OS8 Preliminary CGI Results

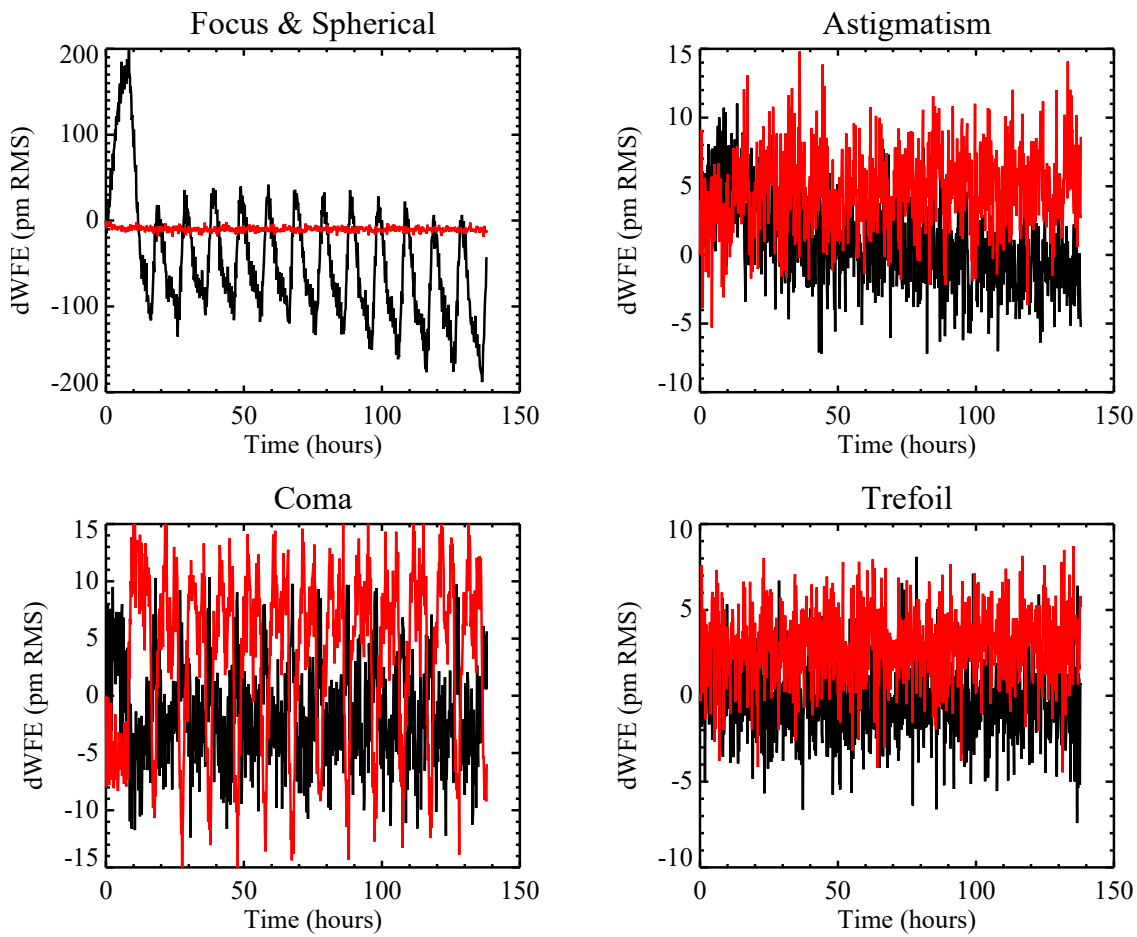
John Krist

Jet Propulsion Laboratory, California Institute of Technology
3 December 2019

© California Inst. of Technology. Government sponsorship acknowledged.

