

HTS Upgrade Status

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Computers

HTS

Camera

PIEZO controller

Objective lens

Illuminator

Stage

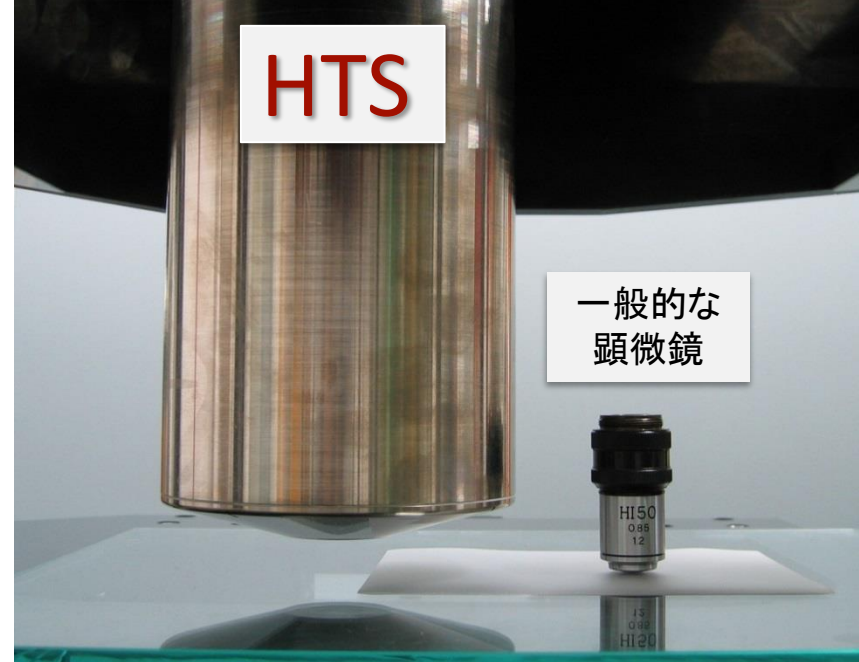
Under operating for

- NINJA
- DsTau
- GRAINE
- Radiography

<https://doi.org/10.1093/ptep/ptx131>

HTS concept

- Very large field of view
5 x 5 mm² (x600 cf. SUTS)
- Quick stage using the linear motors (good transfer characteristic) and counter stage.
- GPGPU based image processing
<100ms @tanθ<1.6 (Geforce GTX680)



	FOV	Frequency	Scan speed
SUTS	0.04mm ²	50Hz	72cm ² /h
HTS (running)	25mm ²	5Hz	4500cm ² /h
HTS / SUTS	x600	x1/10	x62
HTS2 (under dev.)	50mm²	15Hz equiv.	25000cm²/h

Features of HTS2

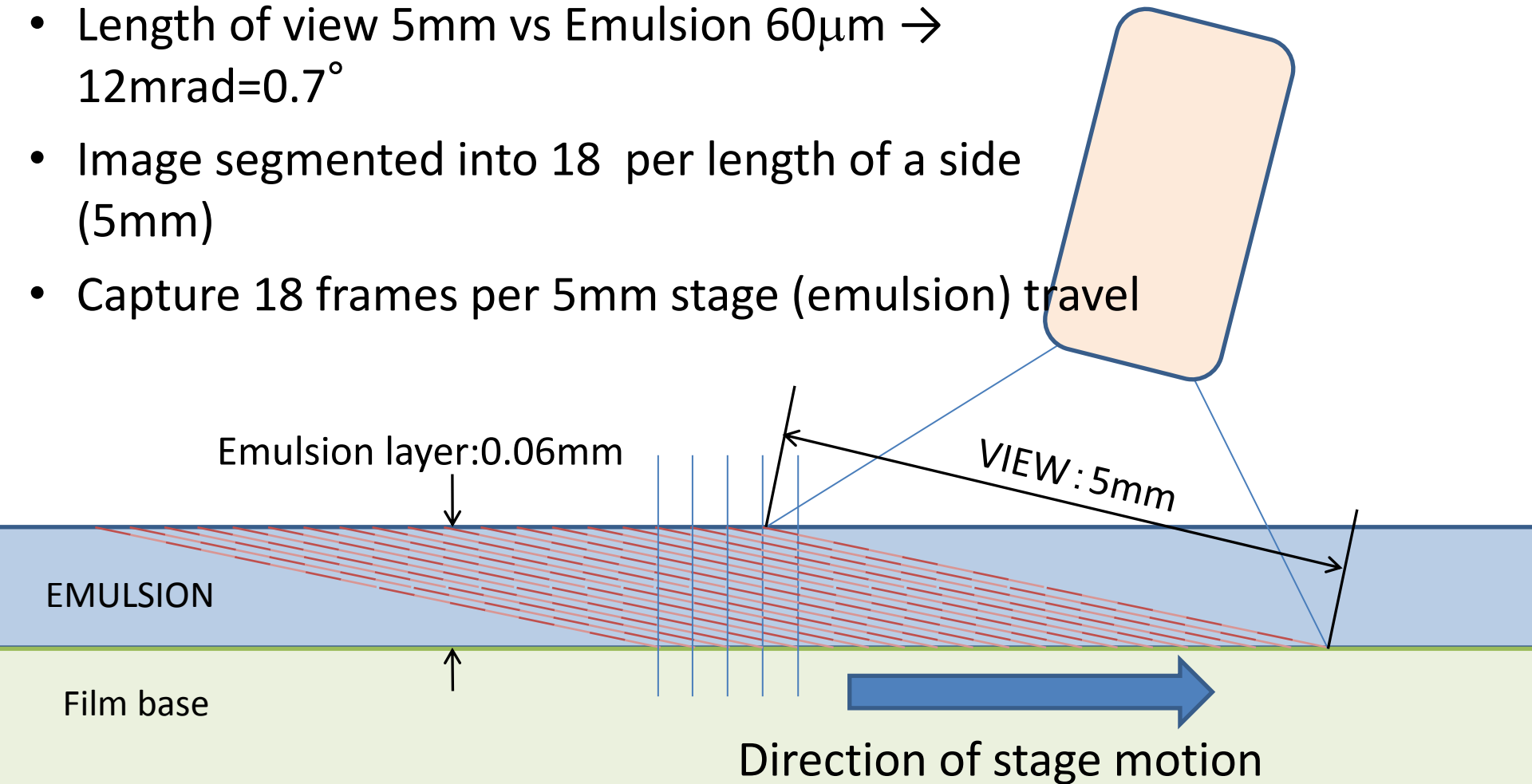
- Target scan speed : $2.5\text{m}^2/\text{h}$ corr. 5x HTS
 - Enlarge FOV : $9.33 \times 5.25\text{mm}^2$, 2x in area.
 - Continuous image capturing : 15views/s,
HTS2 = HTS + SUTS
 - Enlarge stage aperture : accept large emulsion films up to $300 \times 400 \text{mm}^2$

In the case of HTS, actual speed is limited due to plate setting and other things. ~10 OPERA films per an hour can be scanned.

