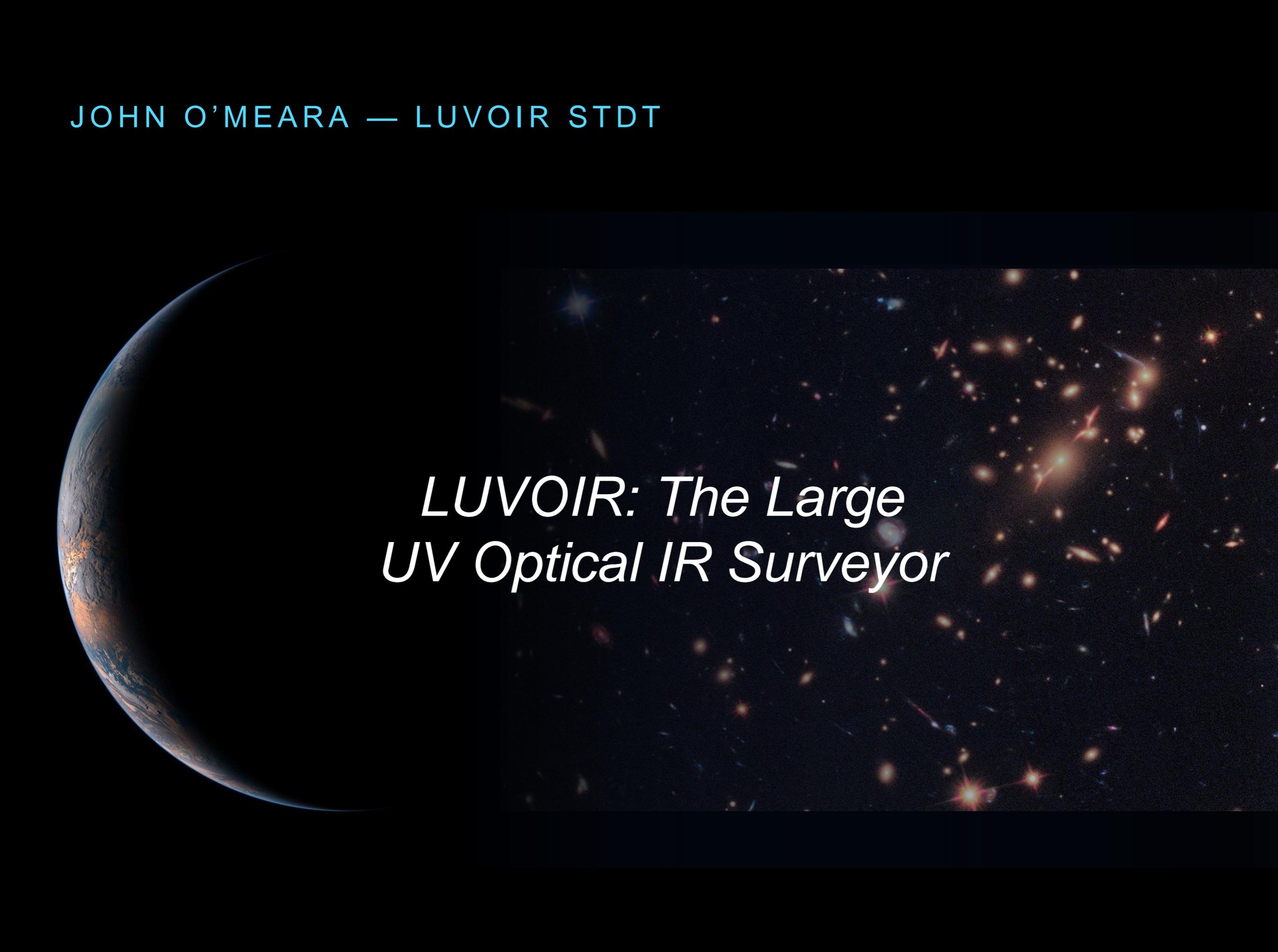


JOHN O'MEARA — LUVOIR STDT



*LUVOIR: The Large
UV Optical IR Surveyor*

