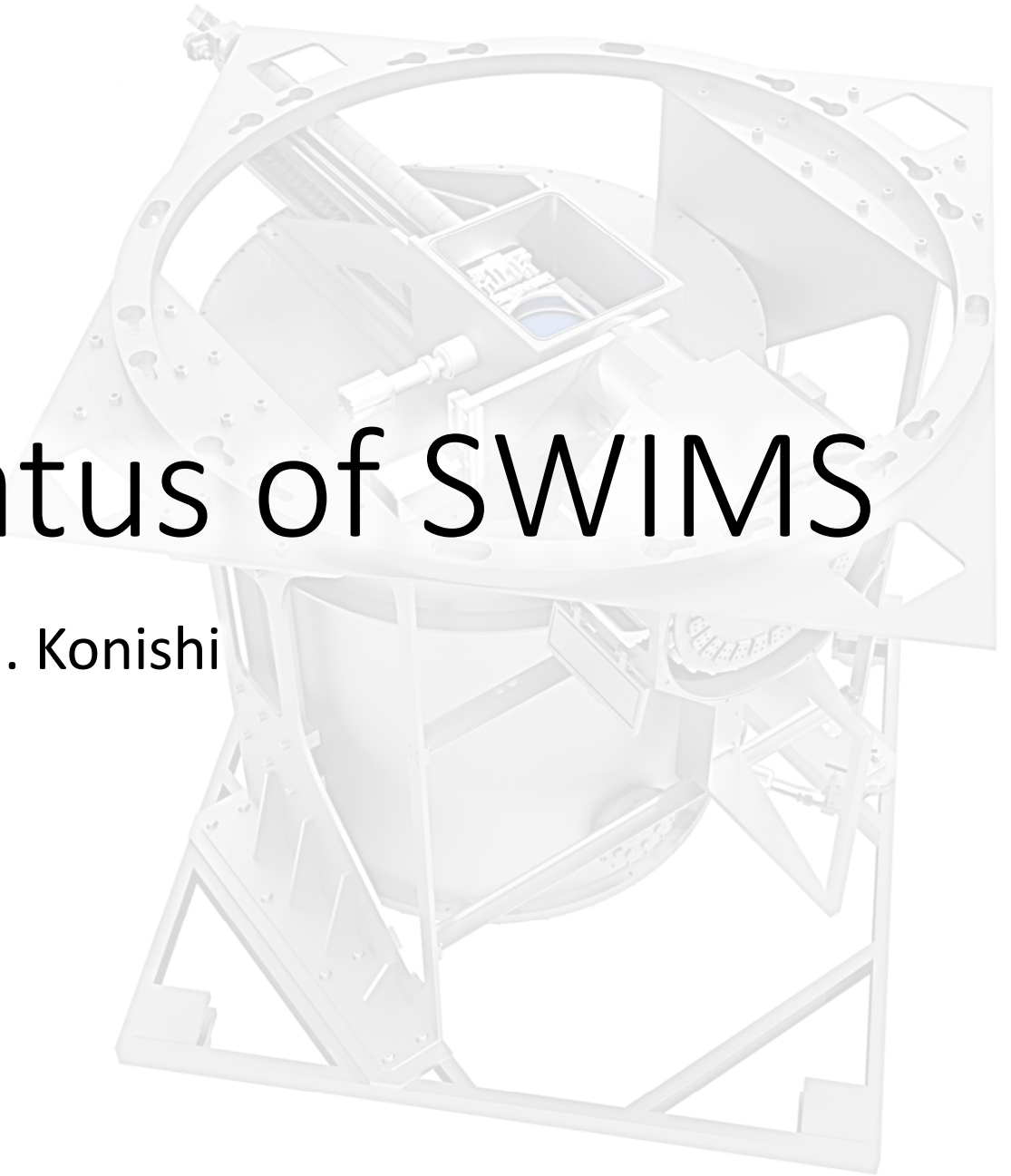


# Current Status of SWIMS

M. Konishi



# Summary of installation status

	Current	Completion
<b>Entrance Window</b>	✓ Installed	---
<b>Collimator</b>	Only lens barrels	Oct 2015
<b>Dichroic Mirror</b>	Only mirror mount	Oct 2015
<b>Camera (<i>blue</i>)</b>	✓ Installed	---
<b>Filters (<i>blue</i>)</b>	Installed except for grism	Oct-Dec 2015
<b>Detector (<i>blue</i>)</b>	Multiplexer x1	Oct 2015