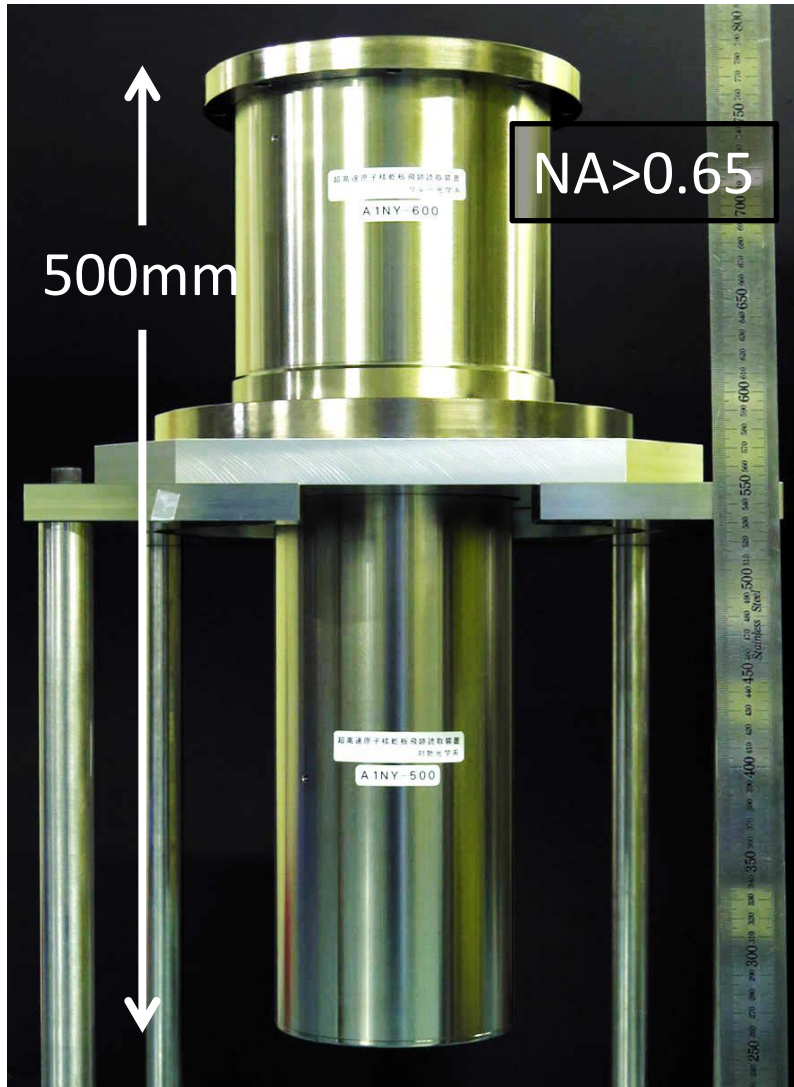
Continuous image capturing

Objective

- Length of view 5mm vs Emulsion 60 μ m \rightarrow 12mrad=0.7 $^\circ$
- Image segmented into 18 per length of a side (5mm)
- Capture 18 frames per 5mm stage (emulsion) travel



