

# KAGRA用防振装置の開発 VIII

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**KAGRA collaboration**

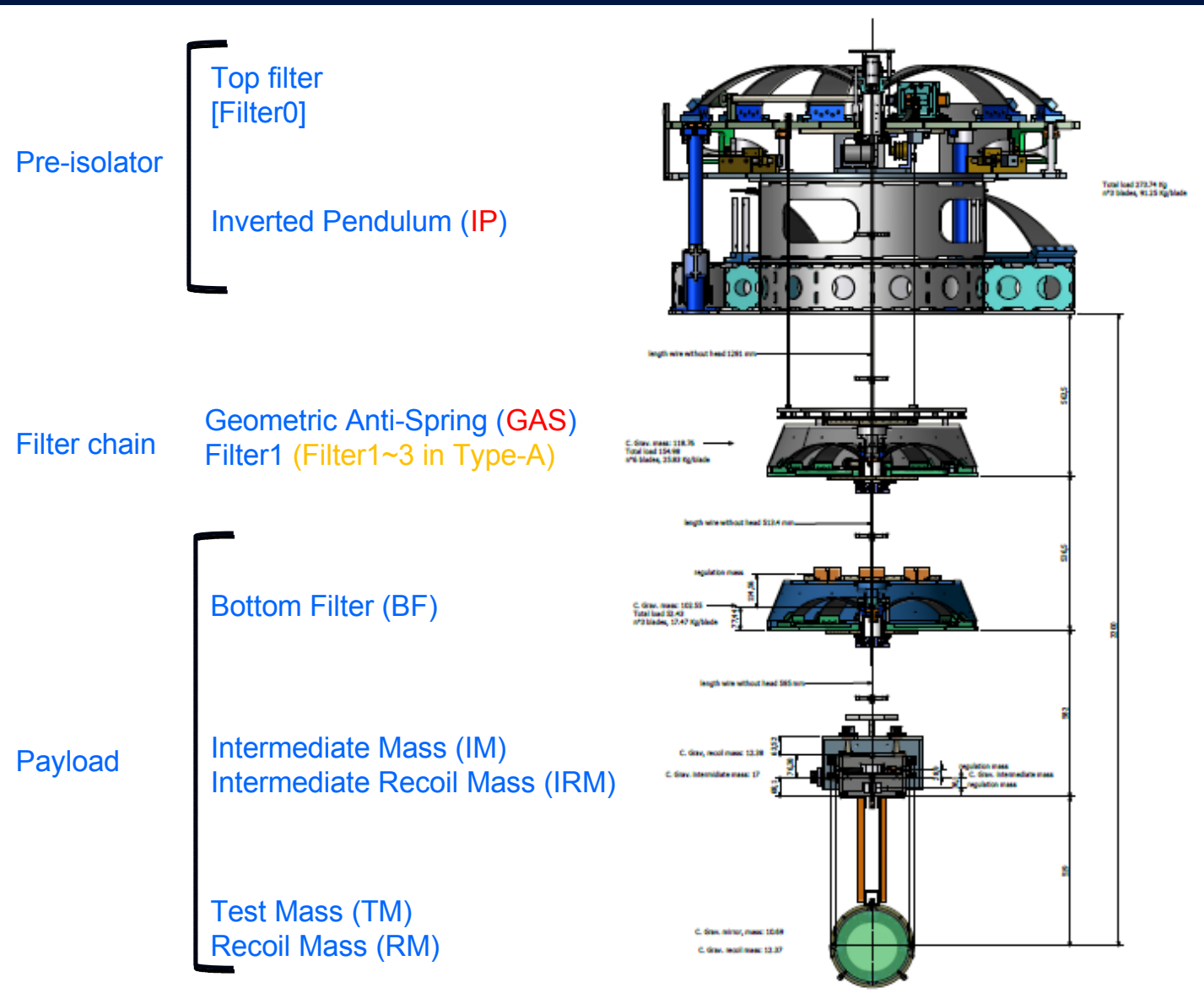
1. Configuration
2. Sensors and Actuators
3. Schedule and Status
4. Summary