<b>Camera (<i>red</i>)</b>	✓ Installed	---
<b>Filters (<i>red</i>)</b>	Only NB filters	Oct-Dec 2015
<b>Detector (<i>red</i>)</b>	HAWAII-2RG x1	Oct 2015



# Lenses



## 【6 lenses】

- ❖ Fused Silica x 2
- ❖ CaF<sub>2</sub> x 3
- ❖ ZnSe x 1



Collimator  
Completion in Oct.

Dichroic mirror  
Completion in Oct.



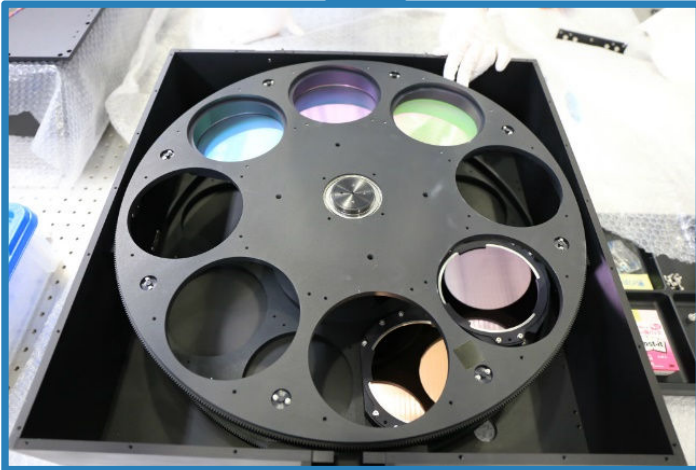
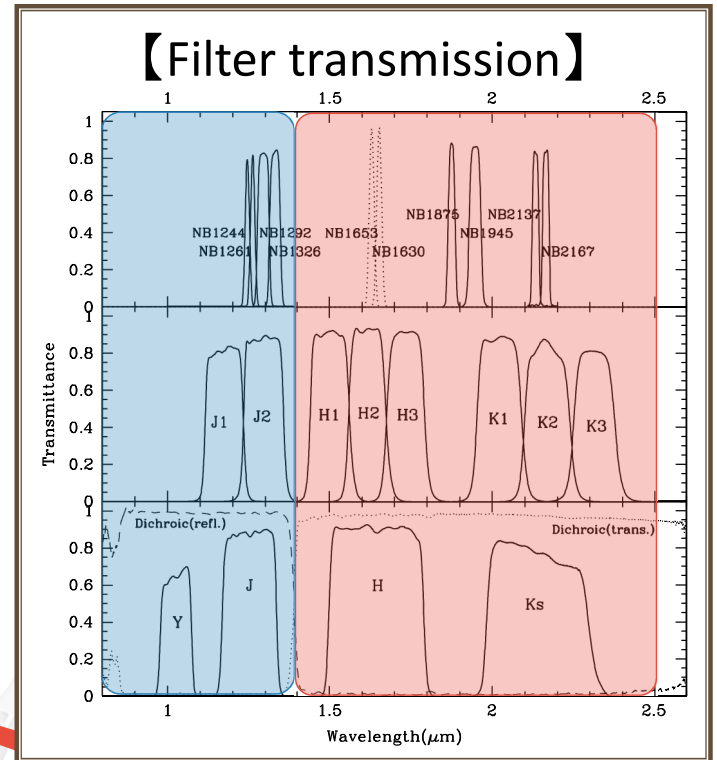
## 【6 lenses】