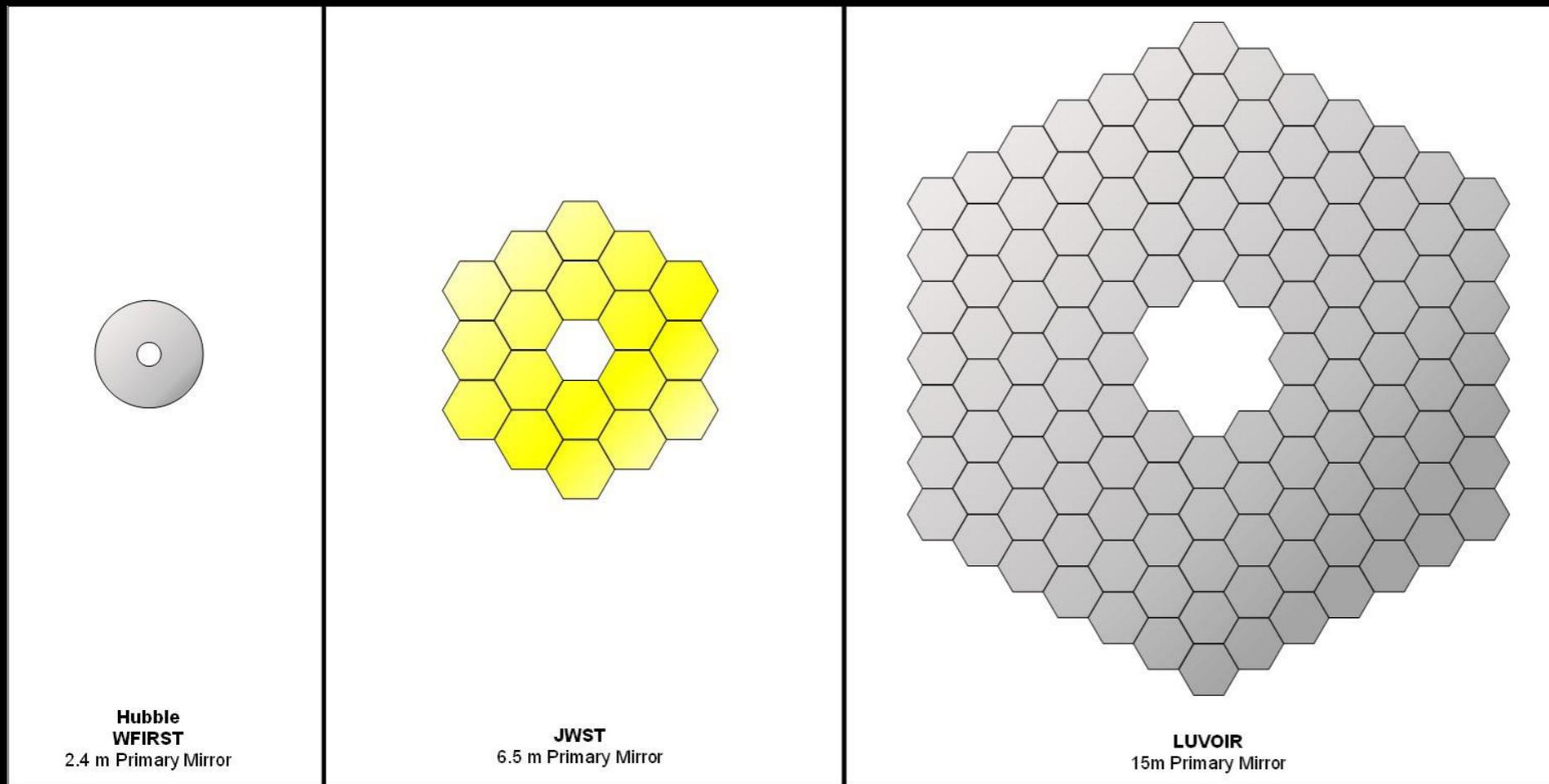
LUVOIR IN A NUTSHELL

- It's Large.
- It's Powerful.
- It's Serviceable.
- It's Open.

