

# KAGRA+

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# GW detectors in the world

USA

Europe

Japan

LIGO

Virgo

GEO

TAMA

Advanced  
LIGO

Advanced  
Virgo

GEO-HF

KAGRA

A+

Voyager

Einstein Telescope

KAGRA+ ?

Cosmic Explorer

1G

2G

3G

# KAGRA+ planning

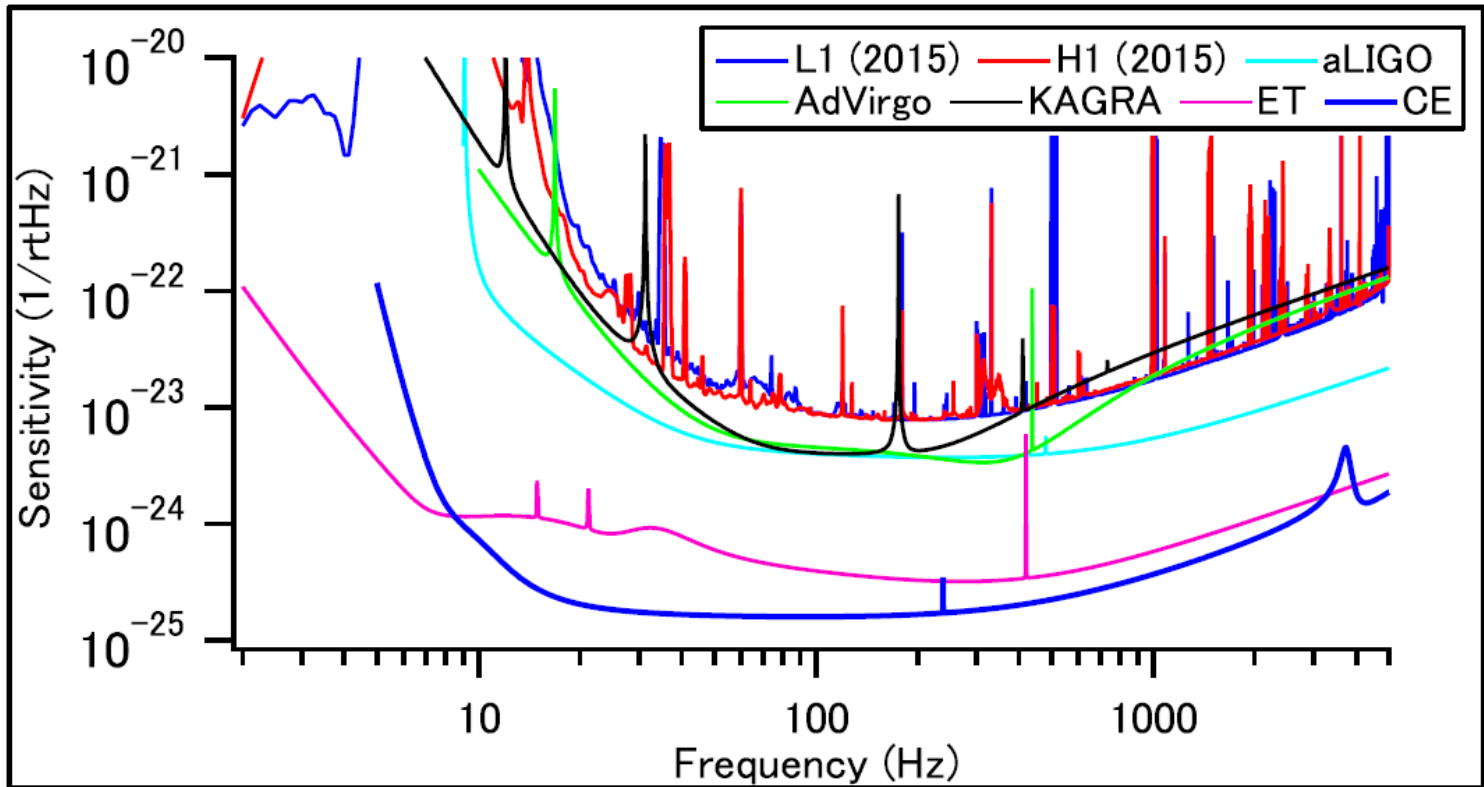
- We should plan ahead (~10 years)
- It will also be a good chance to review current KAGRA design
- The upgrade plan can be an insurance to achieve the design sensitivity
  - e.g. squeezing instead of high power laser
  - new mirrors in case present mirrors are broken

## Advanced R&D session in the next F2F meeting

- In addition to talks on individual R&D activities, we would like to have a discussion on an integrated plan of KAGRA+
- Here KAGRA+ is aiming at the first observation in 2022~2024
- We will need a few volunteers to show their plans so that we can compare and discuss the upgrades

Supplementary slides

# Sensitivities



Inspiral range for BNS

O2	KAGRA	aLIGO	A+	Voyager	ET	CE
70Mpc	150Mpc	200Mpc	320Mpc	700Mpc	3200Mpc	?

## Possible upgrade plans

- Use silicon
- Use larger sapphire (A-axis? Kamaboko? Add masses with HCB?)
- Different mirrors for ITM and ETM
- Variational readout
- Khalili cavity
- Filter cavity
- Delay-line, folded arms
- Half cryogenic
- Higher order modes
- Focus on low frequency
- .....