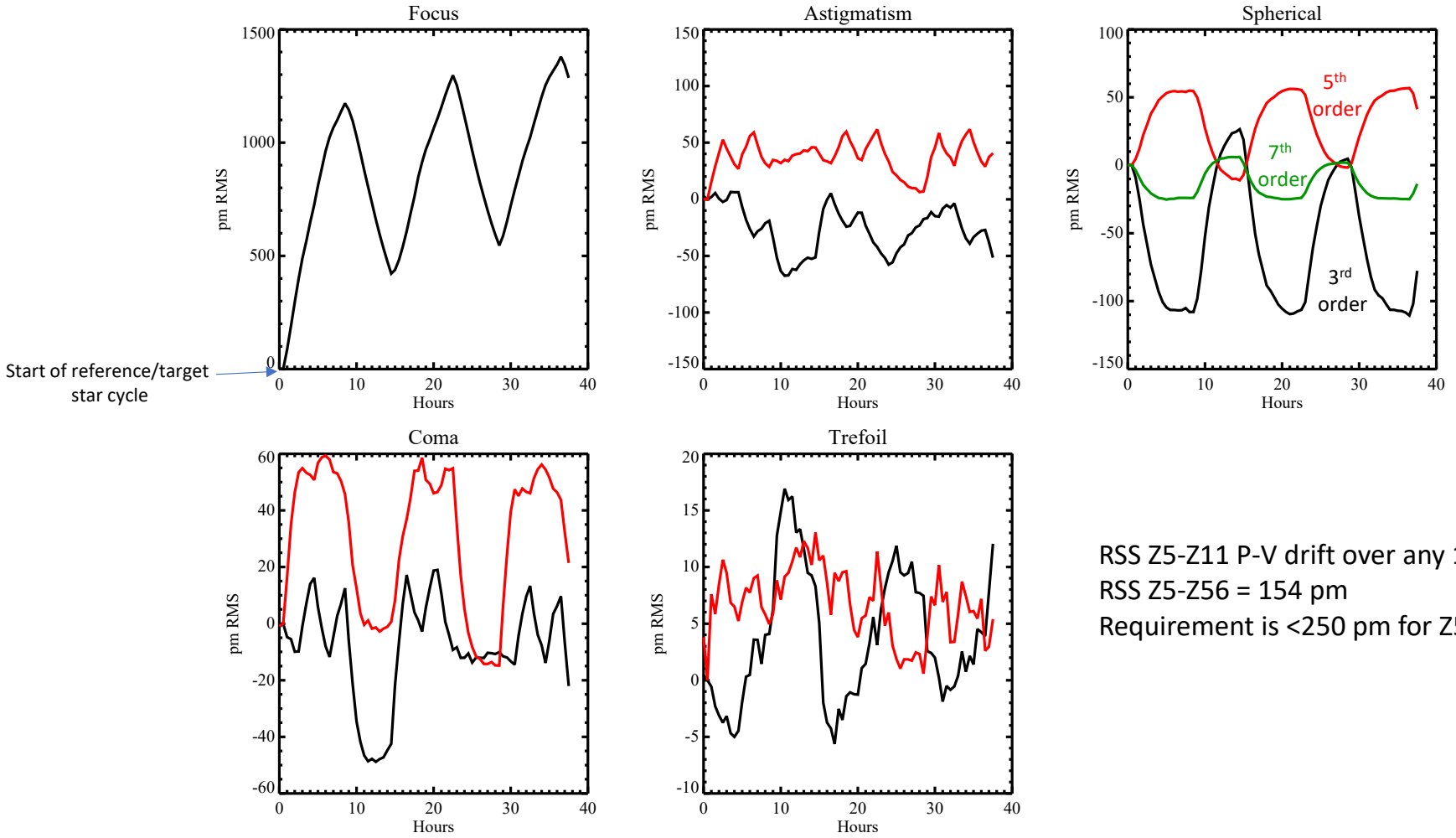
Phase A OS6 Low-Order WFE vs Time

2x structure MUF



Phase B OS8 Low-Order WFE vs Time

