An Introduction to the Roman Space Telescope

Relative Calibration System

Ben Rose

Duke Cosmology Journal Club

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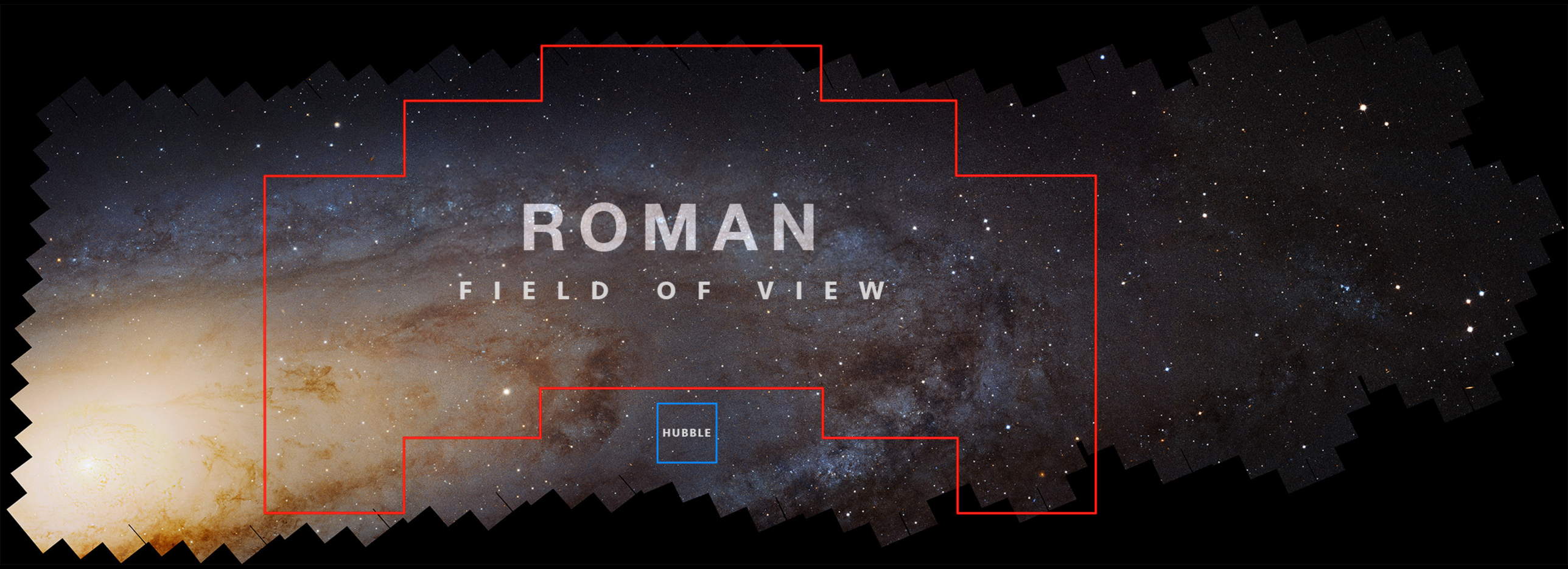
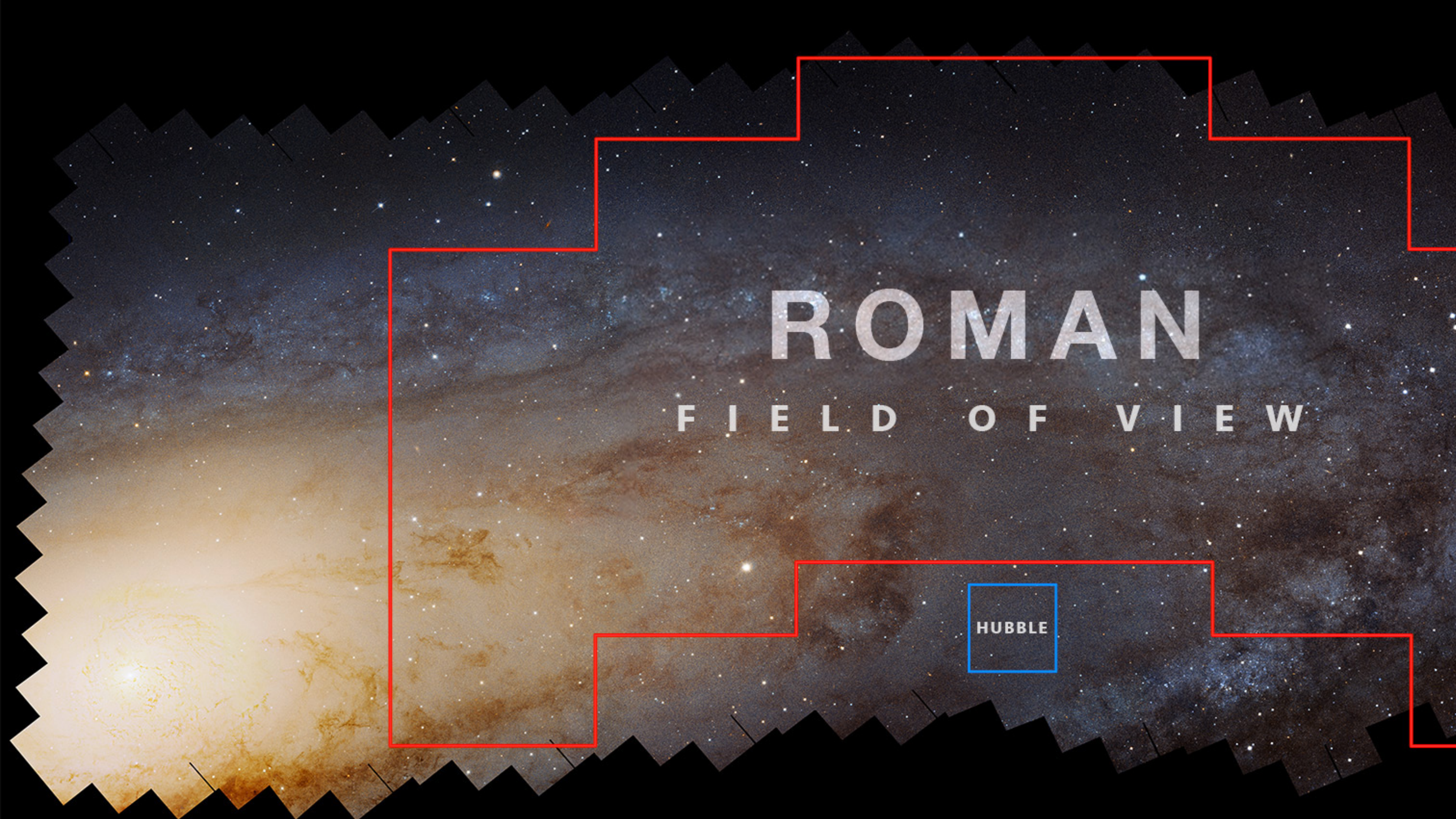