New objective lens

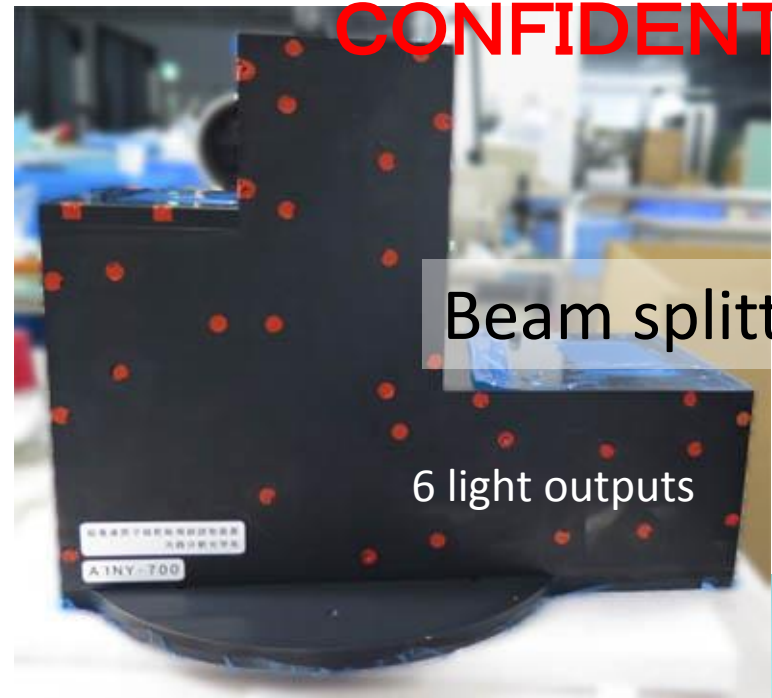


FOV : 9.33mm × 5.25mm

2018/6/1

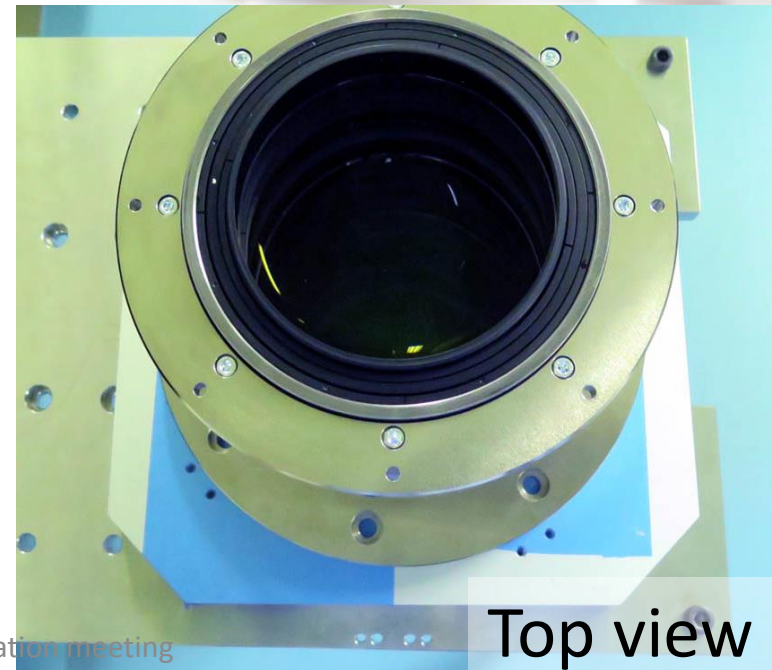
OPERA collaboration meeting

