

ULTIMATE-Subaru Wide Field Imager

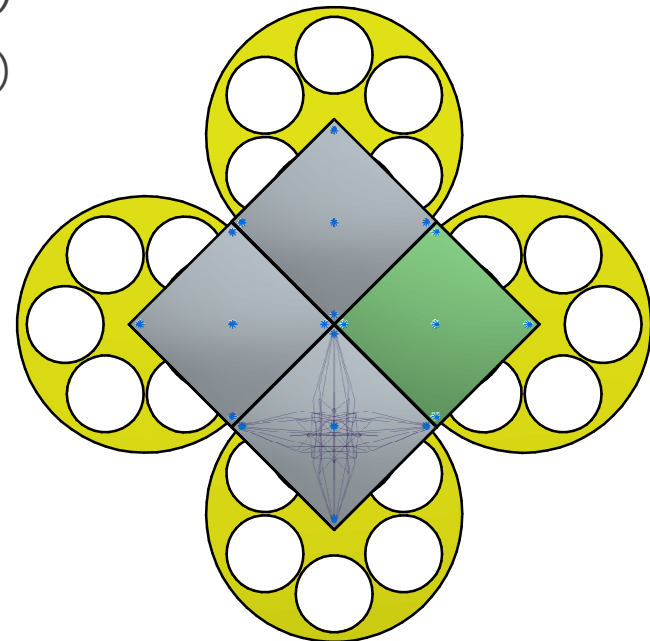
KENTARO MOTOHARA

ON BEHALF OF ULTIMATE-WFI TEAM

2020.03.31 (REVISION 2020.10.19)

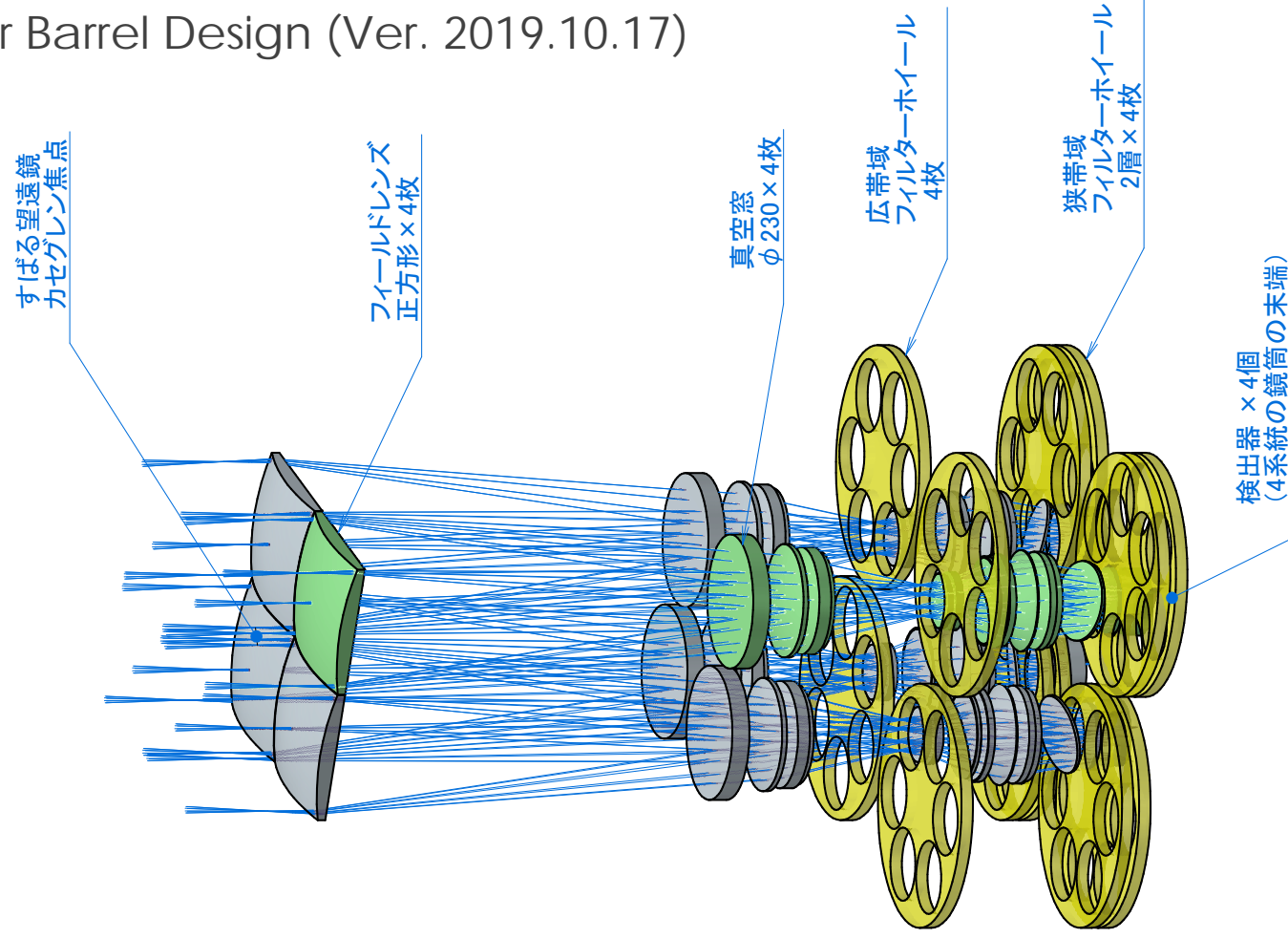
What is WFI?