2012年秋季大会  
於 京都産業大学

# 1. Configuration

# Seismic Attenuation System SAS (Type-A/B)



# Configuration

**Type-A:** IP + GASF (5 stage) + Payload (23kg, cryogenic)

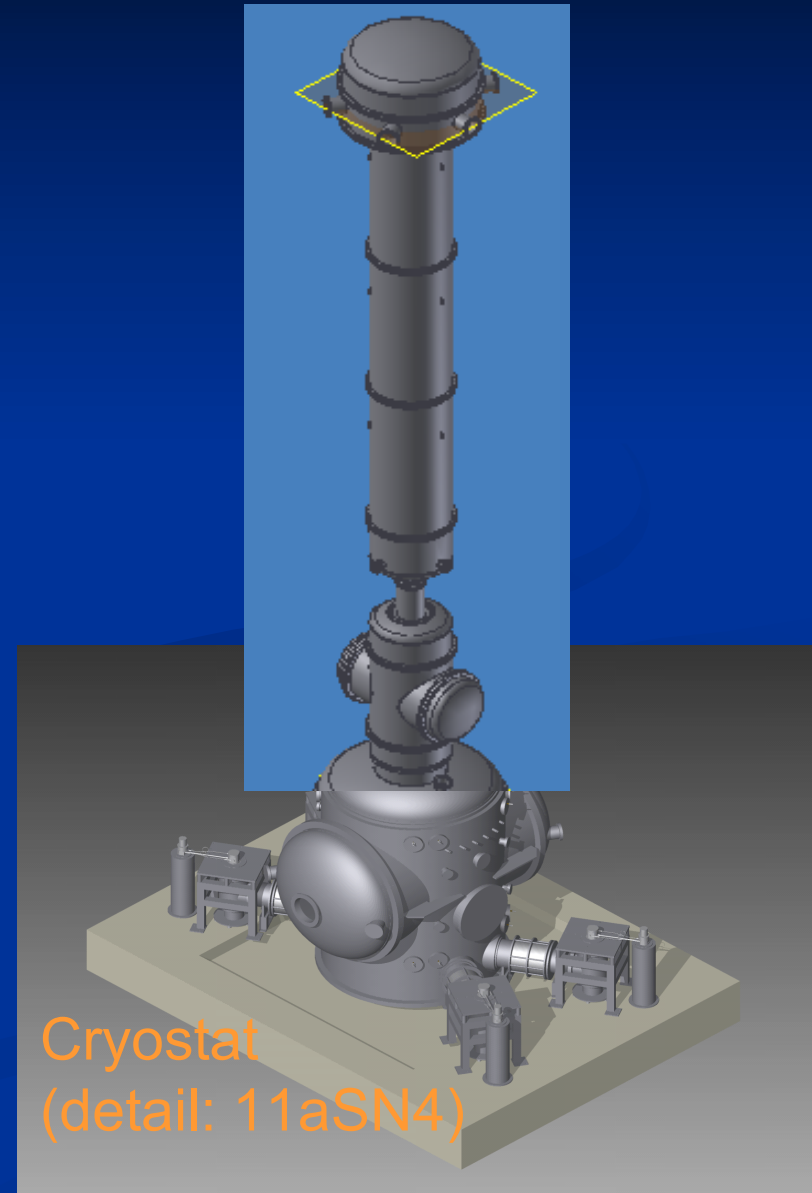
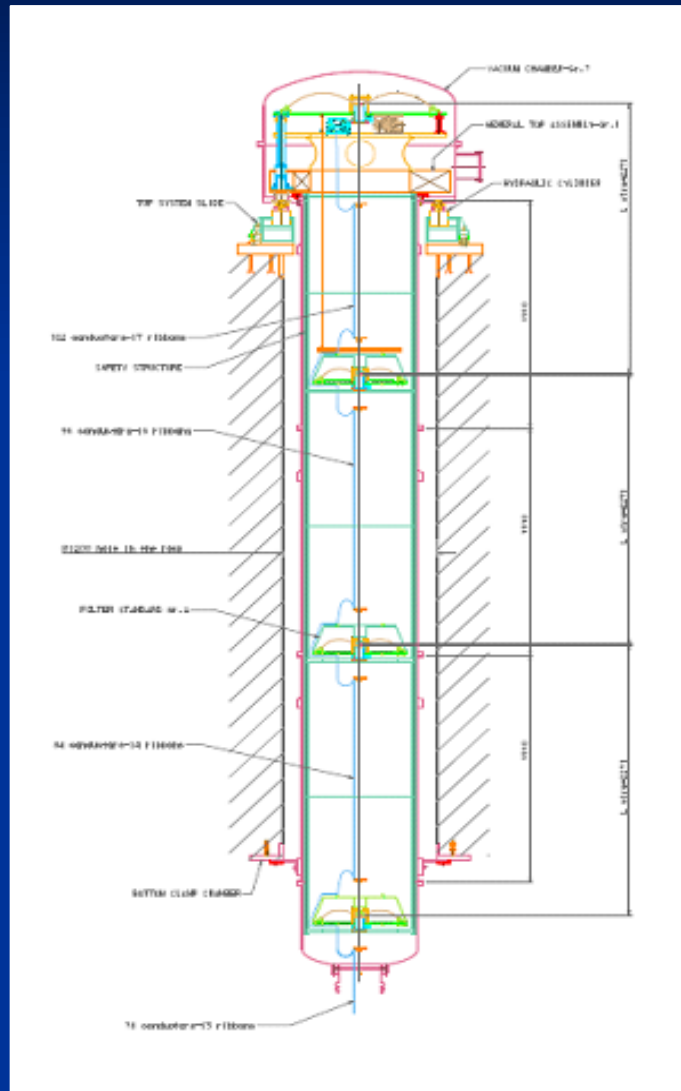
**Type-B:** IP + GASF (3 stage) + Payload (10kg/20kg)