CONFIDENTIAL



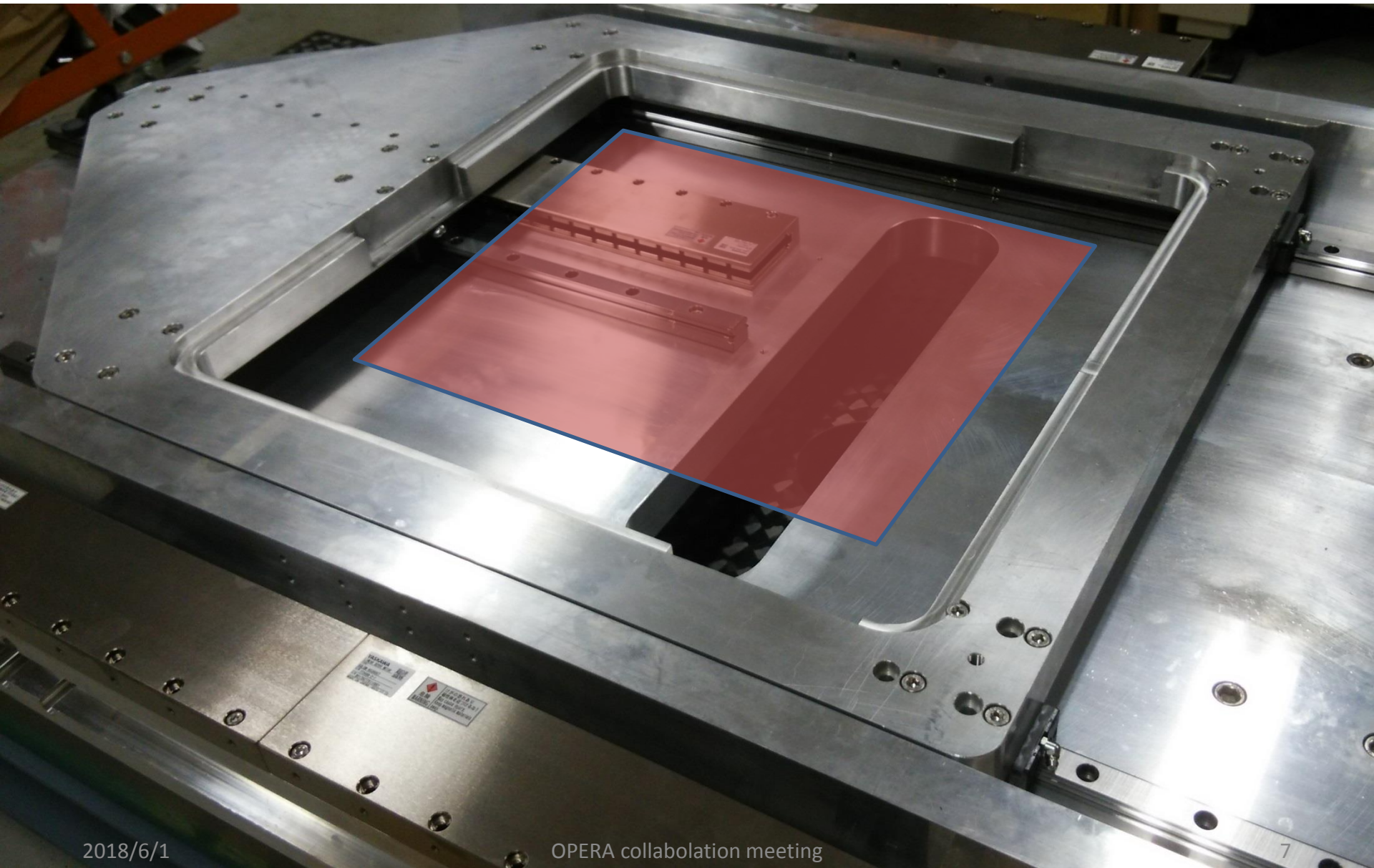
Beam splitter

6 light outputs

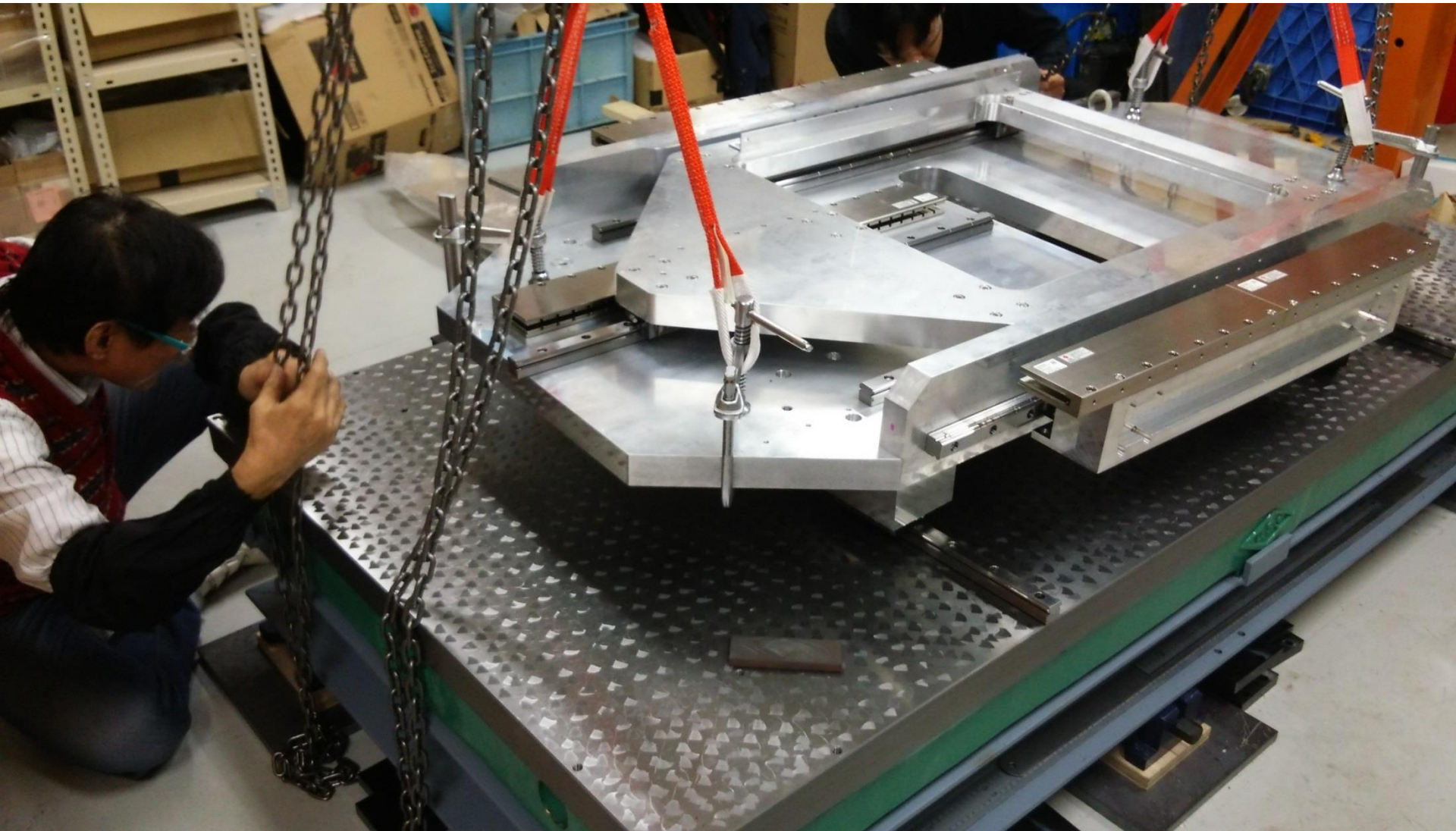


Top view

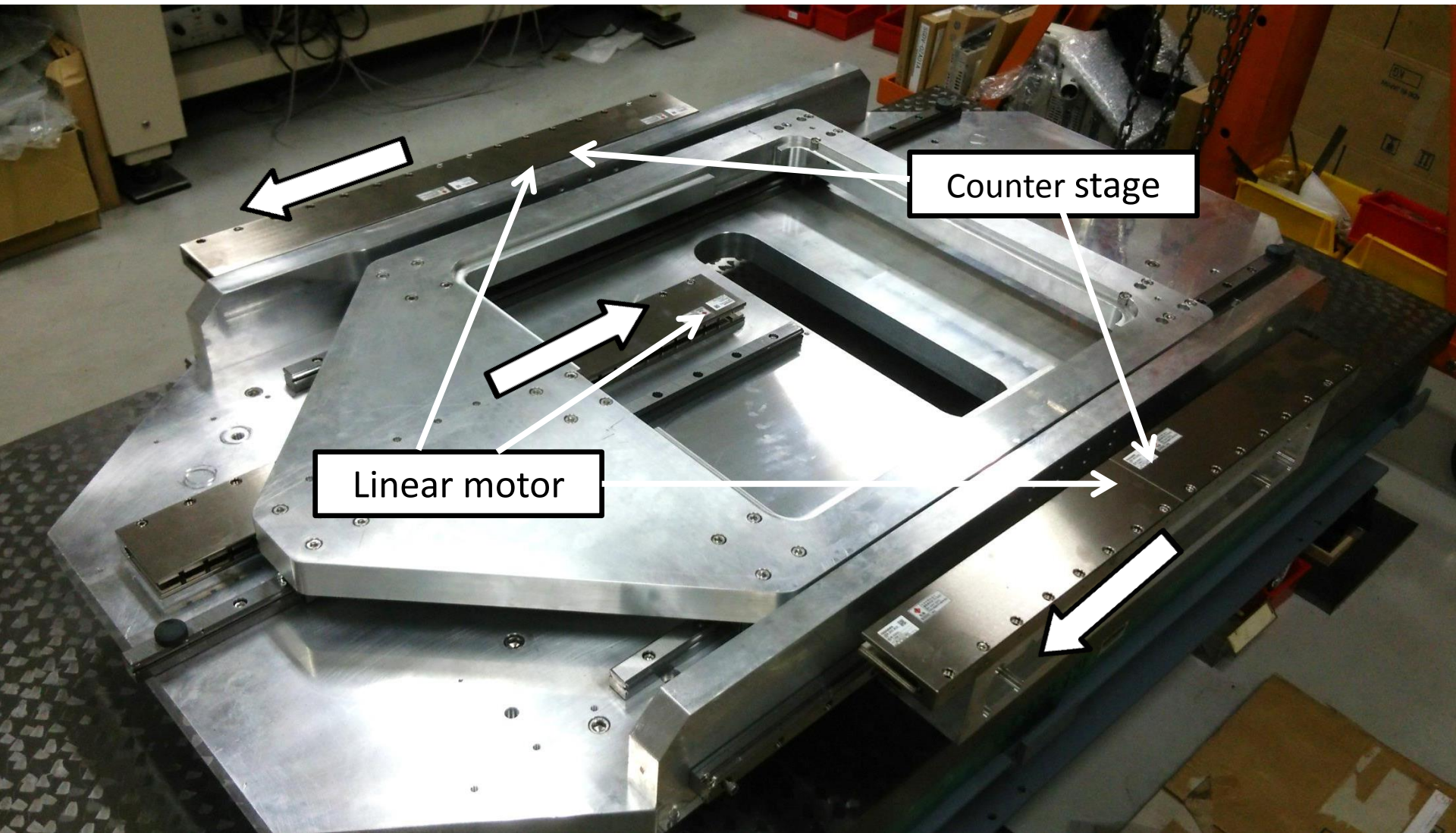