- ❖ Fused Silica x 2
- ❖ CaF<sub>2</sub> x 3
- ❖ ZnSe x 1



# Filters

**BB Filters**  
(red arm)  
Completion in Oct.



Broad-band filters  
(dual wheels, *blue arm*)



Narrow-band filters  
(*blue arm*)



Narrow-band filters  
(*red arm*)

# Filter installation status

## Blue arm

T1	T2	T3
Grism	Order-sort	High-pass
	J1	NB1244
	J2	NB1261
		Pa $\beta$ (NB1292)
Y		Pa $\beta$ -off (NB1326)
J		
Close		
Open	Open	

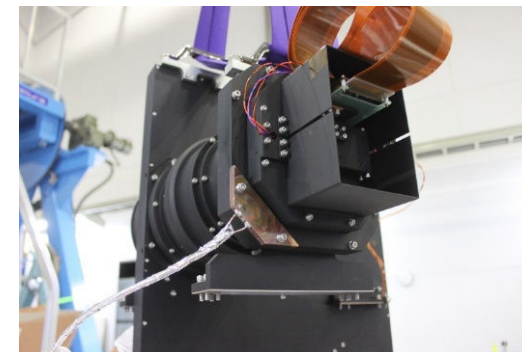
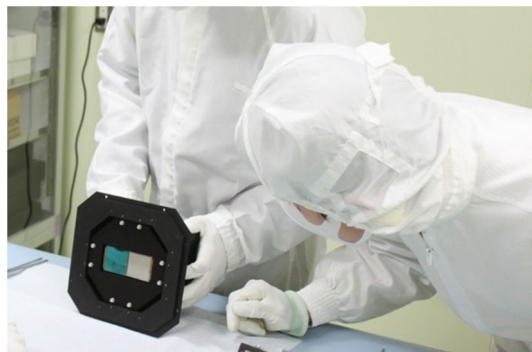
## Red arm

T4	T5	T6
Grism	Order-sort	High-pass
	H1	NB1630
	H2	NB1653
	H3	Pa $\alpha$ (NB1875)
H	K1	Pa $\alpha$ -off (NB1945)
Ks	K2	NB2137
Close	K3	NB2167
Open	Open	

Installed Not installed
----------------------------

Due to be completed in Oct-Dec 2015.

# Detector



- CDS read-out noise (RoN) of a single H2RG

In a test dewar

H2RG #SN	#191	#196	#206
<b>Channel Av.</b>	<b>15.1e-</b>	<b>16.6e-</b>	<b>15.9e-</b>
Max.	18.1e-	18.9e-	18.4e-
Min.	14.2e-	13.8e-	13.7e-

In SWIMS

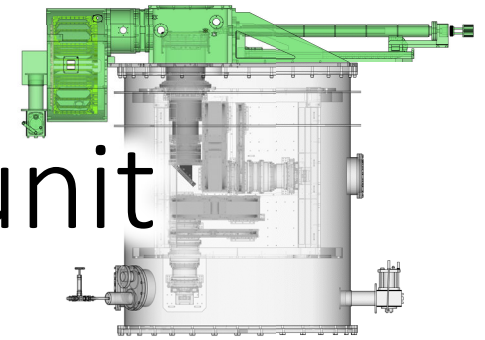
H2RG #SN	MUX
<b>Channel Av.</b>	<b>16.9e-</b>
Max.	15.3e-
Min.	18.5e-