ROMAN
FIELD OF VIEW
HUBBLE


ROMAN
FIELD OF VIEW
HUBBLE


OMAN
D OF VIEW
HUBBLE

SN Science Requirement

SN 2.2.3: WFIRST shall be capable of providing photometric calibration accuracy such that the reported flux from a source of AB 26th mag is 25,119±75 times fainter than an AB 15th mag source, after calibration

SN Science Requirement

SN 2.2.3: WFIRST shall be capable of providing p t the r g is 2 ag source, after calibration

<0.3% uncertainty across 4 orders of magnitude in flux

WL Science Requirement

HLIS 2.0.4: WFIRST shall enable shear measurements with multiplicative shear errors M shall be known to

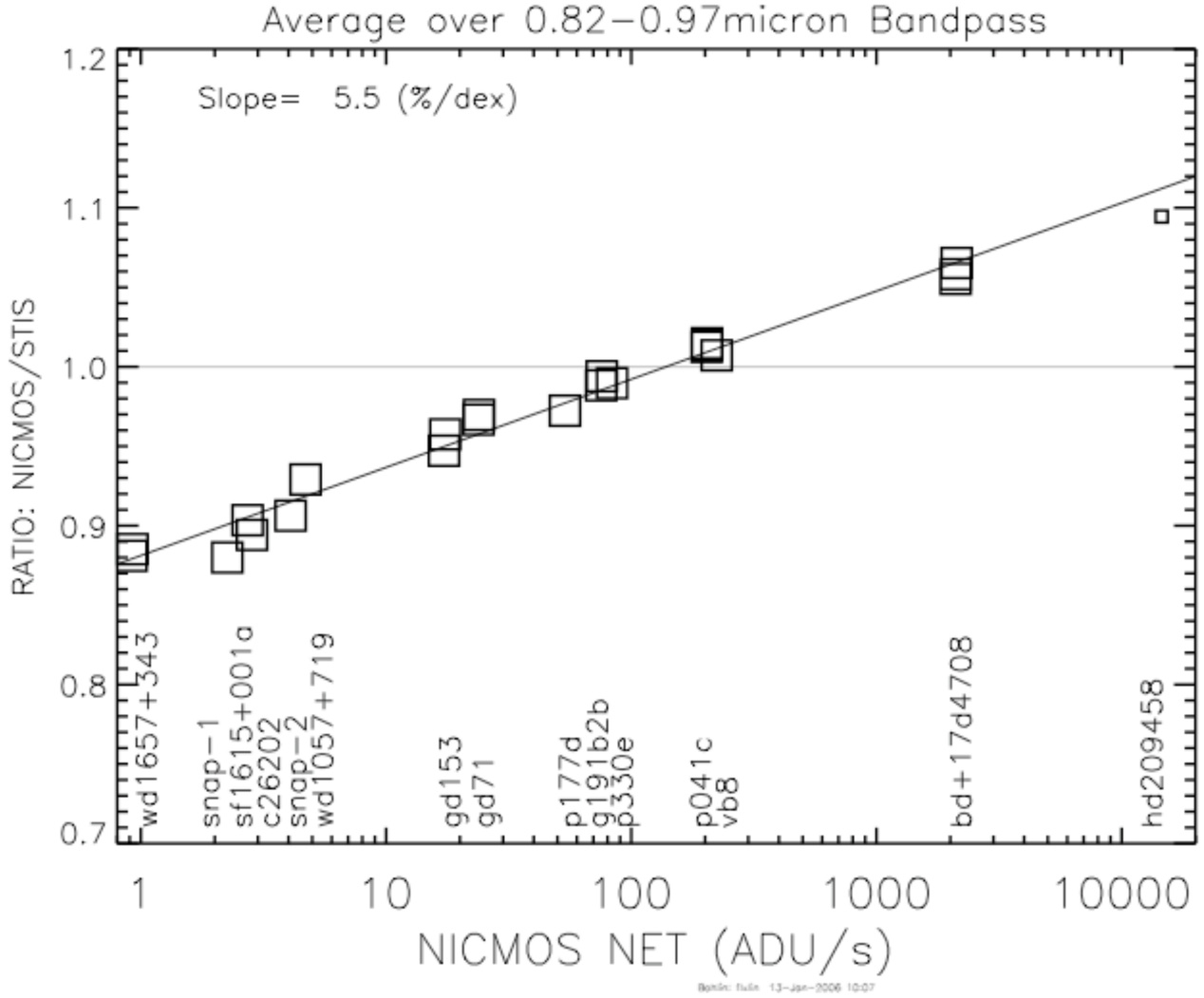
$$\sqrt{\Sigma M^2 S} < 3.2 \times 10^{-4}$$

where the sum is over independent terms in the multiplicative systematic budget.

Count Rate Non-Linearity

Count Rate Non-linearity

Making bright objects look brighter and faint object look fainter since NICMOS.