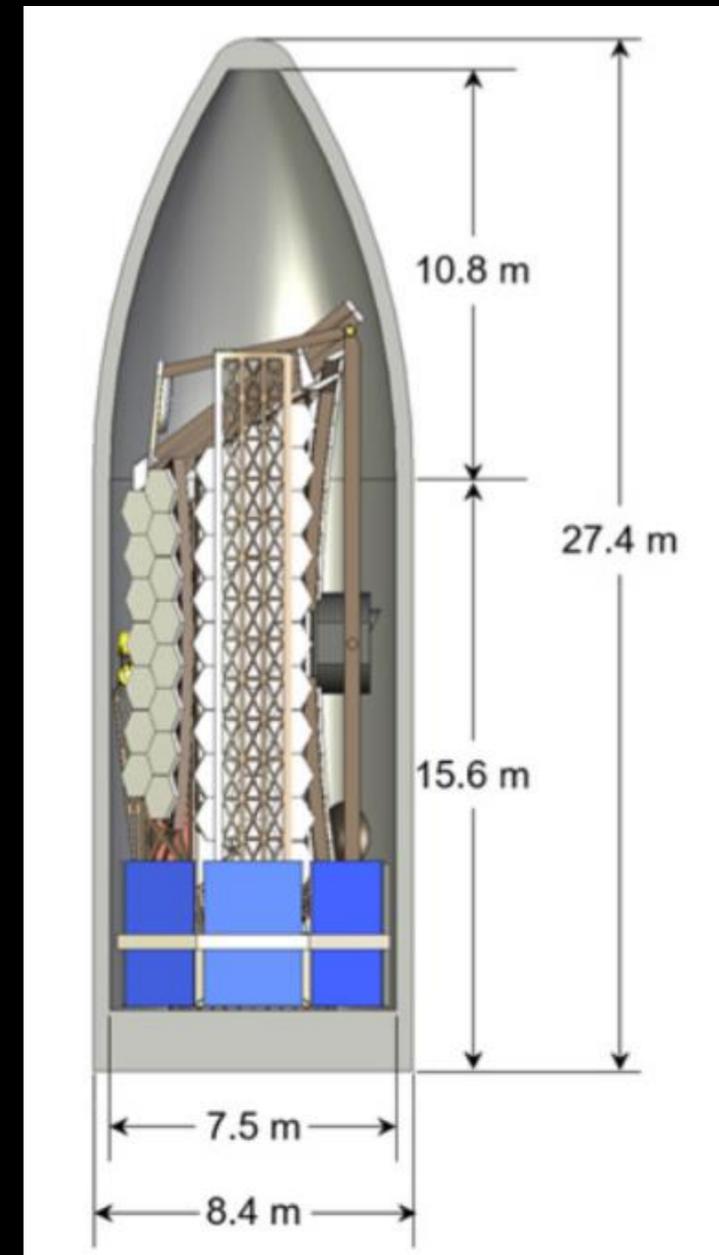
LUVOIR IN A NUTSHELL

- It's Large.
- It's Powerful.
- It's Serviceable.
- It's Open.

IT'S LARGE



LUVOIR-A



LUVOIR-A + SLS Block 2 Fairing

LUVOIR IN A NUTSHELL

- It's Large.
- It's Powerful.
- It's Serviceable.
- It's Open.

IT'S POWERFUL

- 4 instruments being studied for architecture A
 - **ECLIPS**: High contrast NUV/VIS/NIR coronagraph with imaging and integral field spectroscopy
 - **HDI**: Nyquist sampled dual-channel (NUV/VIS, NIR) 2'x3' imager
 - **LUMOS**: FUV/NUV Multi-object spectrograph and FUV imager
 - **POLLUX**: (European Instrument Study): High resolution UV spectropolarimeter

HDI SPECIFICS (LUVOIR-A)

UVIS channel: 200 – 950 nm

Field of view 2 x 3 arcmin @ 2.73 mas/pixel

2.68 Gigapixel array (40 8K x 8K detectors in 5 x 8 pattern)

Filter wheel assembly provides 52 slots

4 wheels x 13 slots/wheel

CMOS-based detectors assumed

NIR channel: 800 – 1800 nm (with stretch goal of 2200 nm)

Field of view 2 x 3 arcmin @ 8.20 mas/pixel

335 Megapixel array (20 4K x 4K detectors in 4 x 5 pattern)

Filter wheel assembly provides 30 slots

3 wheels x 10 slots/wheel

HgCdTe based detectors assumed

HDI SPECIFICS (LUVOIR-A)

Angular Resolution:

UVIS channel is Nyquist sampled at 400 nm
2.73 mas/pixel (15.1m), 4.45 mas/pixel (9.3m)
FWHM @ 500 nm = 7.0 mas (15.1m), 11.5 mas (9.3m)

NIR channel is Nyquist sampled at 1200 nm
8.20 mas/pixel (15.1m), 13.35 mas/pixel (9.3m)
FWHM @1200 nm = 16.9 mas (15.1m), 27.5 mas (9.3m)