【Summary of preliminary spec.】

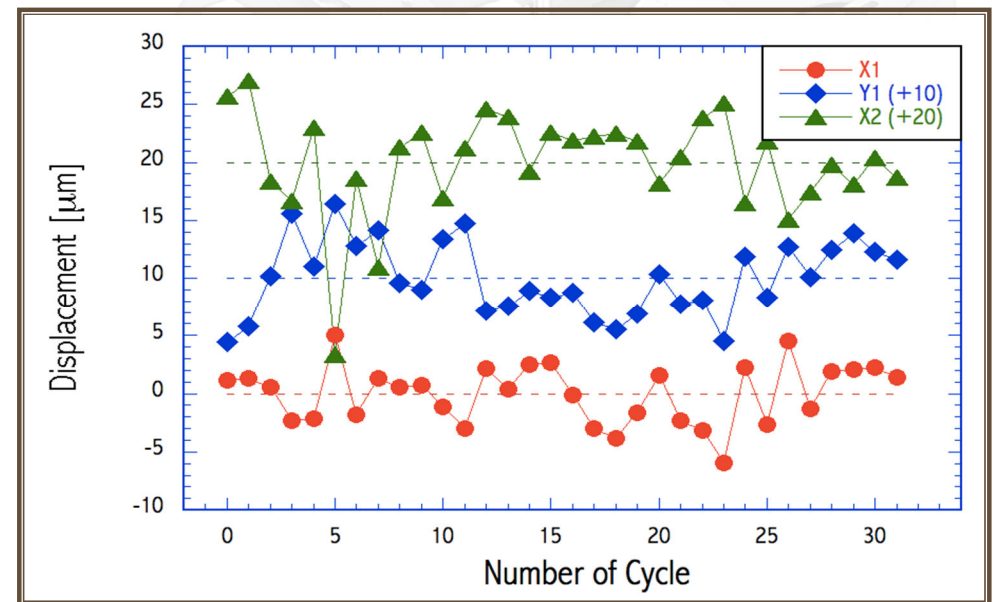
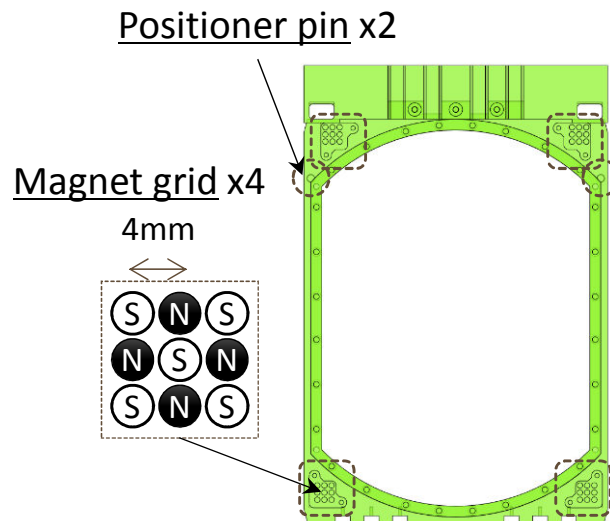
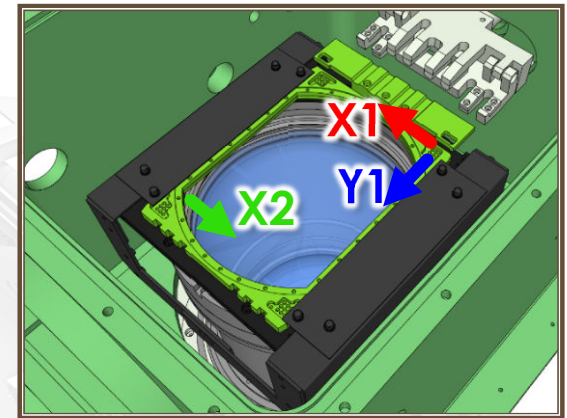
- ❖ RoN of simultaneous readout of the arrays gets worse due to interference between the flat cables.
  - now preparing a newly-designed cable with noise shields.
  - will be tested in Dec 2015.