- ▶ Wide Field Imager for ULTIMATE
- ▶ Cover 14'x14' with 4 H4RGs (8Kx8K)
 - ▶ 3x larger than VLT/HAWK-I (7.5'x7.5')
- ▶ ~0.1"/pix sampling
- ▶ Wavelength 0.9-2.5 μ m
- ▶ Various Filters
 - ▶ Y, J, H, Ks
 - ▶ MBFs (8-9), NBFs (~10)



Optics

▶ Four Barrel Design (Ver. 2019.10.17)



Optics (cont'd)

- ▶ 11 spherical lenses + cylindrical lens
- ▶ 1 arcmin gap at the center
- ▶ Total length ~1500mm
- ▶ Field Lens at room temperature

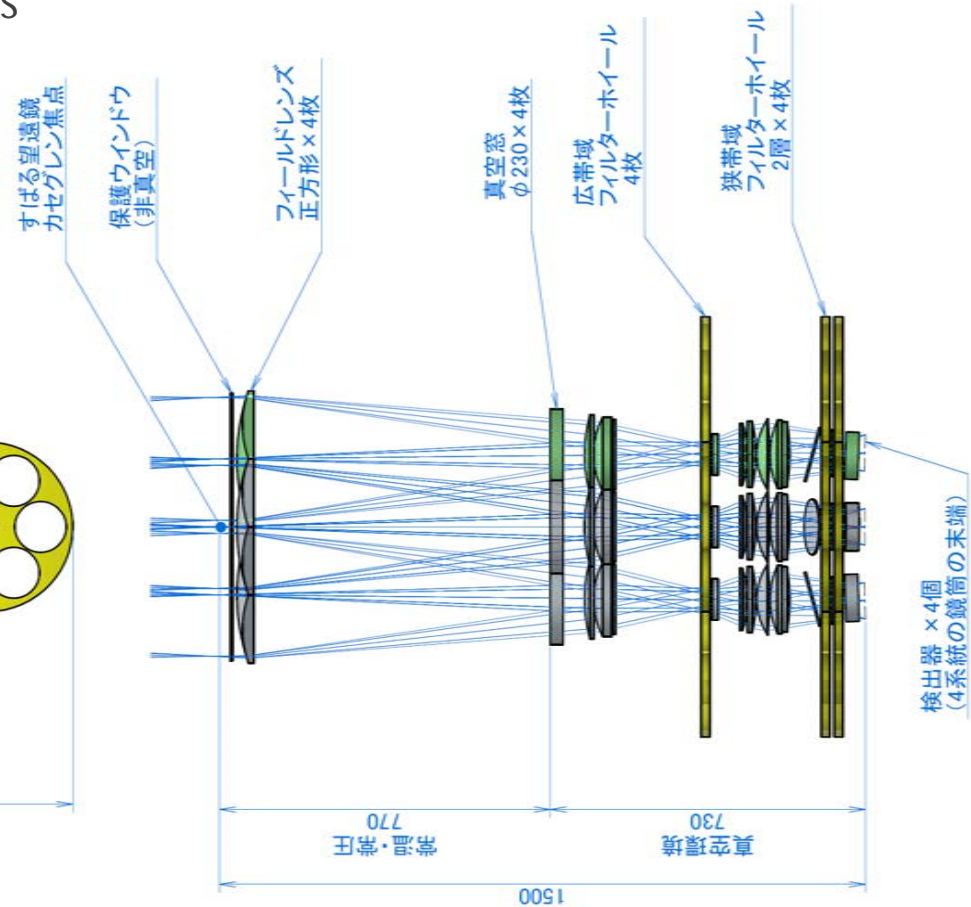
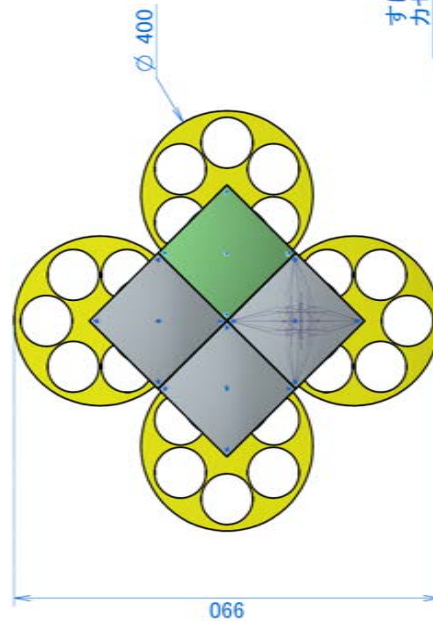
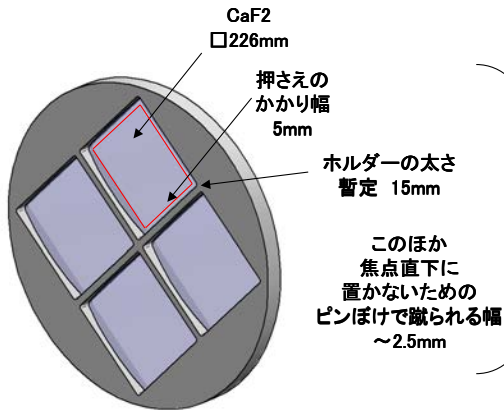
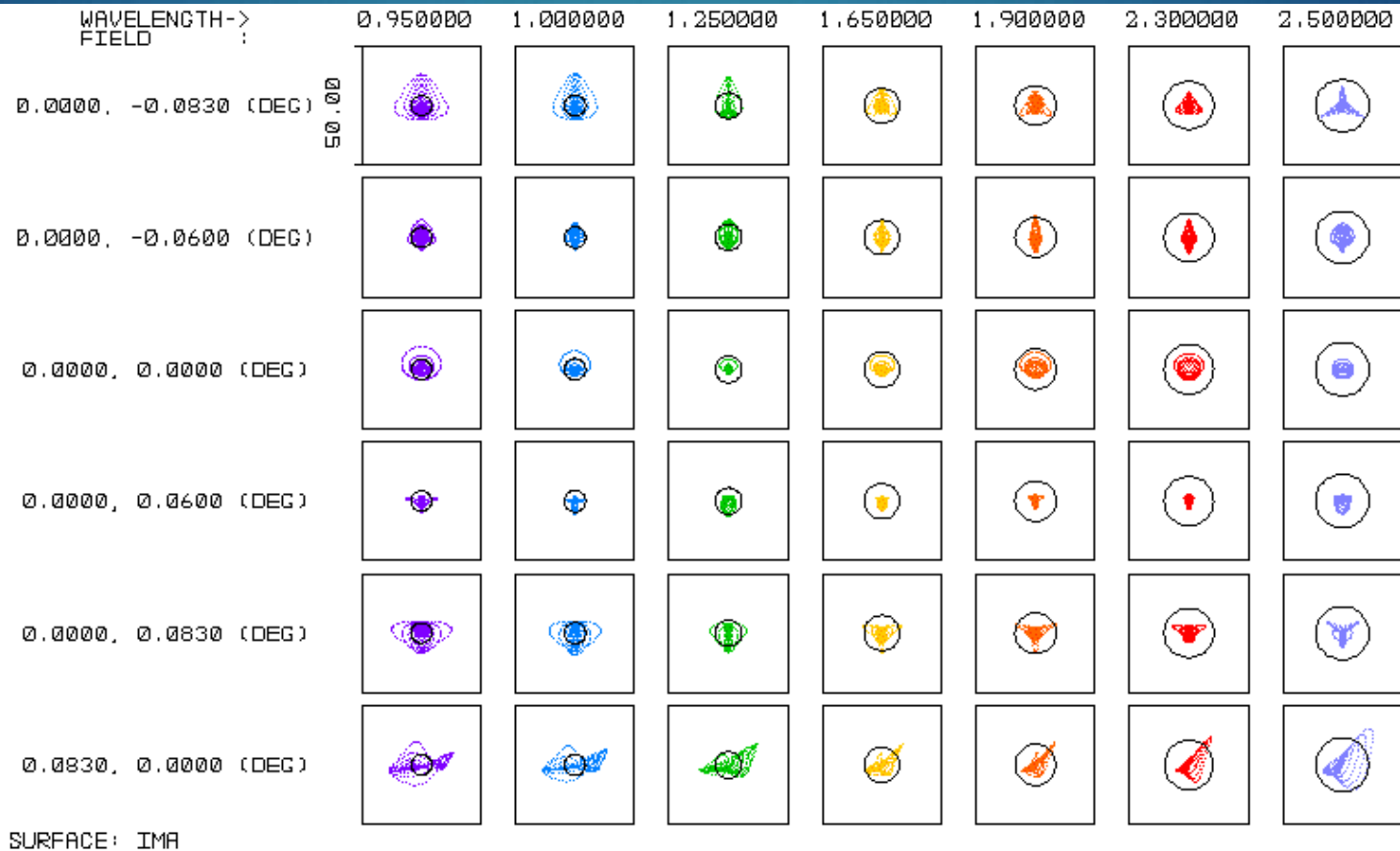


