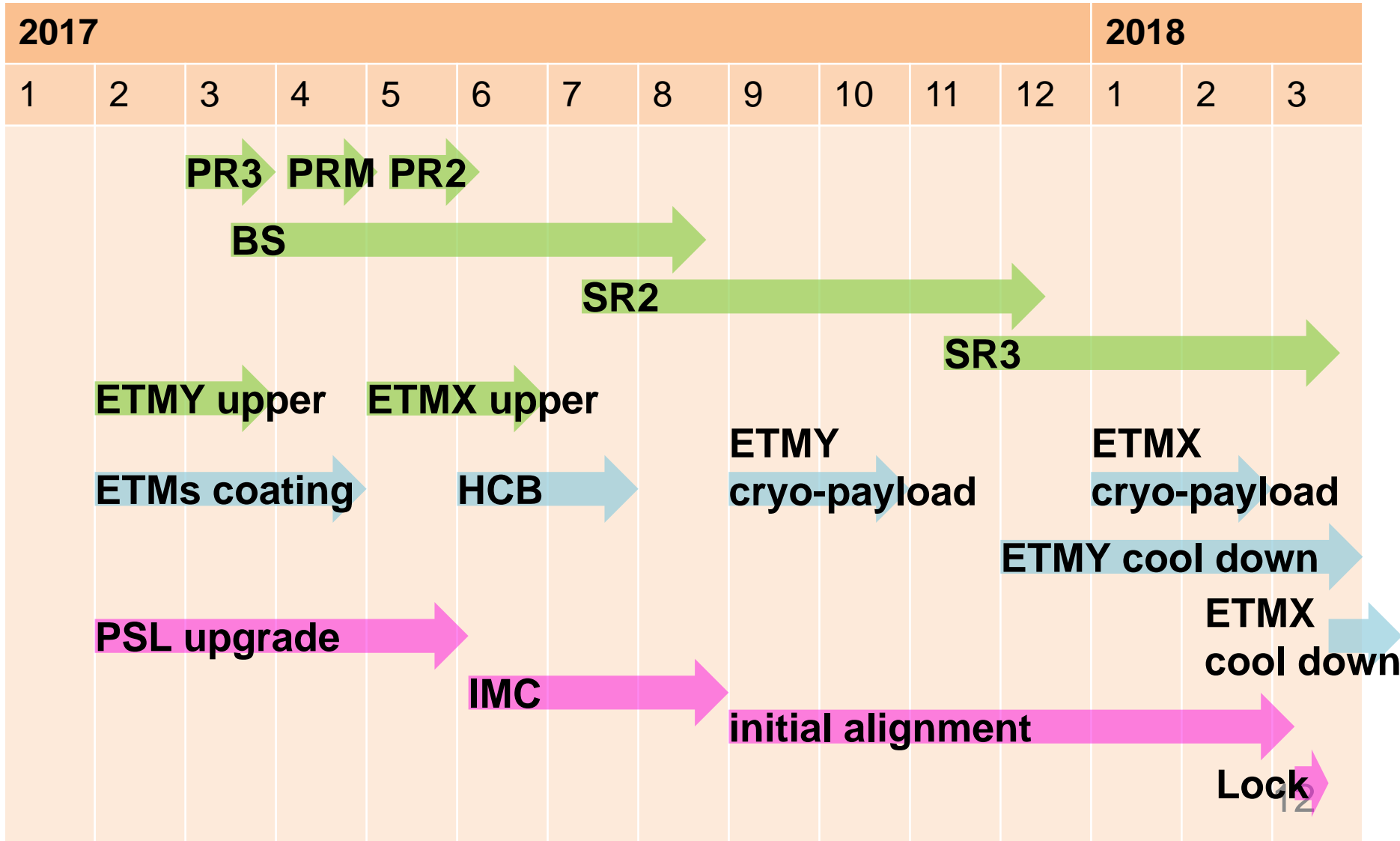
# Next step: bKAGRA Phase 1

- 3 km Michelson
- Sapphire ETMs at **cryogenic** temperature
- Deadline: **March 2018**