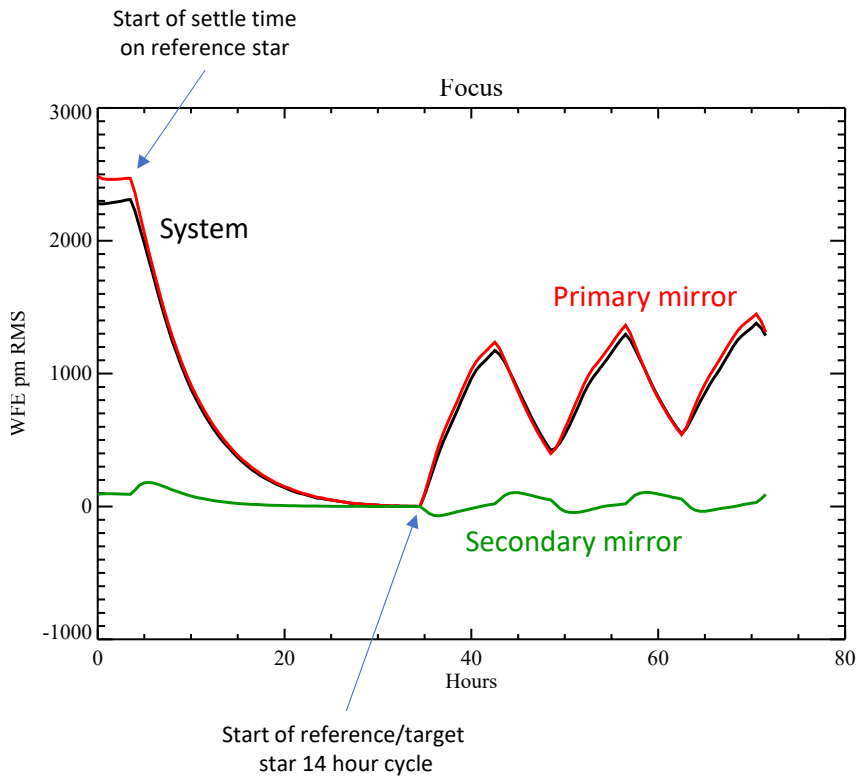
2x structure MUF

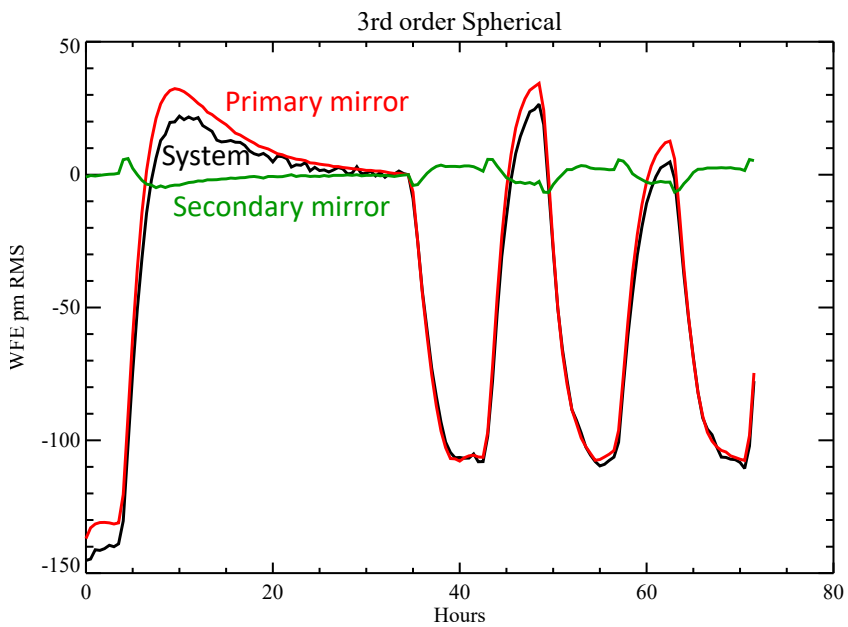