OTA provides diffraction-limited performance to 500 nm

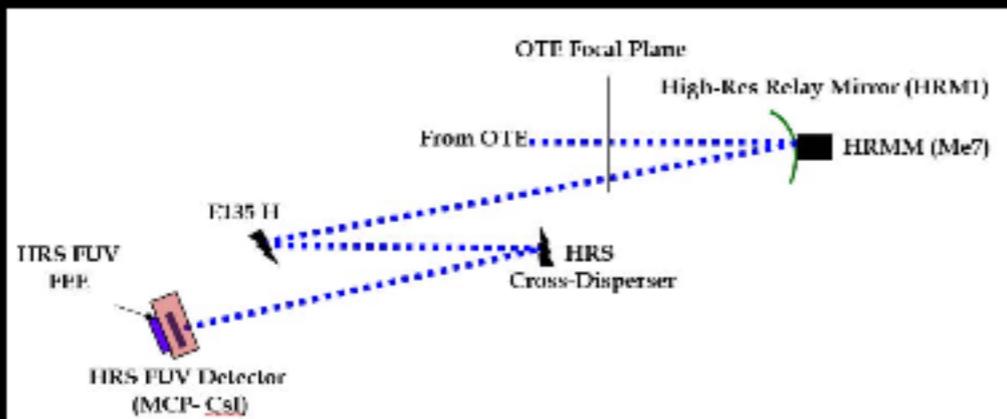
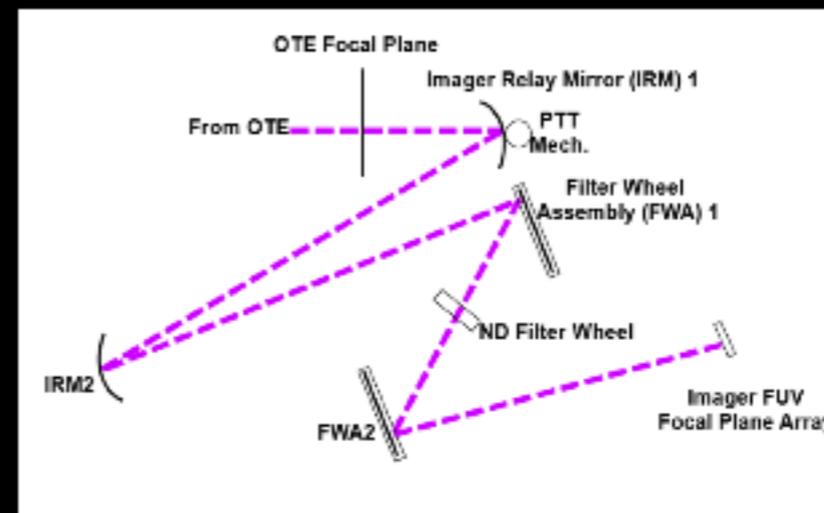
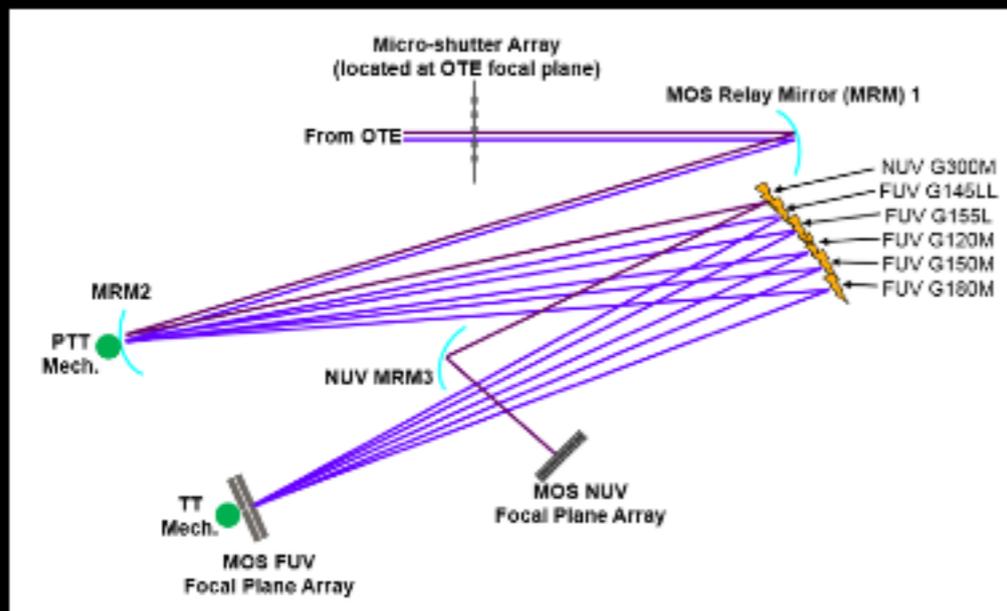
WFE across FOV \leq 20 nm