**Type-C:** Stack + Single/Double-pendulum (~1kg)

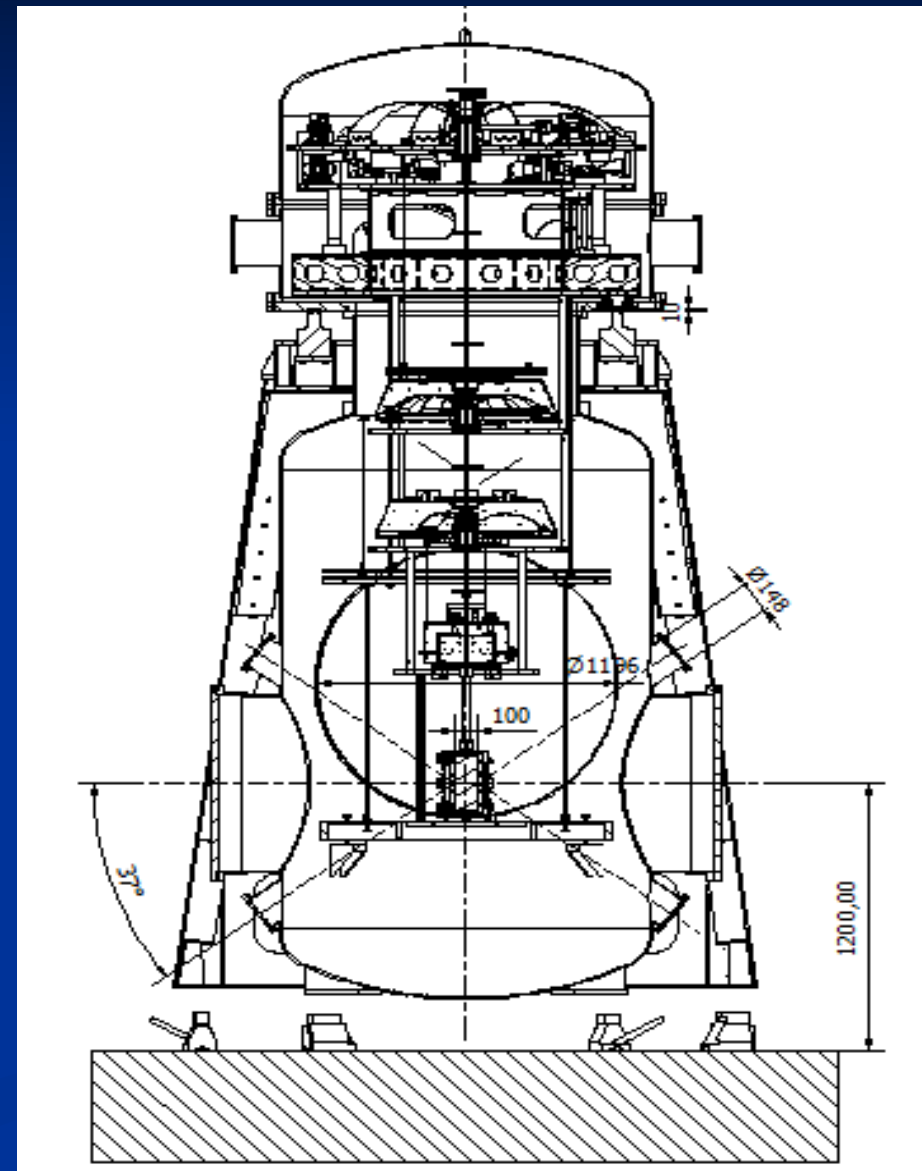
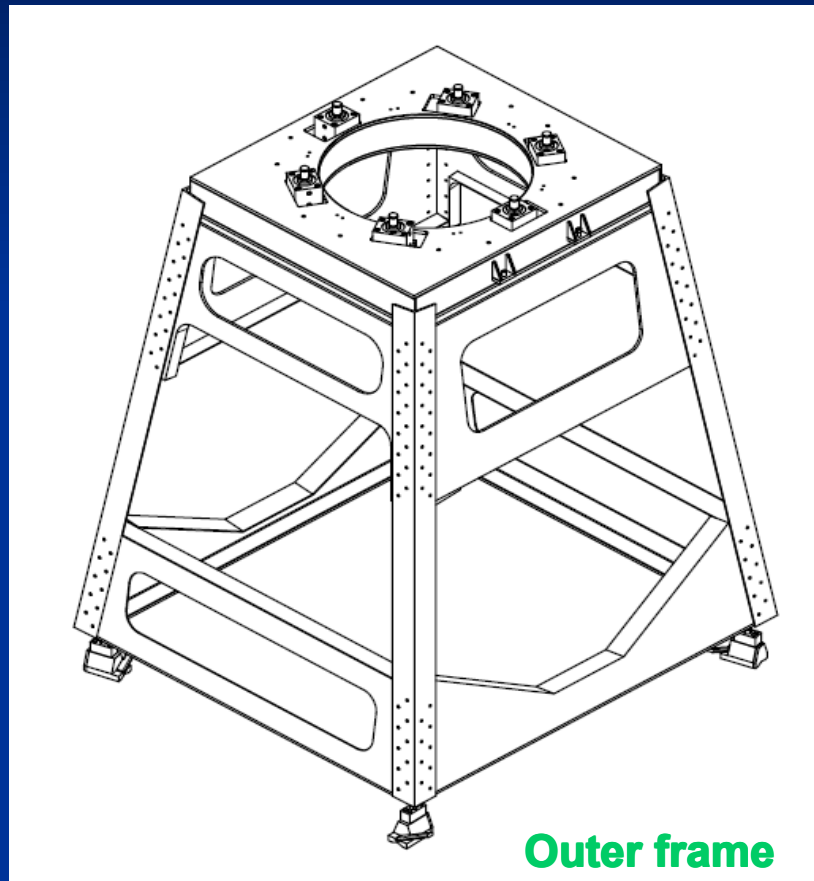
Chamber	iKAGRA	bKAGRA
IXV, IYV, EXV, EYV		Type-A
IXA, IYA, EXA, EYA	Type-B Payload on rigid table (for ITM/ETM)	
BS, PR2, PR3	Type-B (Only payload is free, other parts are not used)	Type-B
PRM, SRM, SR2, SR3		Type-B
MCF, MCE, IFM, IMM	Type-C	Type-C
OFI, OMC, EXT, EYT		Type-C