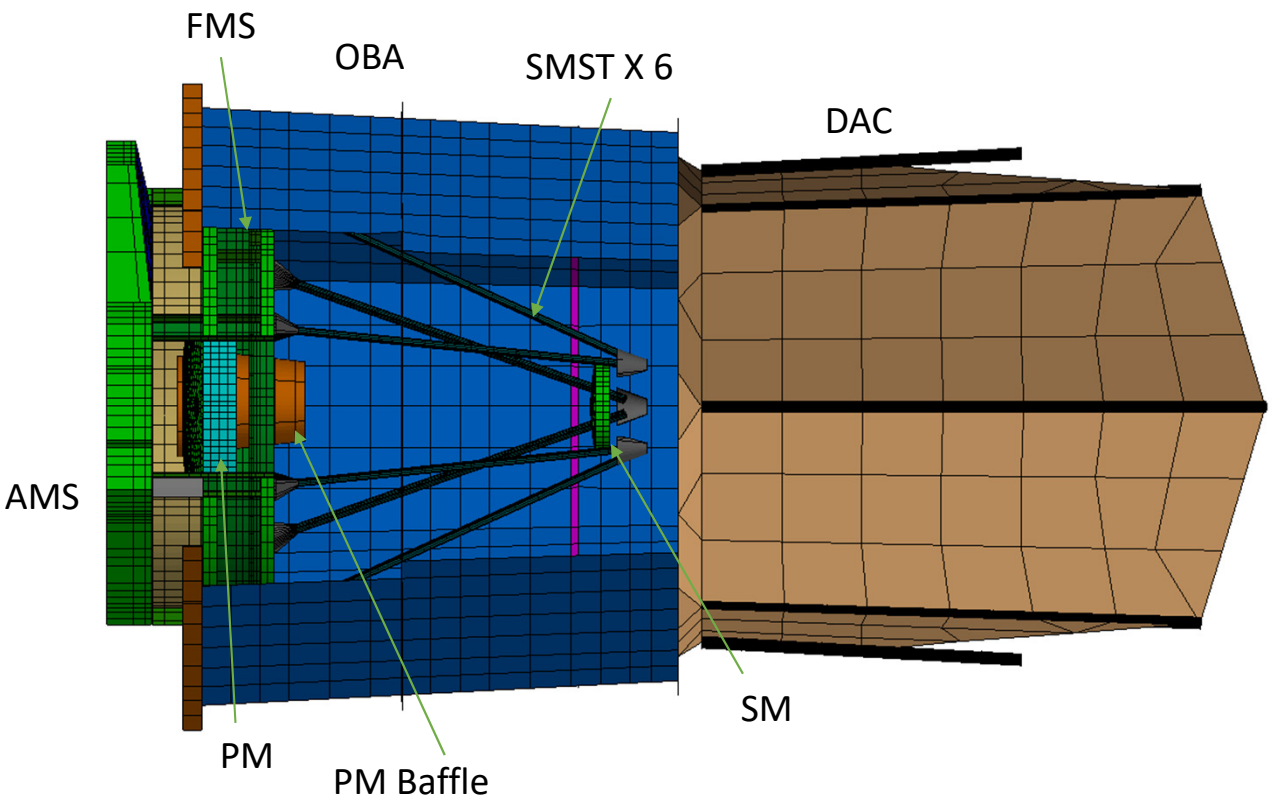
RSS Z5-Z11 P-V drift over any 10 h = 141 pm
RSS Z5-Z56 = 154 pm
Requirement is <250 pm for Z5-Z11.