New stage : Large aperture



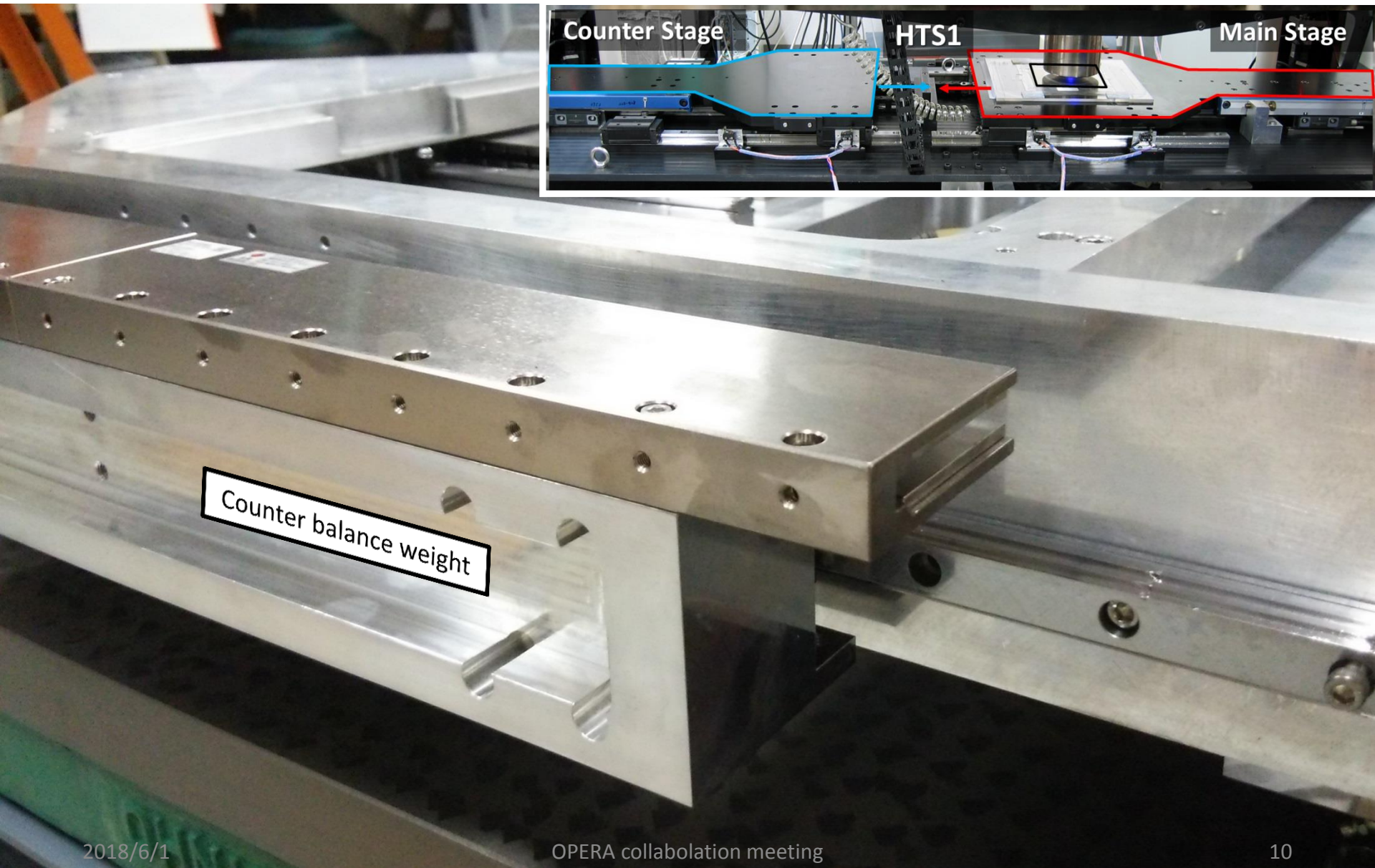
Assembling new stage



New stage : 300mm × 400mm stroke

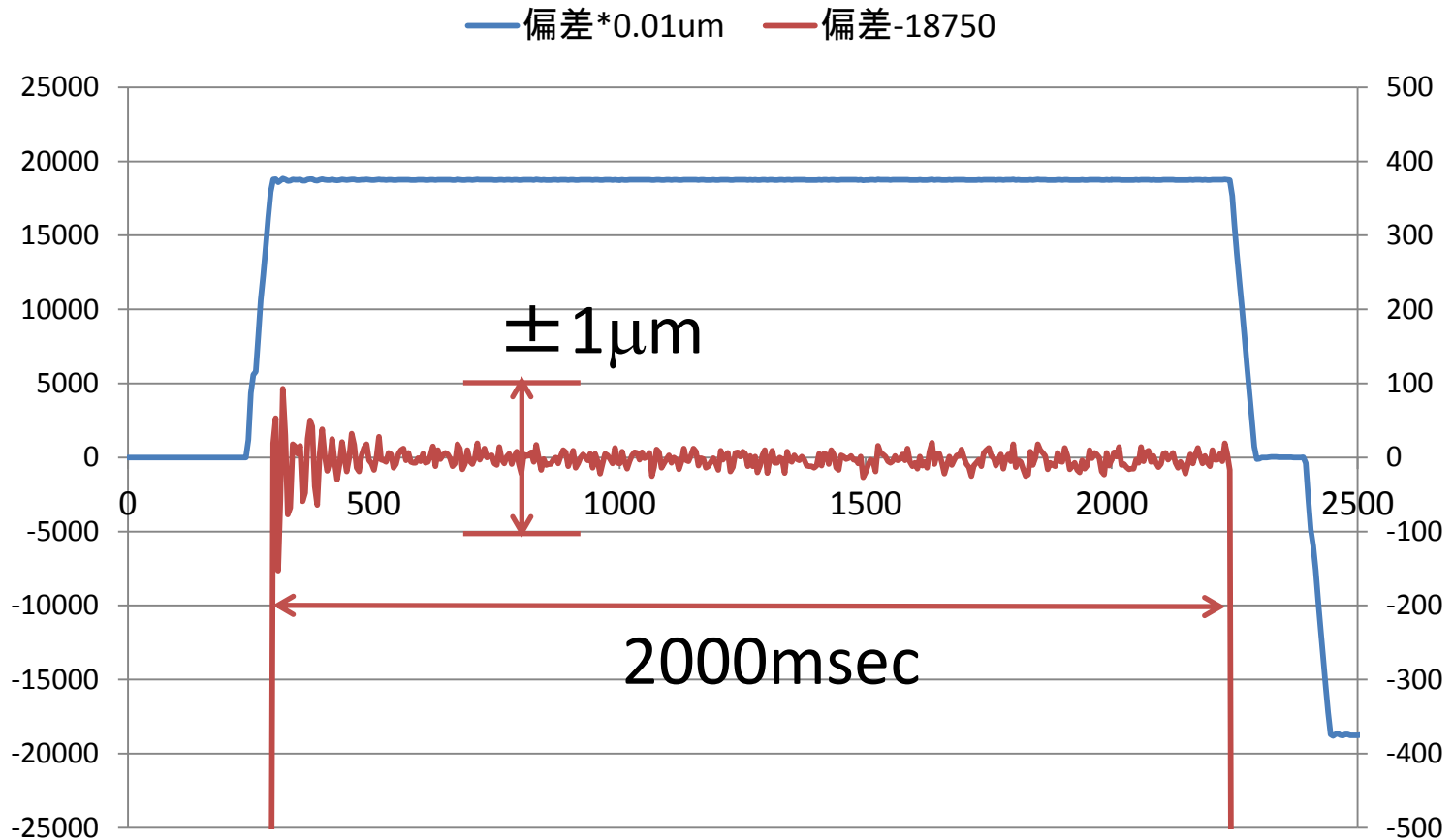