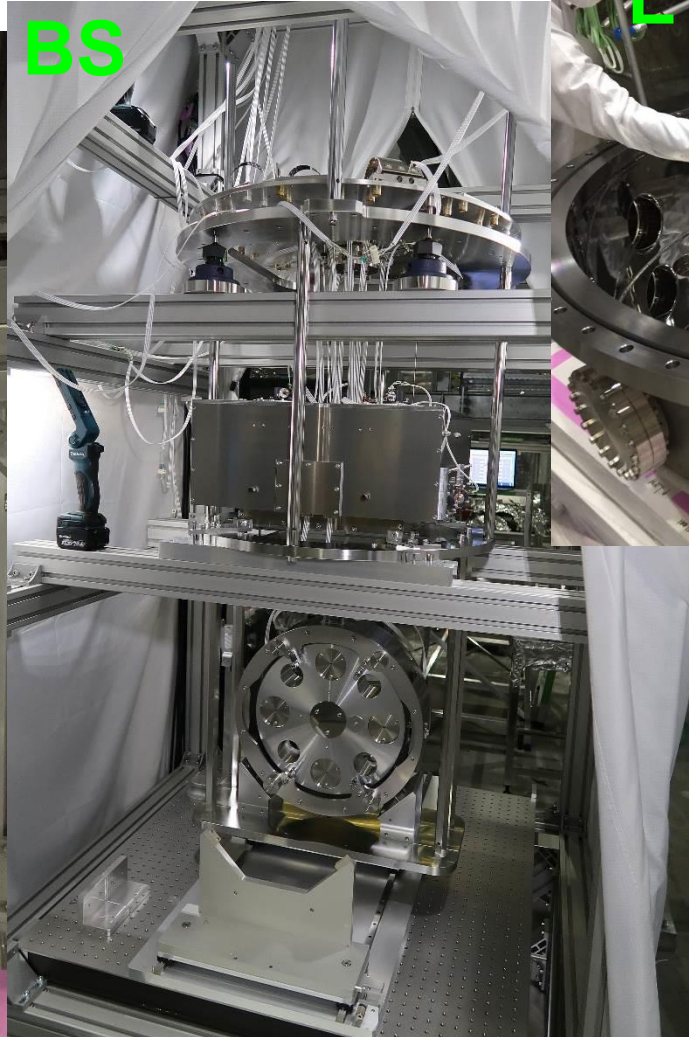
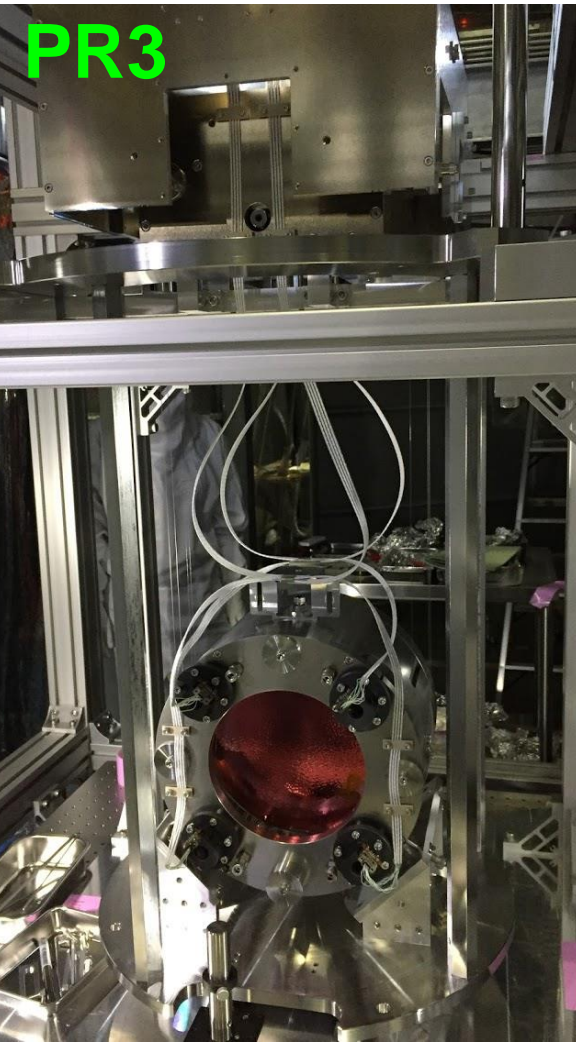
# bKAGRA Phase 1 Schedule