# Type-A

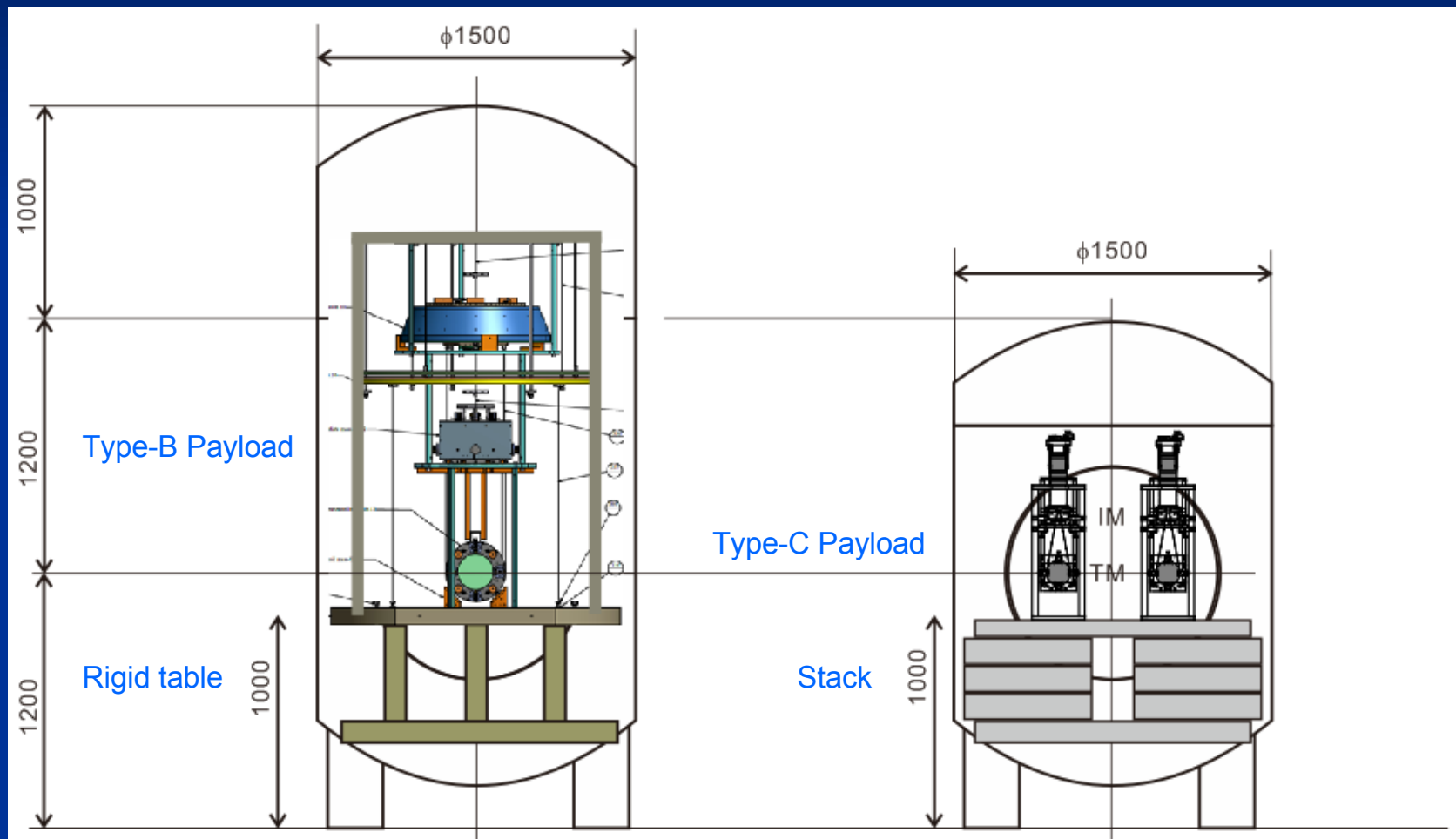


# Type-B



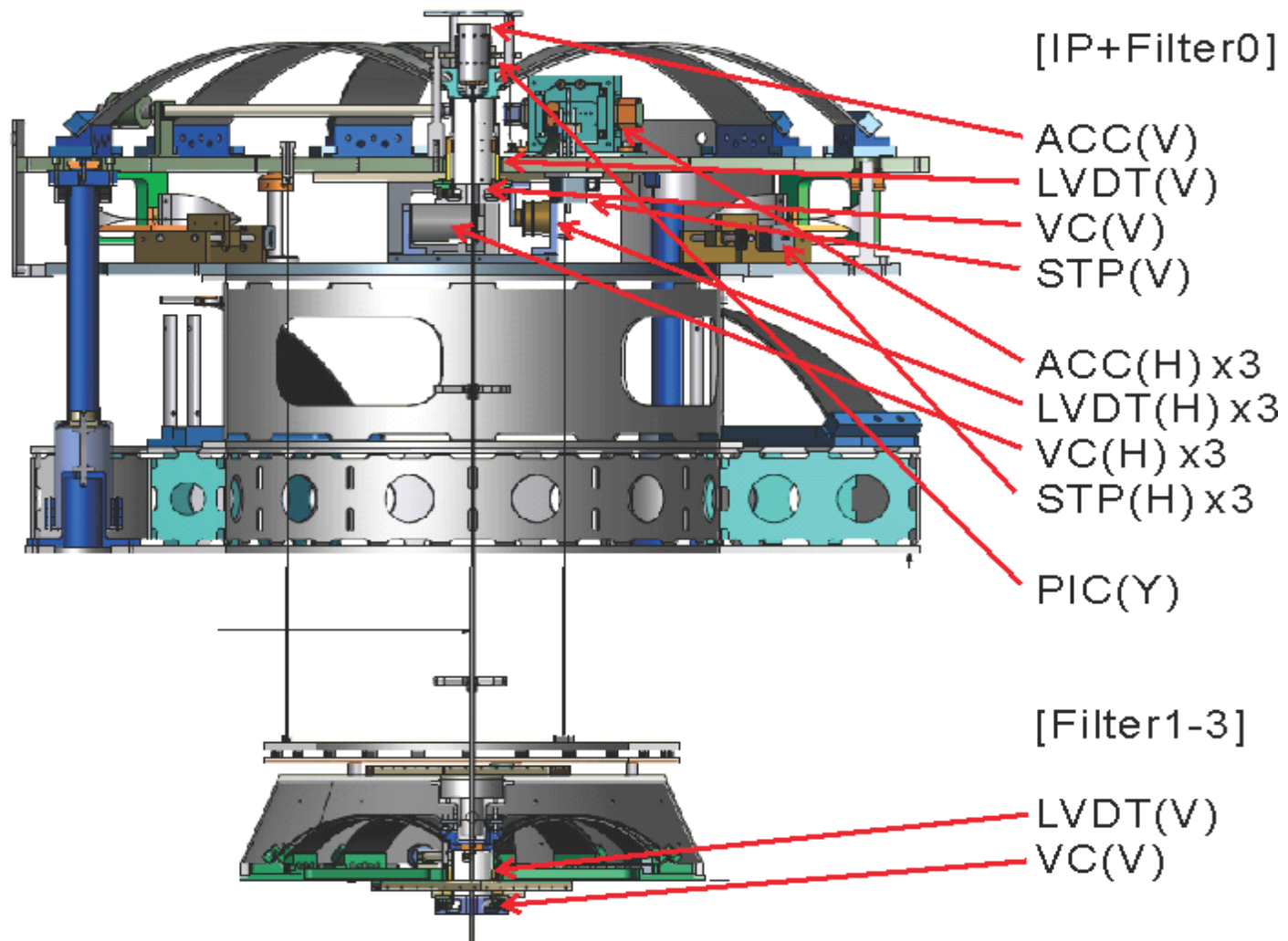
# Type-B payload on rigid