Counter stage mounted on both side wall



Speed uniformity check

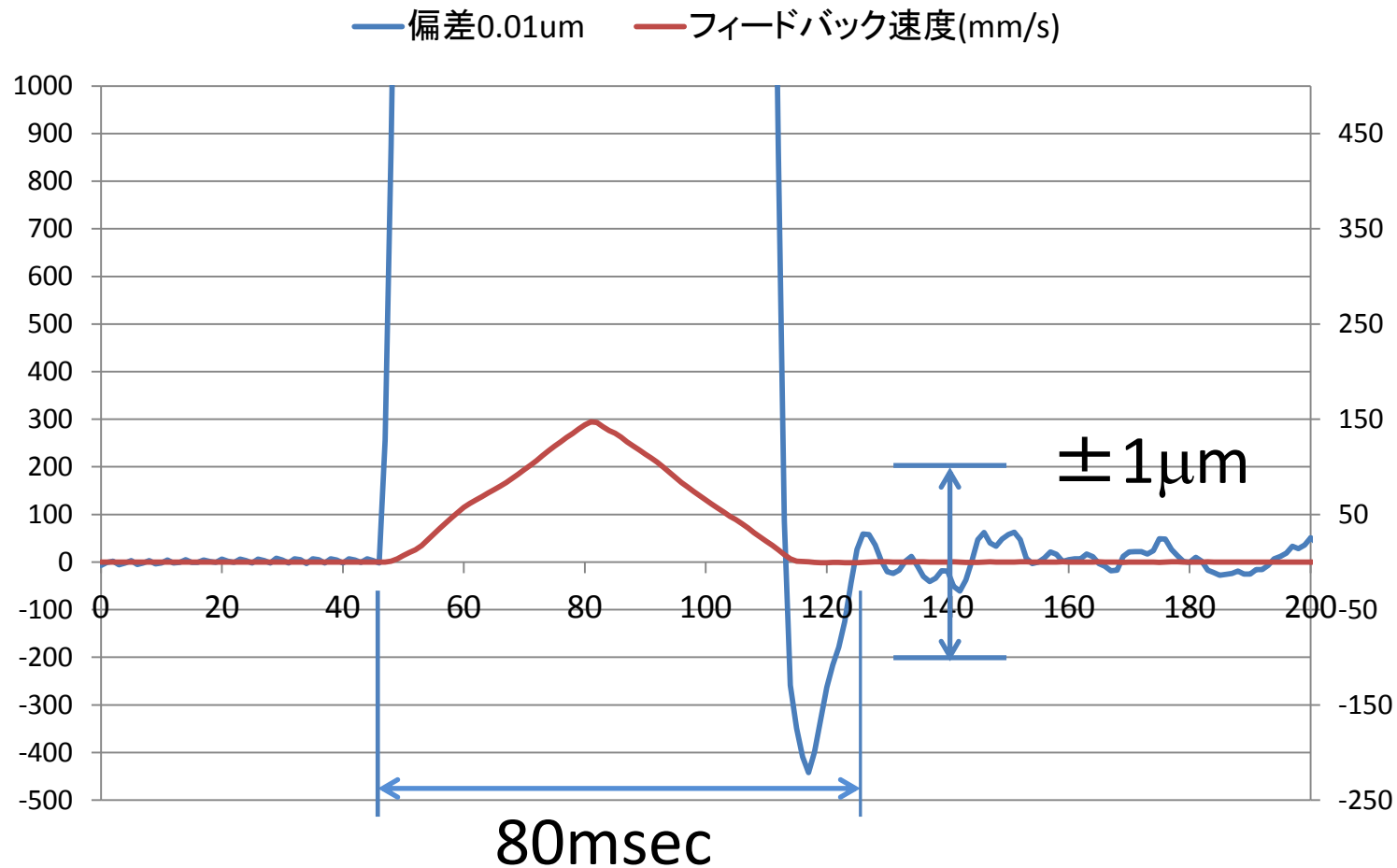
@100mm/s



Note: Not yet evaluated vibration etc.

