# **KAGRA** Introduction & Status





#### Hisaaki Shinkai on behalf of KAGRA collaboration

Chair, KAGRA Scientific Congress Osaka Institute of Technology

## **KAGRA** Kamioka Gravitational Observatory

former name LCGT = large cryogenic gravitational telescope named by public naming contest, 神楽(かぐら) dance music in front of Gods

### **3km Laser Interferometer, Cryogenic**



1000m under the summit of the Mt.

358m above the sea level.

http://gwcenter.icrr.u-tokyo.ac.jp/en/

#### KAGRA collaboration: as of June 2018

385 collaborators

(8 B students, 73 M students, 35 D students, 10 PDs)

90 institutes

15 countries

(Australia 5, China 35, France 1, German 1, India 3, Italy 17, Japan 253,

Korea 23, The Netherlands 1, Poland 2, Russia 1, Taiwan 34, UK 2, USA 10, Vietnam 2)



PI: Takaaki Kajita

Face-to-Face meeting at Osaka City Univ. May 2018 ⇒



## Schedule (Construction and Operation)

slide from Kajita



### bKAGRA phase-1 operation (Apr 28 - May 6, 2018)

- All vacuum
- Cooled ETMY (18K for 30 days).
- Duty cycle (88.6% first 5 days; <u>26.8% May 3 & 4</u>; 59.8% May 5 &6)
- Longest lock was >10 hrs
- Sensitivity 2x10^{-17} / rHz
- PEM injection, hardware injection tests





Details are by Miyakawa Tomaru Nagano

## LIGO/Virgo joint observation plans

### "Scenario Paper"

Living Rev Relativ (2018) 21:3 https://doi.org/10.1007/s41114-018-0012-9



### Roadmap of bKAGRA phase2 &3, Join LIGO/Virgo O3 run

time limited, we have to compromise

2018							2019												2020	
July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
							LIGO/VIRGO Observation 3													
ITMX			X-arm																pla	ın A
		Xend	com.			ETMX		]	post	com.										
ETMY					Y-a	arm	FPMI													
			IT	MY		com.							post			DRF	PMI	pla	ın B	
La	ser		mode	mode cleaner					DREPMI (RS			·上)		com.			(F	RSE)		
data analysis rehear				is rehears	sal	Data Sharing with KAGRA-LIGO-Virgo														
	,																			

— either DRFPMI(RSE) (30-40Mpc, Oct?) or FPMI (10-20Mpc, June?) checking points: Sep/2018, Dec/2018 and Mar/2019

#### **Re-organizing KAGRA groups for joint observations**





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- $\checkmark$  Phase-1 test operation finished.
- $\checkmark$  Decided to join O3 of LIGO/Virgo.
- $\checkmark$  Preparing hard & soft, Re-organizing structure.



GW physics and astronomy in 2019 will be with more precise data, and new phase.