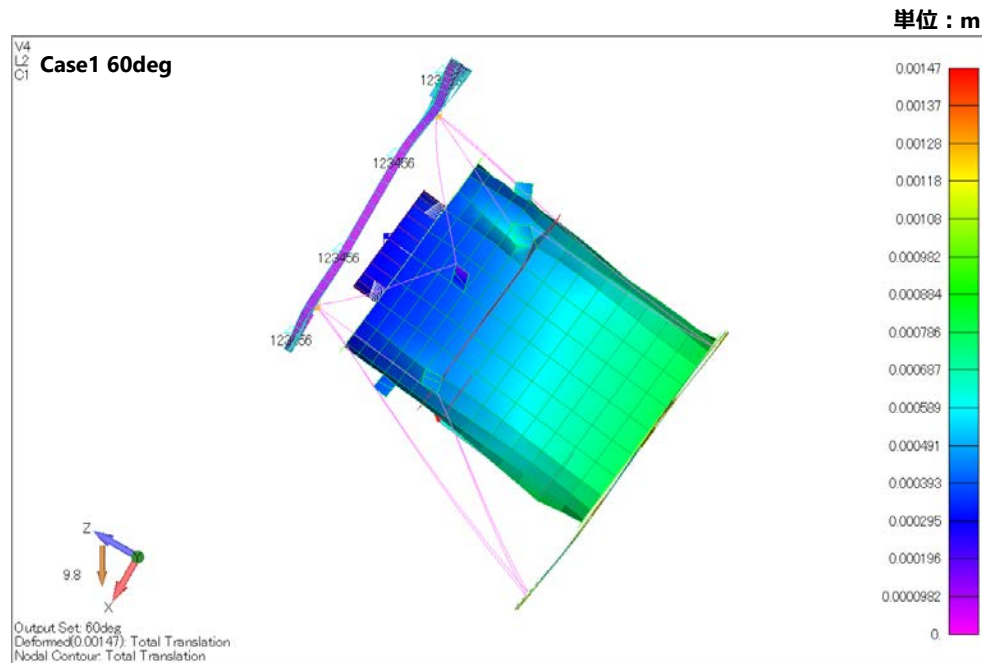
Image Quality



► RMS Spot Size 0.04" ~ 0.07" (8~13 μ m)

Gravitational Deformation

- ▶ Detector offsets are $\sim 0.8\text{mm}$ at elevation=60 degree
- ▶ Offset between the field lenses and the cryogenic lenses is max $\sim 0.5\text{mm}$
- ▶ Both seem not to cause serious problem, but detailed evaluation is necessary



Summary

- ▶ ULTIMATE-WFI will be the largest NIR imager for the 8m telescopes
 - ▶ FoV=14'x14'
 - ▶ 3x larger than VLT/HAWK-I
- ▶ Optical solution exists with four barrel optics
 - ▶ Image quality is less than 0.1"
 - ▶ optimized for the GLAO system
- ▶ Dewar design ongoing
 - ▶ Need some improvement for gravitational deformation