Driving ability of stepping motion

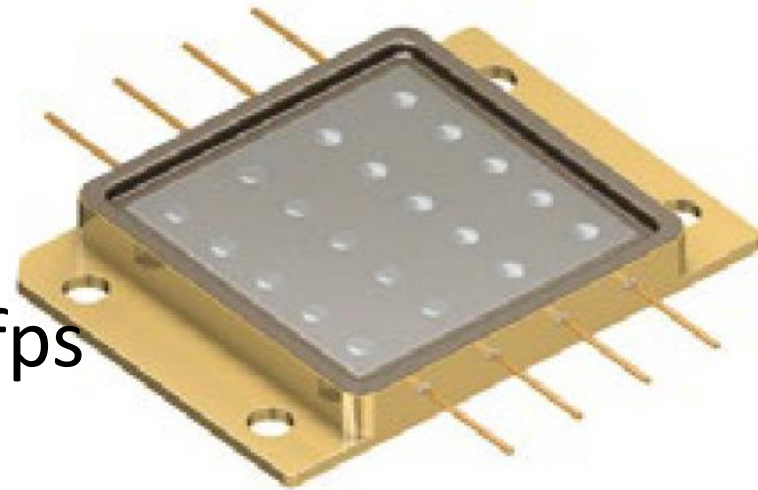
@5mm STEP



Illumination – pulse LD array

To acquire image while moving

- <2usec pulse light is required
- Peak power should be ~50W
- Repetition(frame) rate > 300 fps
- Duty cycle : 1:1000-3000
- Intensity will be controlled by PWM



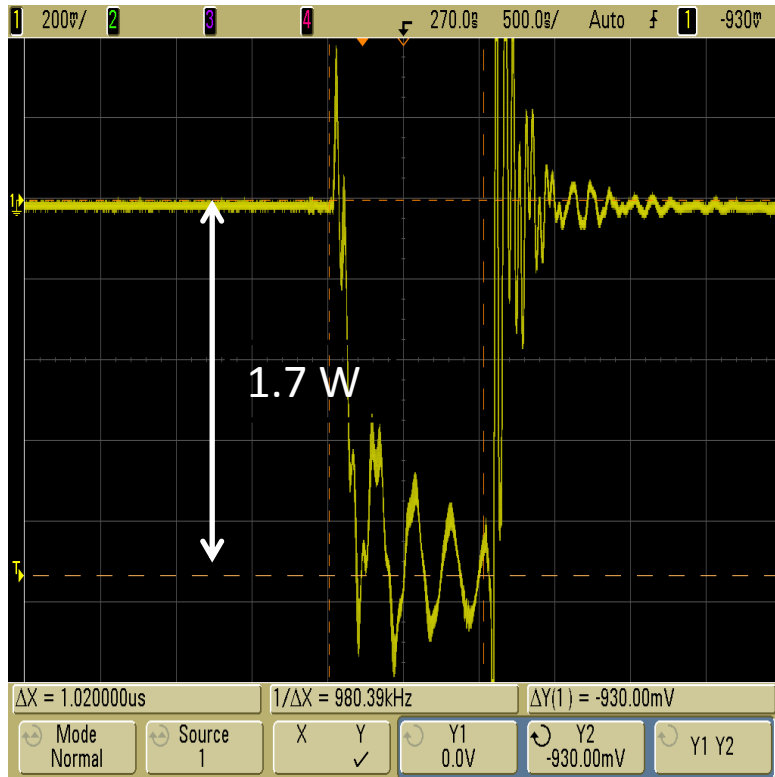
$\lambda \sim 445\text{nm}$

~20 collimated beam converge into a fiber light guide.

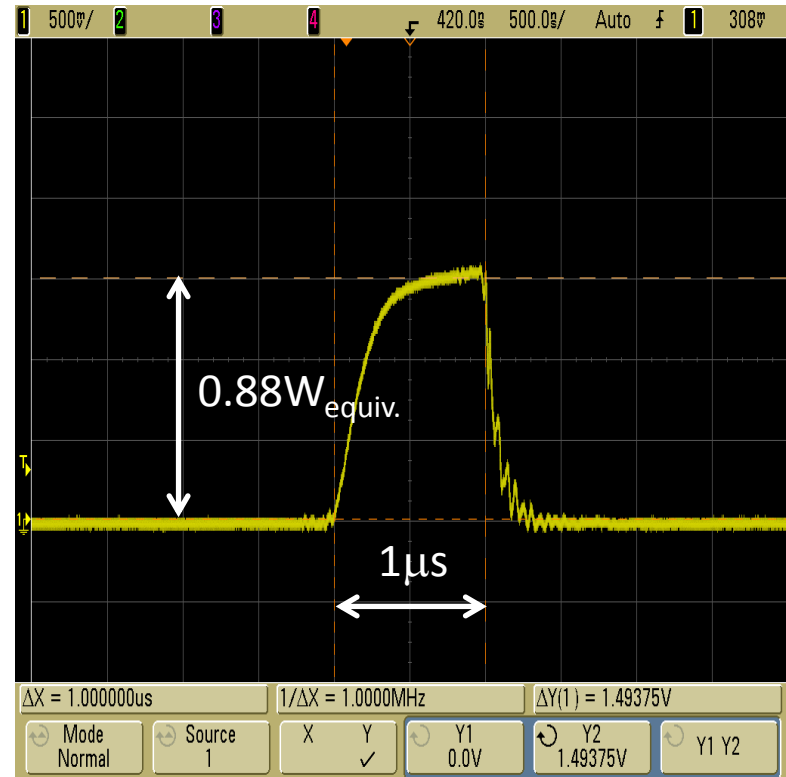
It acts as a laser decoherencer.