LUMOS SPECIFICS



LUMOS: three channels (FUV and NUV)

- Low/Med-res ($R = 500 \rightarrow 60K$), FUV and NUV MOS. FOV = $3' \times 1.6'$
- FUV imager. FOV = $2' \times 2'$



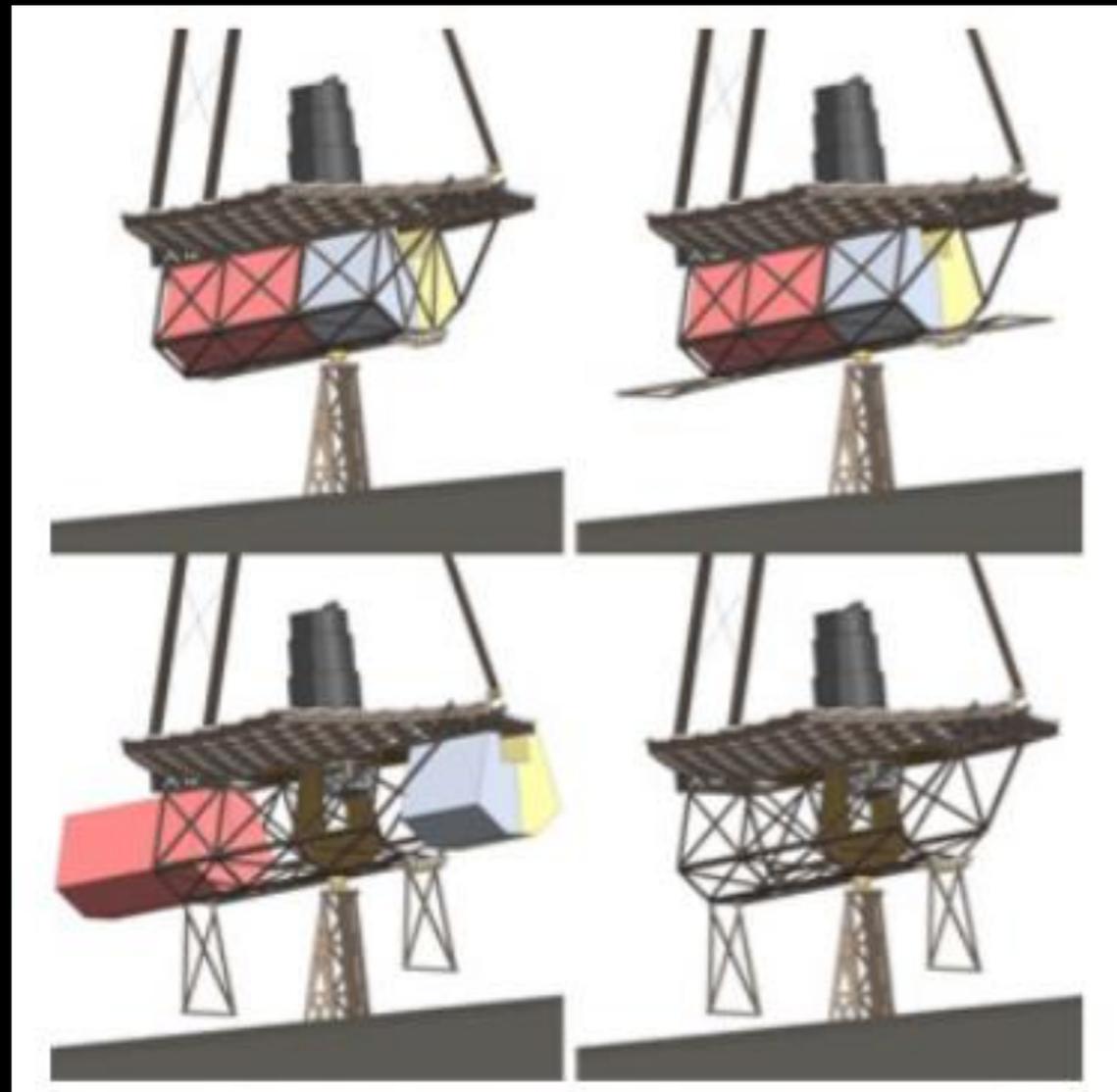
- High-res ($R \geq 100K$) point source spectrograph (complements CNES POLLUX instrument)

LUVOIR IN A NUTSHELL

- It's Large.
- It's Powerful.
- It's Serviceable.
- It's Open.