table

# Type-C

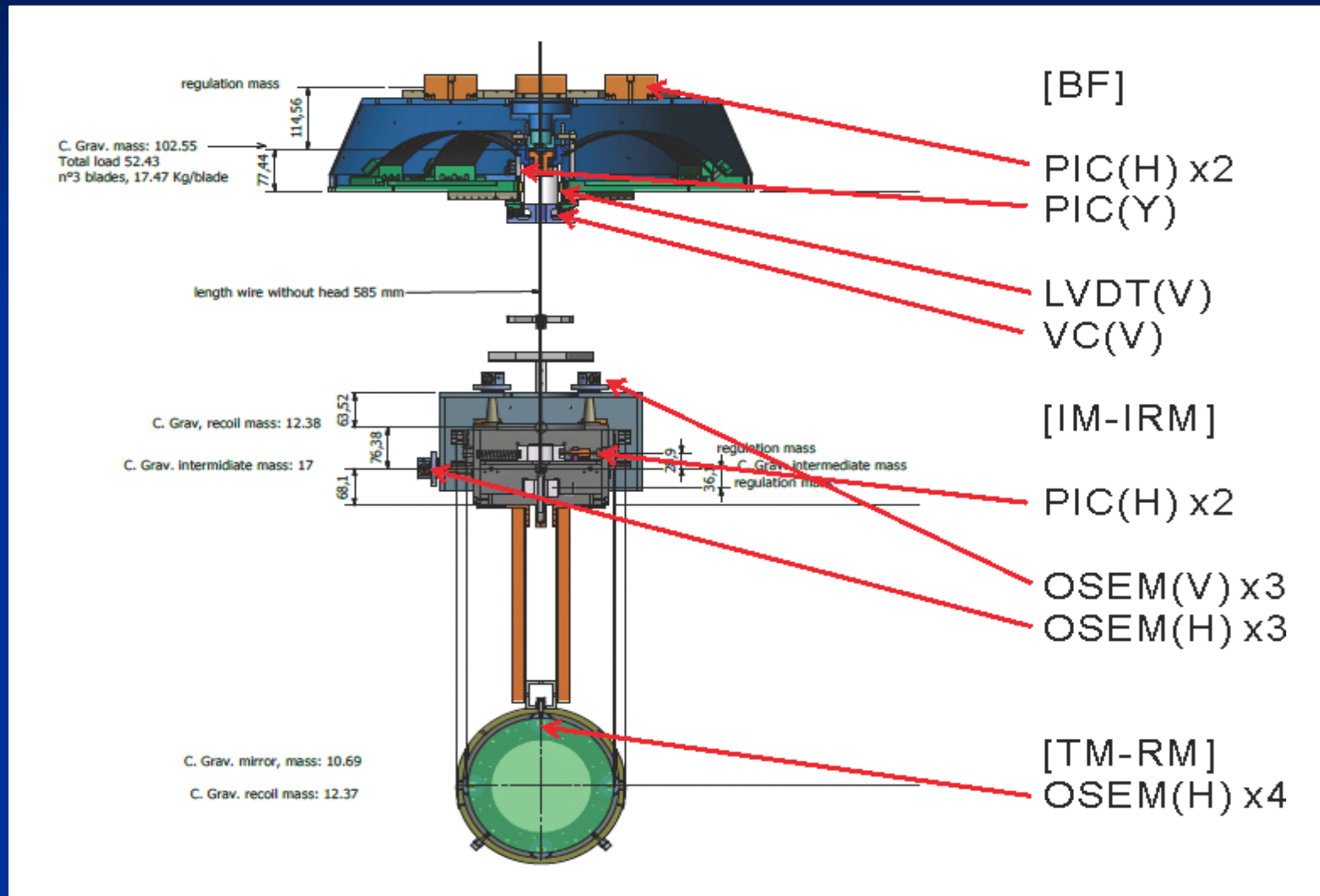


## 2. Sensors and Actuators

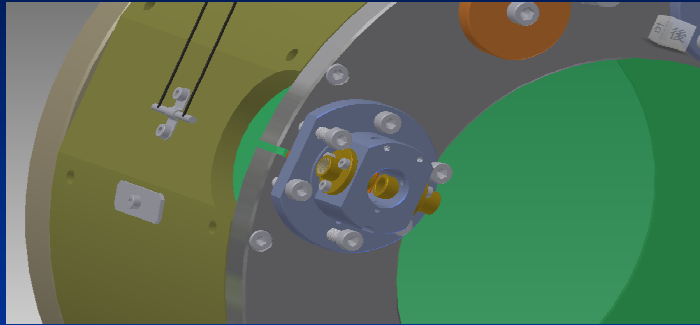
# Pre-isolator



# Type-B Payload



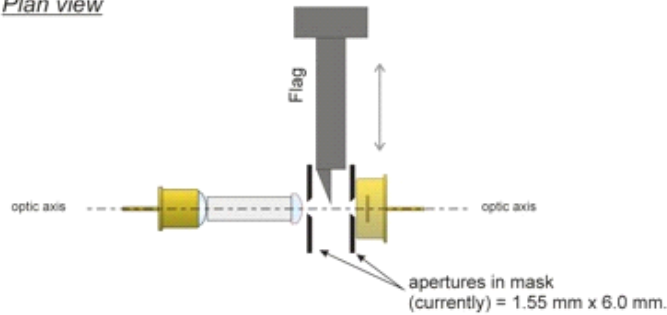
# Optical Sensor and Electro-Magnetic actuator (OSEM)