<b>Read-out speed</b>	1.48 sec/frame
<b>Conversion factor</b>	2.3 e-/ADU
<b>Crosstalk by IPC</b>	~1.3%
<b>Read-out noise</b>	~16 e- (CDS), ~4 e- (32 Fowler)
<b>Dark current</b>	< 0.1 e-/sec/pix
<b>Linearity</b>	~5% at 40% of the full well
<b>Full well</b>	~5.5e4 ADU (~1.3e5 e-)

# Multi-object spectrograph unit



- Reproducibility of the position of Slitmask
  - $\sim 2\text{--}4\ \mu\text{m}$  ( $< 0.1\ \text{pix}$ ) @ EL=90 deg
- To be measured soon
  - Reproducibility / stability of the position of slitmask, with changing EL



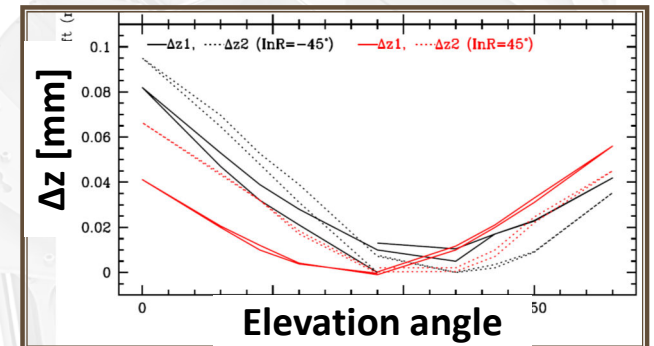
# Cryostat



- Flexure of the optical bench between EL=0 — +/-90 deg.

- Displacement: **~2 pix** (on focal plane), **~100 μm** (optical axis)
- Tilt: **< 30 μm** (0'.4)
- → almost acceptable

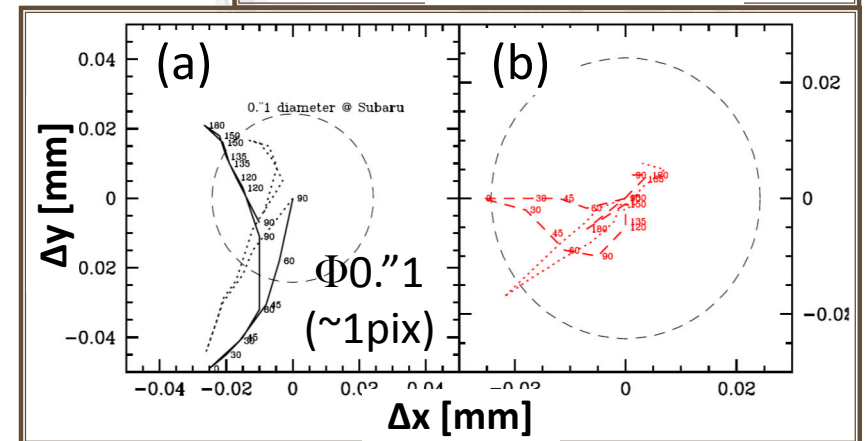
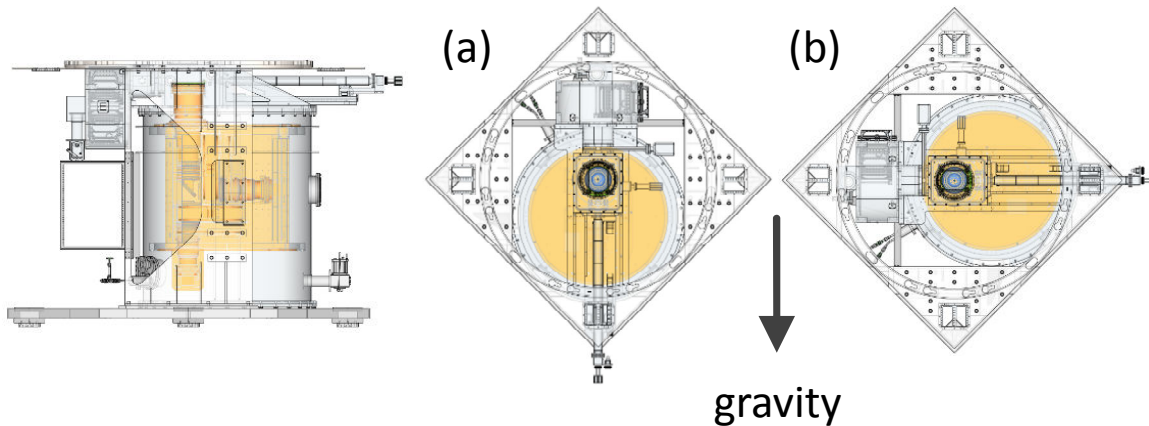
【Displacement of Optical bench】