IT'S SERVICEABLE

- Observatory designed from the beginning to have HST-like swappable instruments



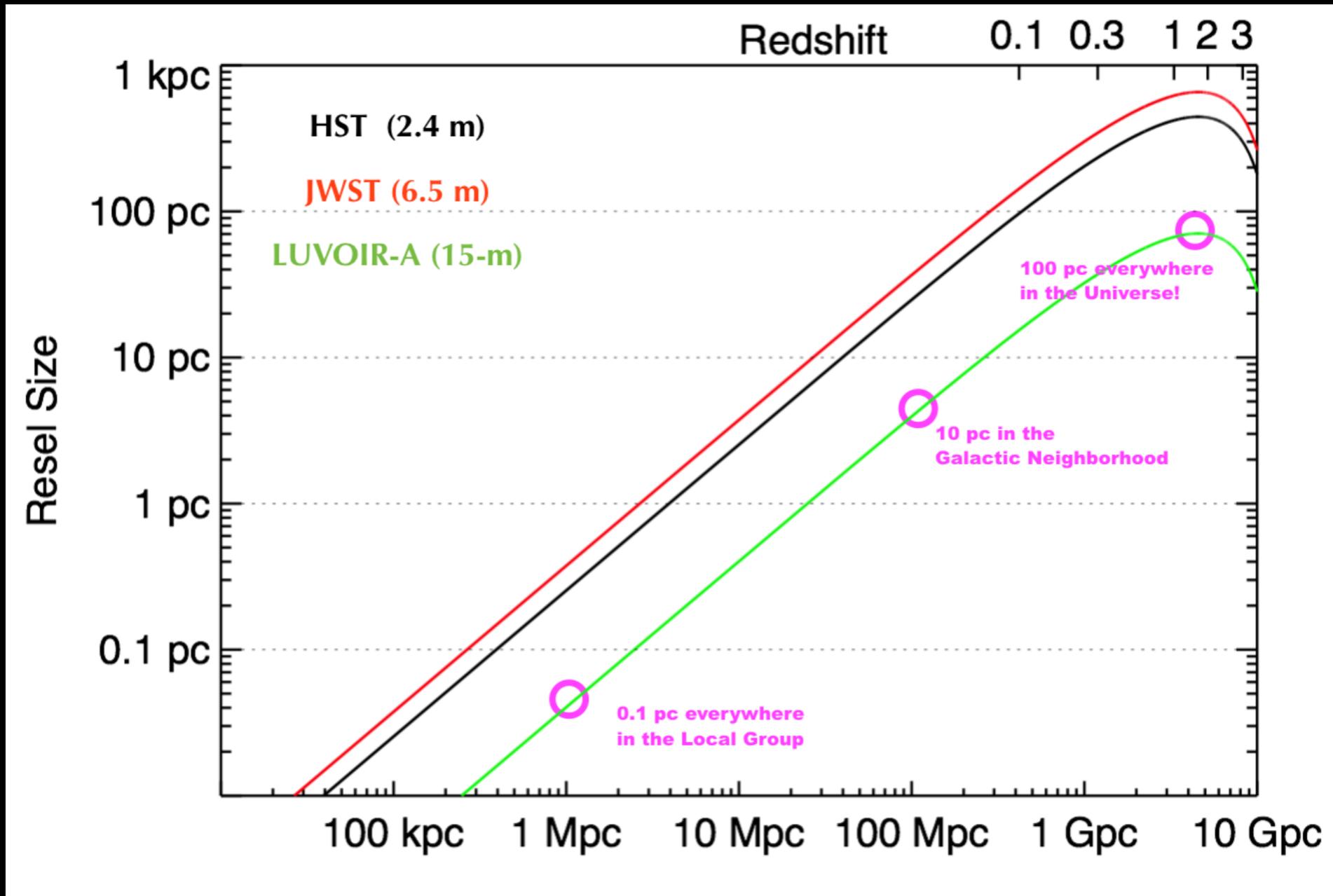
LUVOIR IN A NUTSHELL

- It's Large.
- It's Powerful.
- It's Serviceable.
- It's Open.