WFE vs Time: System & Optic Deformation

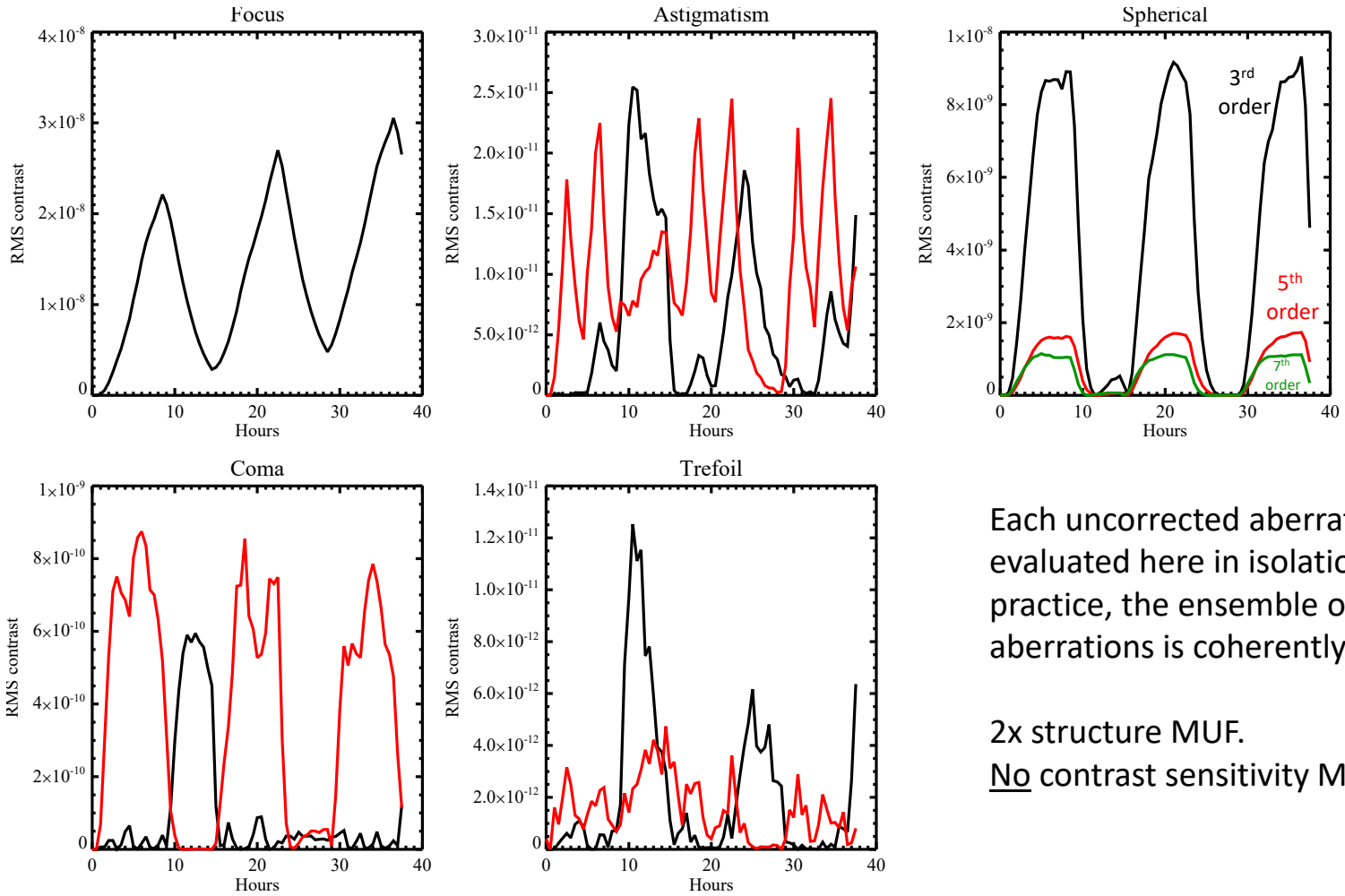
2x structure MUF






FMS
OBA
SMST X 6
DAC
AMS
PM
PM Baffle
SM

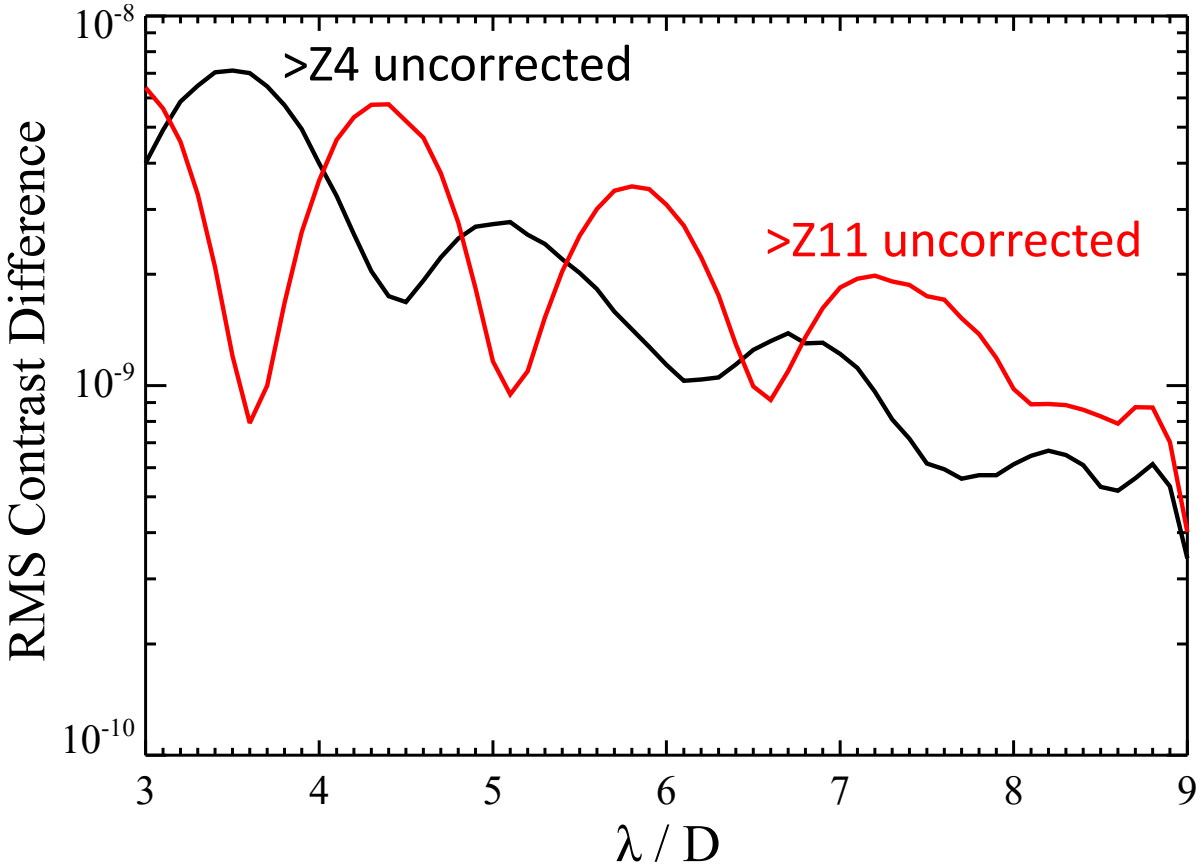
Phase B OS8 ΔContrast (3-4 λ/D) vs Time



Each uncorrected aberration is evaluated here in isolation; in practice, the ensemble of aberrations is coherently summed.

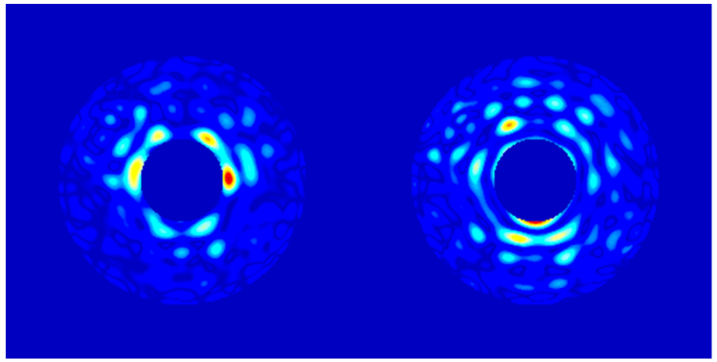
2x structure MUF.
<u>No</u> contrast sensitivity MUF (2x).

Reference – Target Contrast Differences
HLC; 2x structure MUF, no sensitivity MUF



ABS(contrast change)

>Z4 uncorrected >Z11 uncorrected



Only aberration changes are included.
No shear or jitter.

Summary

- Note: The results presented here neglect WFE changes due to secondary mirror misalignment due to macro bug (being fixed) in JPL pipeline, but such misalignment would not be dominant
- Wavefront variations are generally an order of magnitude greater in Phase B OS8 than in Phase A OS6
- Wavefront variations are dominated by primary mirror thermal distortion
  - These are a consequence of the revised model, not the observing scenario
- Focus and Z5-Z11 variations are within interface requirements
- Unexpectedly large 5th and 7th order spherical variations in the primary are the major contrast instability drivers
  - these cannot be sensed and corrected accurately by LOWFS/C due to cross-talk with other aberrations
- Beam walk effects have not been evaluated yet