- More suspensions, cryogenics, PSL upgrade



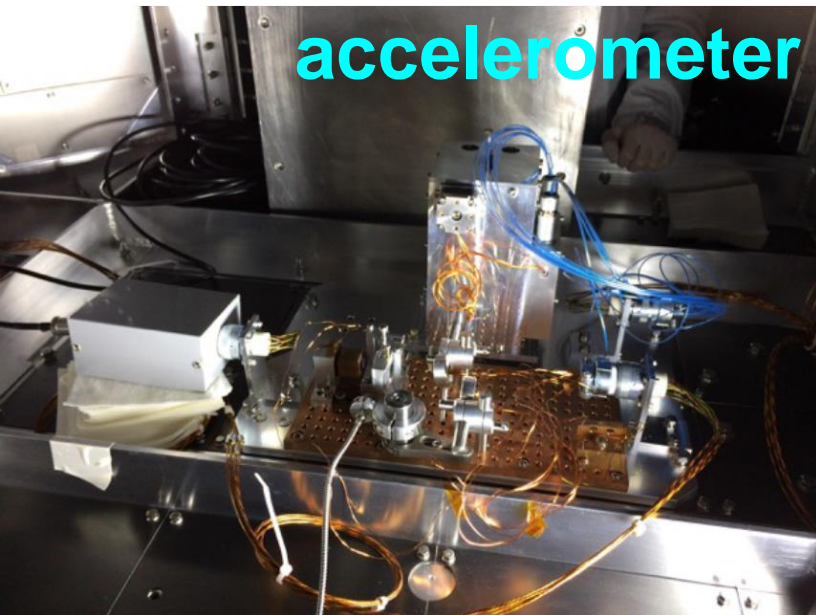
# Suspension Installation

- Test hanging, pre-assembly on-going at the site



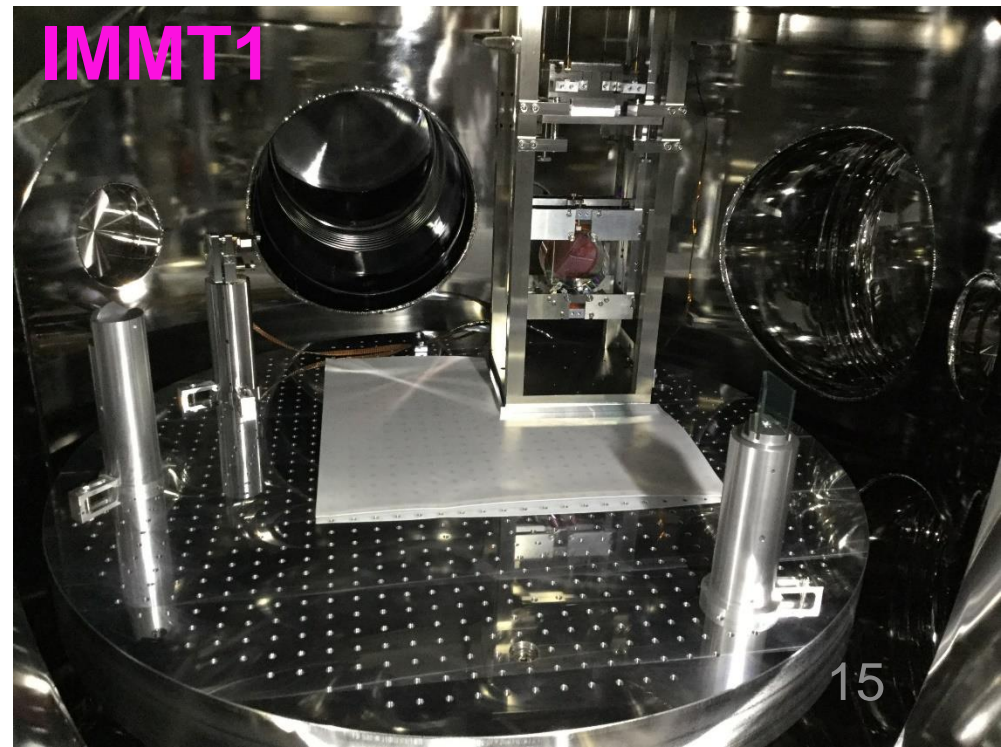
# Cryogenics

- Magnetic noise, vibration measurements at cryostats at the site on-going
- Cryopayload test at KEK, HCB test at NAOJ
- Risk of ETM coating delay (preparing spares)



# Input Optics Upgrade

- Input Mode Cleaner (IMC) magnets replaced
- Input Mode Matching Telescope (IMMT) suspensions installed
- iKAGRA Pre-stabilized Laser (PSL) disassembled, bKAGRA PSL being assembled



# Summary

- Successfully completed the first test run at room temperature (iKAGRA)
- Working hard for the first cryogenic test run by March 2018 (bKAGRA Phase 1)
- The first observation run in ~2020
- Stay tuned to KAGRA elog (klog)  
<http://klog.icrr.u-tokyo.ac.jp/osl/>



# Extra Slides

# KAGRA Sensitivity

- If sapphire mirrors are at 23 K