IT'S OPEN

- LUVOIR will be a Guest Observer driven observatory analogous to HST

BUT WHY?



WHY YOU SHOULD CARE #1: DEPTH



HUDF

400 orbits

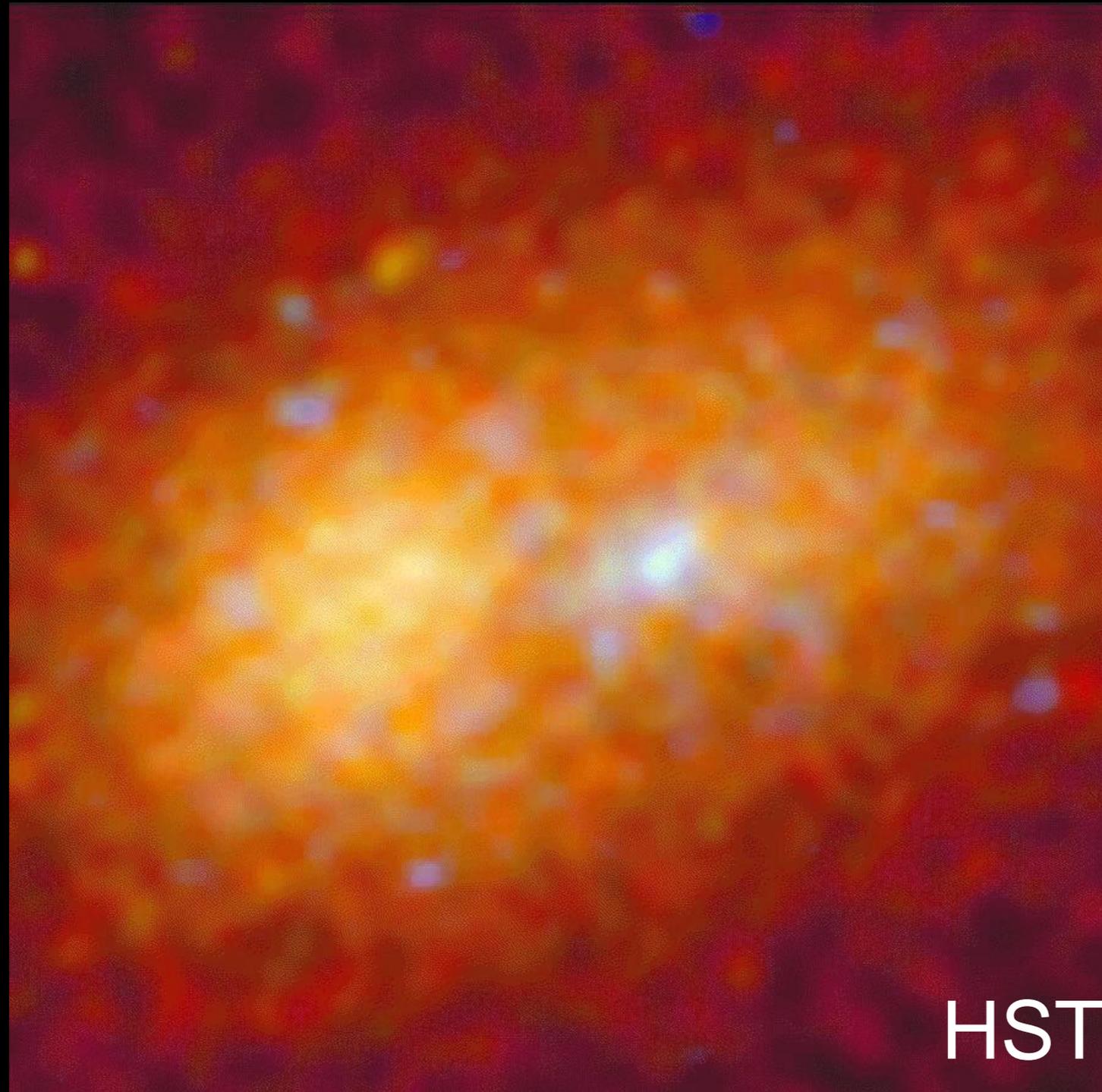
11.3 days (~1 Million sec)