【Side View】

【Top View】

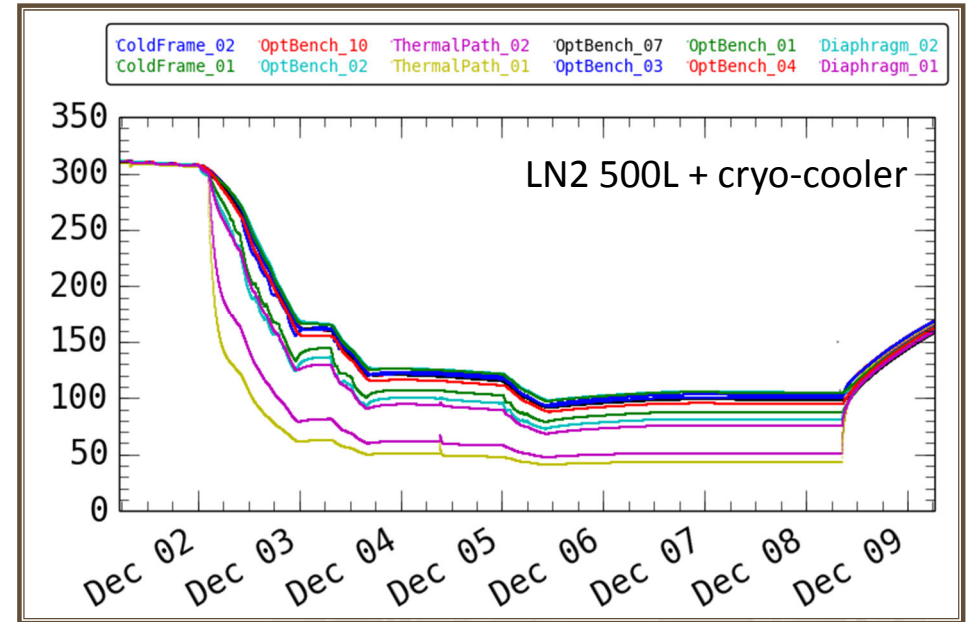
Along Optical axis →  
On Optical plane ↓





# Cryostat

- Cooling performance
  - Takes **~4 days** to cool down with Liquid nitrogen 500L + a GM cryo-cooler.
  - Optics and detector **still too hot**, which causes
    - High thermal radiation (in K-band)
    - Low optical performance
- Investigation in progress.



Location	current	goal
Optical bench	~120K	80K
Detector	~115K	70K
Slit mask	~80K	<100K

# Throughput (expected)

- Lenses
  - Measured transmittance/reflectance:  $>\sim 0.98$  /surface
- Filters
  - Medium-band, narrow-band:  $\sim 0.8-0.9$
  - Grism:  $\sim 0.7$
- Detector
  - QE  $\sim 0.8$  (Y to Ks)
- Total
  - Imaging:  **$\sim 0.4$**
  - Spectroscopy:  **$\sim 0.3$**



# Subaru → TAO

- Telescope focus: Cassegrain → Nasmyth
- Replaces the collimator unit (all the 7 lenses) to cancel the different field curvatures of the telescope.