Count Rate Non-linearity

SN

CRNL mimics
Dark Energy

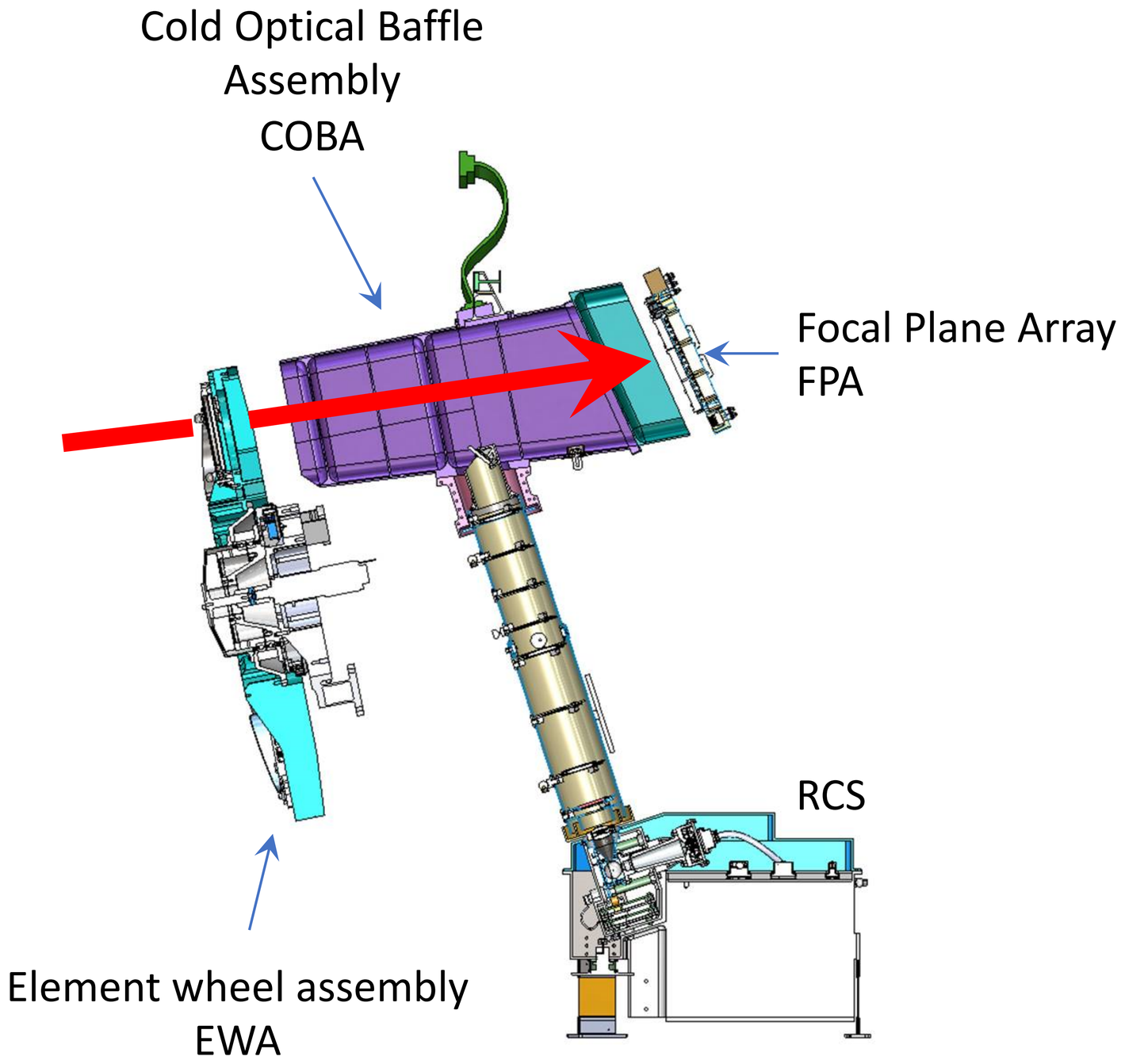
WL

CRNL effects
PSF uncertainty

CRNL can change:

1. with time
2. across the focal plane
3. as a function of wavelength

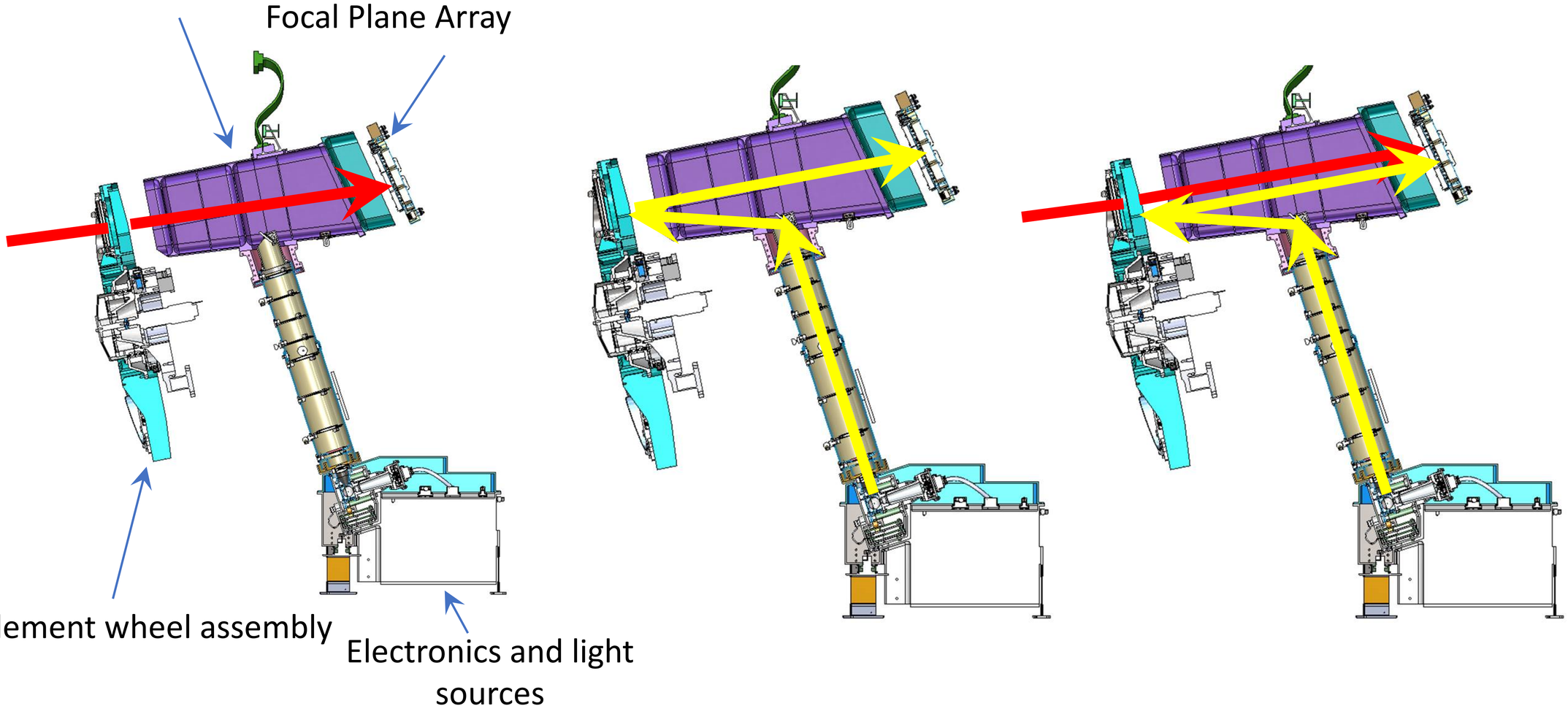
Relative Calibration System


Cold Optical Baffle
Assembly
COBA
Focal Plane Array
FPA
RCS
Element wheel assembly
EWA

RCS Off
Light from telescope only

RCS Direct Mode
Light reflects from diffuser on the back of the dark filter
No light from telescope