LD response

Input power for LASER diode
(Forward current)



Optical Power measurement with
Photo diode (with ND100)

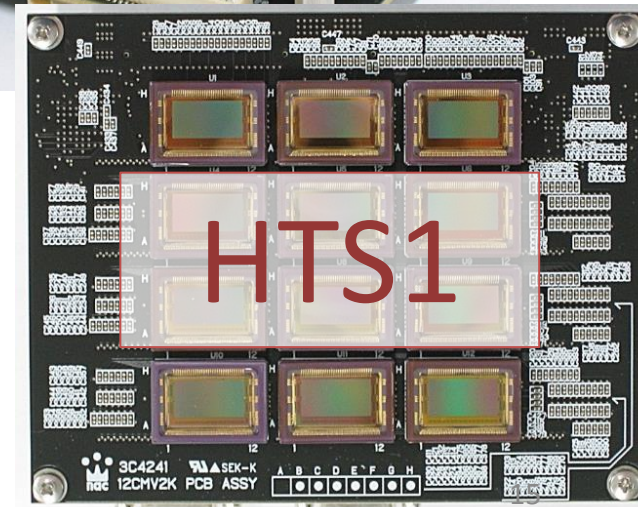
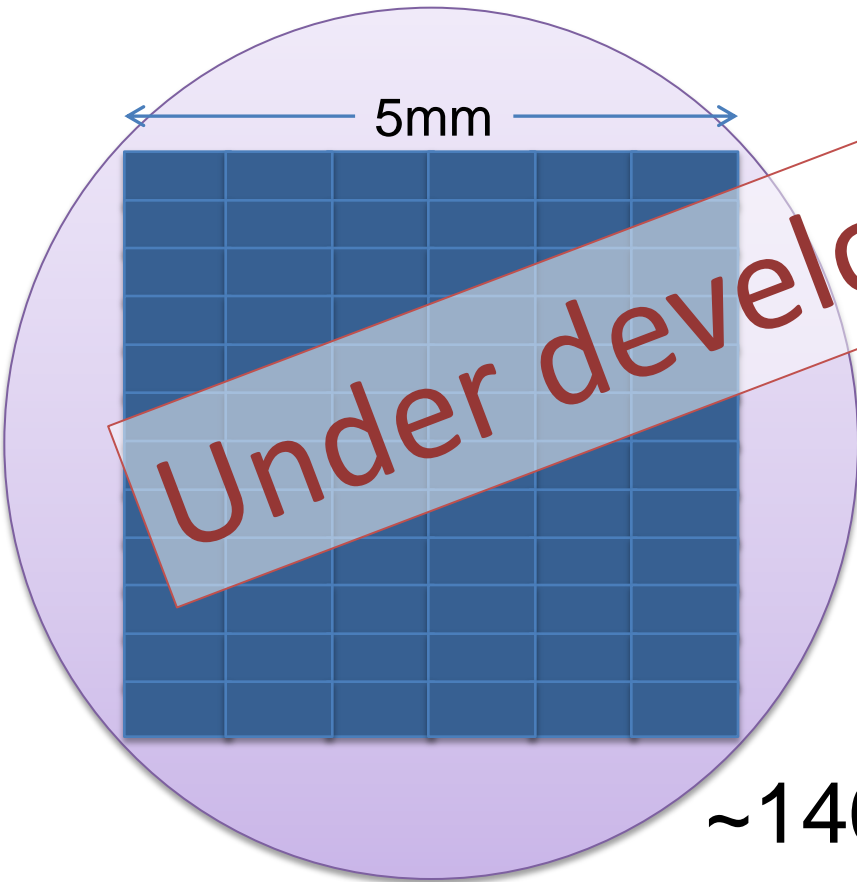


Note: Result is consistent with the photodiode response, LD is much faster.

Speed and Coverage of Mosaic Imager

Divide FOV into 72 parts.
Need 72 sensors of 2M pixel and 340fps.

Specially designed Mosaic Imager



~140M Pixels

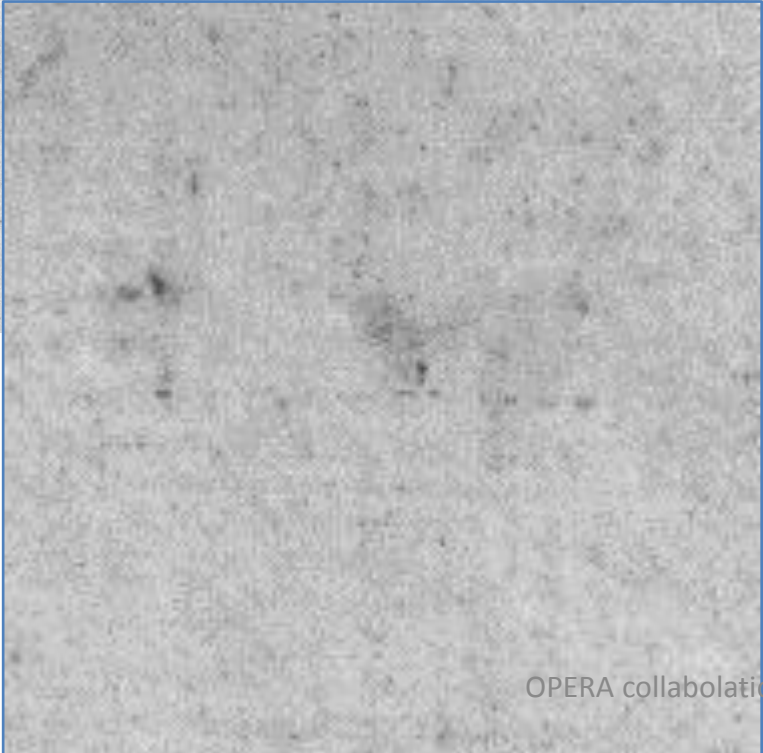
Conclusion

- Development of “HTS2” is going on.
 - Target scan speed : 2.5m²/h
 - Accept large emulsion films
- Status
 - New Stage has been constructed.
 - Optics has been delivered.
 - Imagers module is under development.

Commissioning will be started in the next year.



HgXe



PL TB450B 2nd L+D