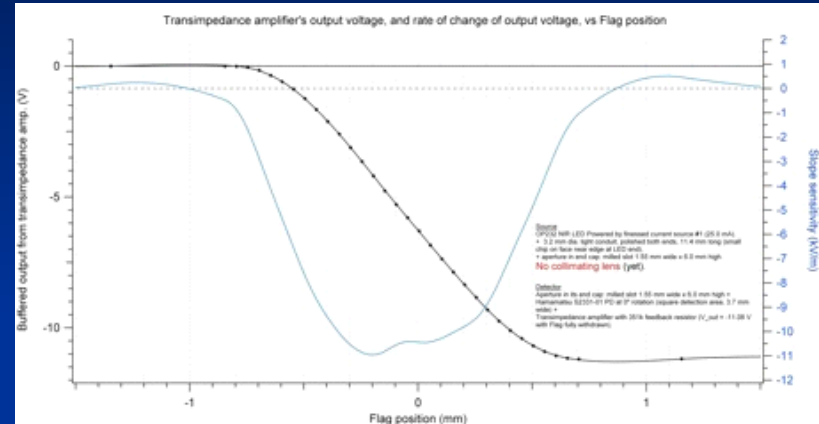
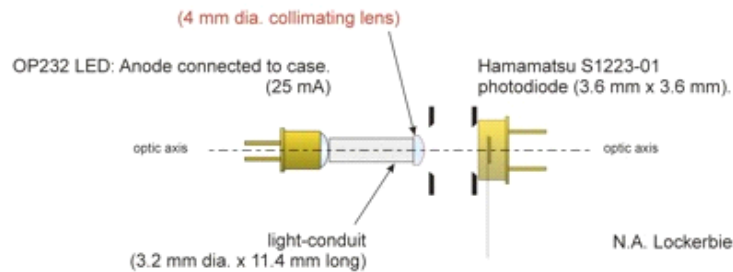
13 April, 2012

## Current OSEM Design

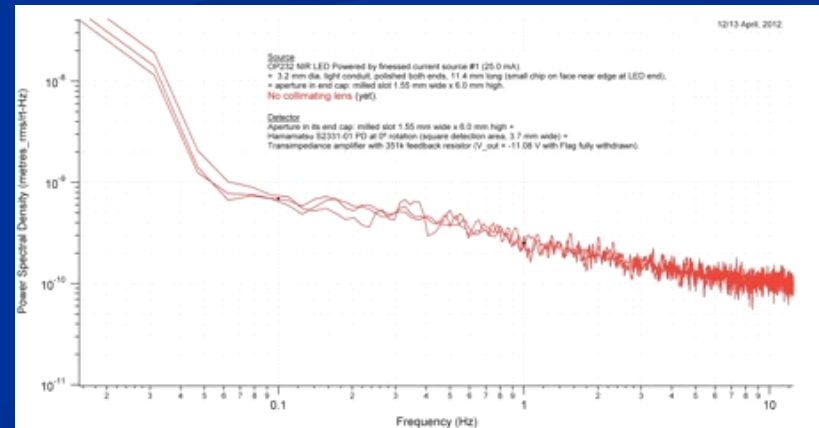
Plan view



Side elevation



The linear range is ~ 1mm.



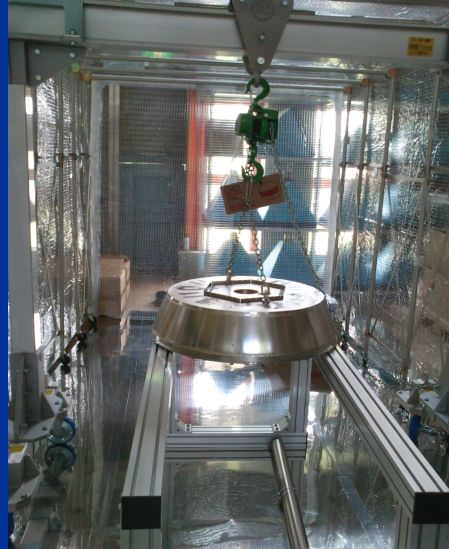
The sensitivity is ~  $2.5 \times 10^{-10}$  m/Hz<sup>1/2</sup> at 1 Hz, and ~  $7 \times 10^{-10}$  m/Hz<sup>1/2</sup> at 0.1 Hz.

### 3. Schedule and Status



# Schedule

		2011	2012	2013	2014	2015	2016	
Standard GASF	Prototype test							in NIKHEF/ICRR
	Procure							
	Assembling							in Akeno
Pre-isolator	Prototype test							in ICRR
	Procure							
	Assembling							in Akeno
Type-B payload	Prototype test							in NAOJ
	Procure							
	Assembling							in Kamioka
	Installation							
Type-A SAS	Prototype test							in the site
	Installation					ETM	ITM	
Type-B SAS	Prototype test							in TAMA
	Installation					SRM	PRM	
Stack	Procure							
	Installation							