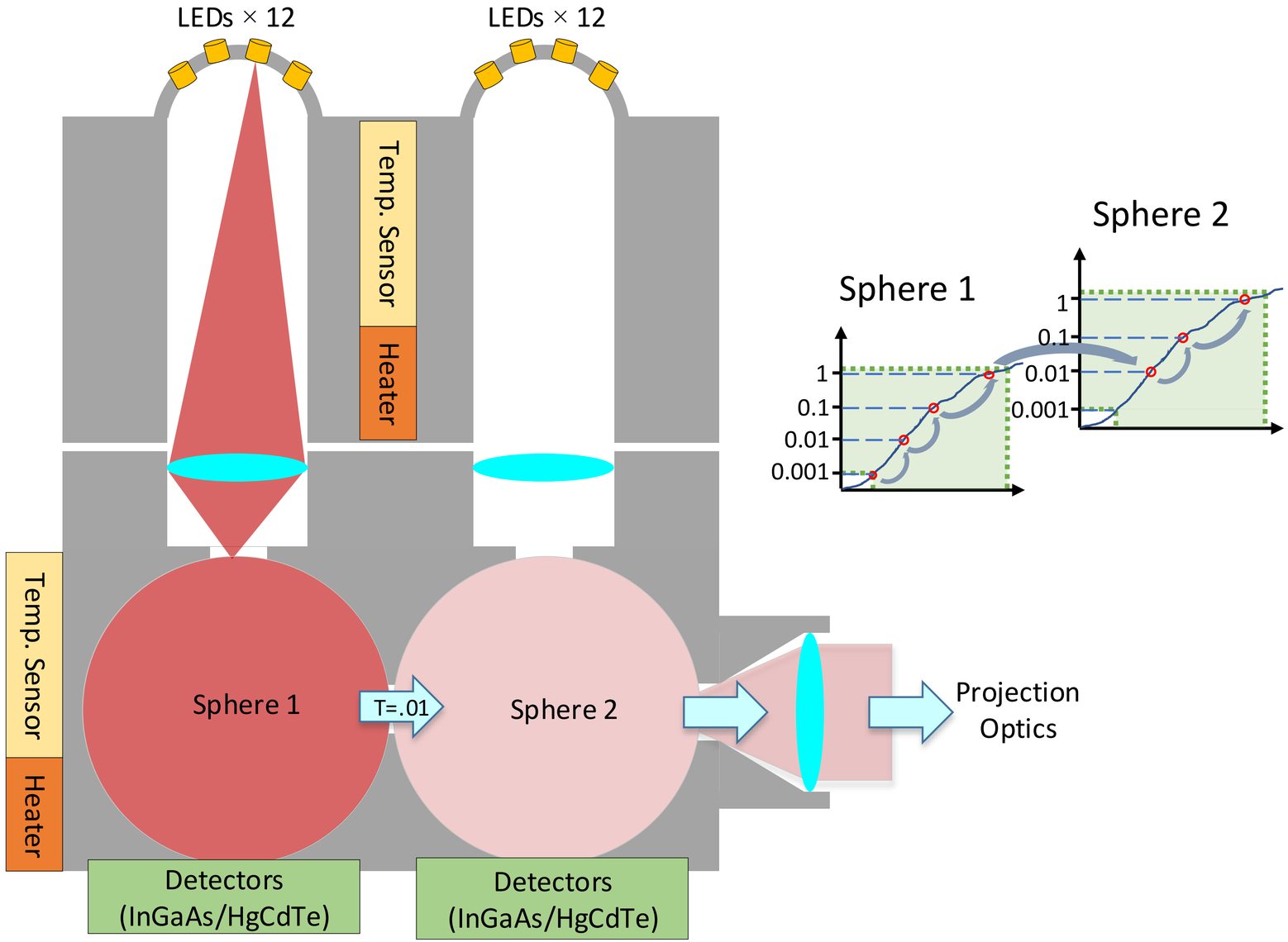
RCS Lamp-on/Lamp-Off
Light reflects from diffuser on the back of pupil mask + beam from telescope



RCS Architecture

12 LEDs per sphere
6 primary & 6 redundant

6 Wavelengths:
620 nm
880 nm
1070 nm
1300 nm
1550 nm
1750 nm



Risks

1. Loss of all LEDs in one wavelength
2. Loss of peak flux at more than one wavelength
3. Loss of flux ratio knowledge
4. Loss of flux stability, but have knowledge of its fluctuations

Current Status

In ~2 weeks - Internal Peer review of risk mitigation strategies

December 2020 - Final Design Review

Late 2021 - Integrated into Wide Field Instrument