## Current task

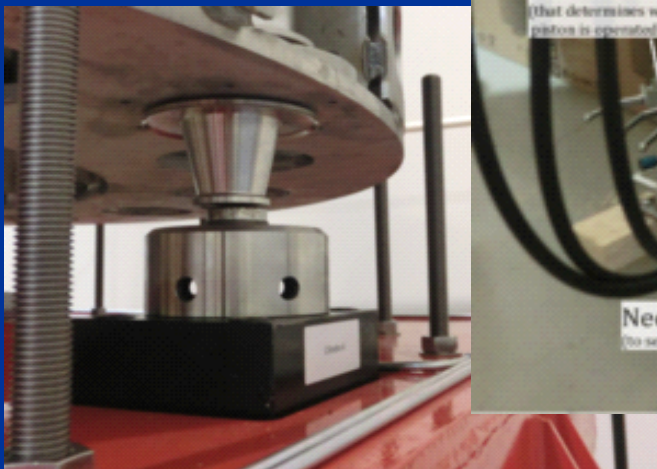
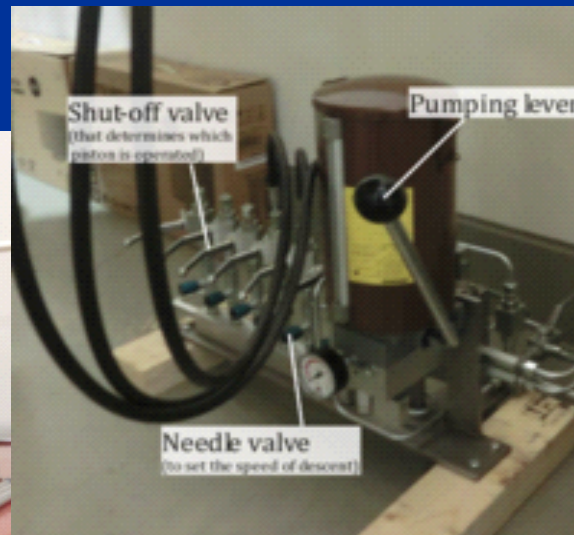
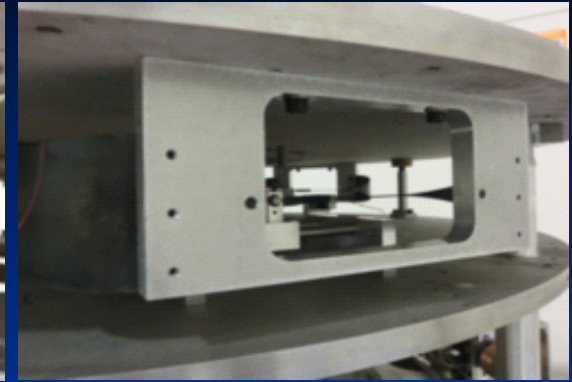
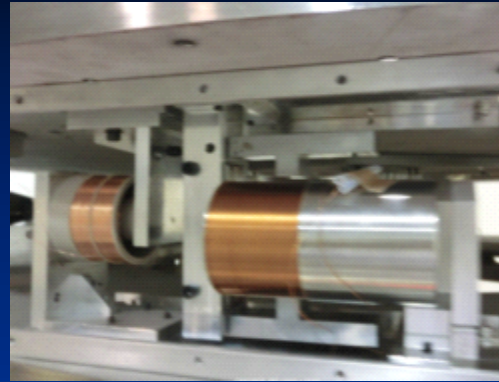
- Prototype test of the pre-isolator in Kashiwa
- Assembling of the GAS filters in Akeno

## Order in 2012FY

- Payload prototype: June
- 6 Pre-isolators: October

# Test of pre-Isolator prototype

detail: 11aSN3



Motor sliders and LVDT-actuator modules were assembled onto the IP with cabling.

The level of the IP base was tuned using the hydraulic piston.



# Storage & Assembling in Akeno

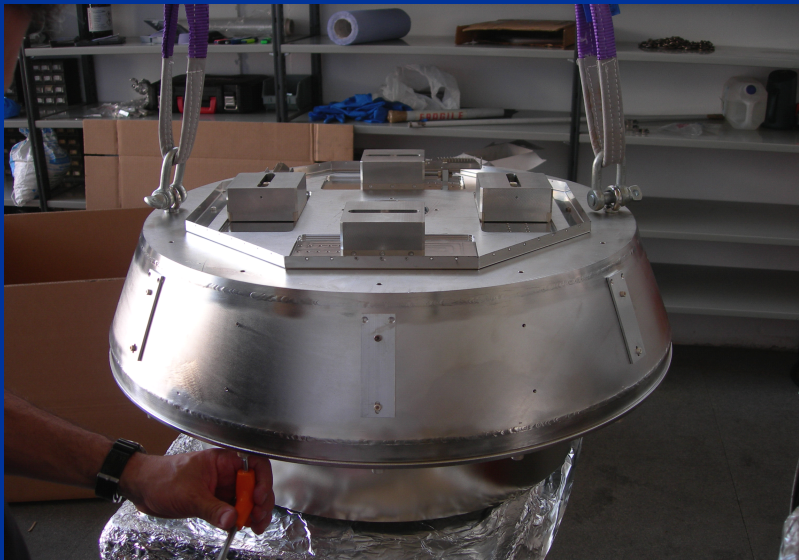
- The 19 GAS filters have been delivered in February, 2012.
- The clean booth is ready for assembling.
- Final tuning will be started soon.





# Manufacturing of payload prototype

- The payload prototype has been delivered in August, 2012.
- Assembling and tests will be started soon.



## 4. Summary

- The seismic attenuation system (SAS), which consists of **inverted pendulum (IP) and geometric anti-spring (GAS) filter**, is used in KAGRA.
- **Three kinds of isolation system** are used depending on required specifications.
- **Sensors and actuators** are embeded onto each stage of the isolation system for local and global controls.
- **Test of prototypes and production of instruments** for iKAGRA are now going.