4 filters

$m_{AB} \sim 29$

	Photometric bands, Limits are 5σ for point or point like sources in 100,000 seconds limits for 200,000 seconds are 0.4 mag deeper									
	F225W	F275W	F336W	F475W	F606W	F775W	F850W	F125W	F160W	F220W
15m	32.9	33.0	33.4	33.6	33.4	33.1	32.6	33.5	33.2	30.2
9m	31.8	32.0	32.4	32.5	32.4	32.2	31.6	32.4	32.2	29.2

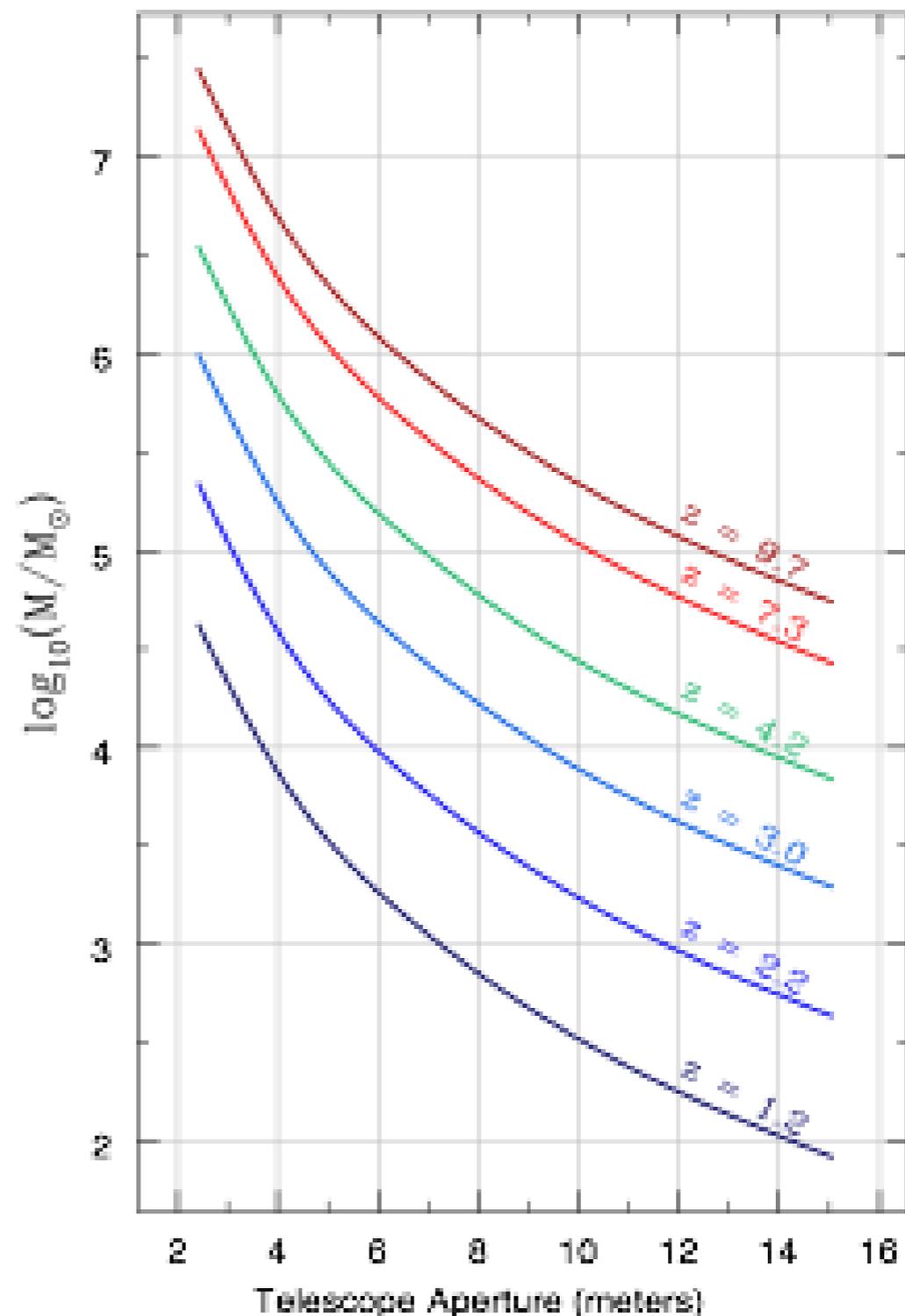
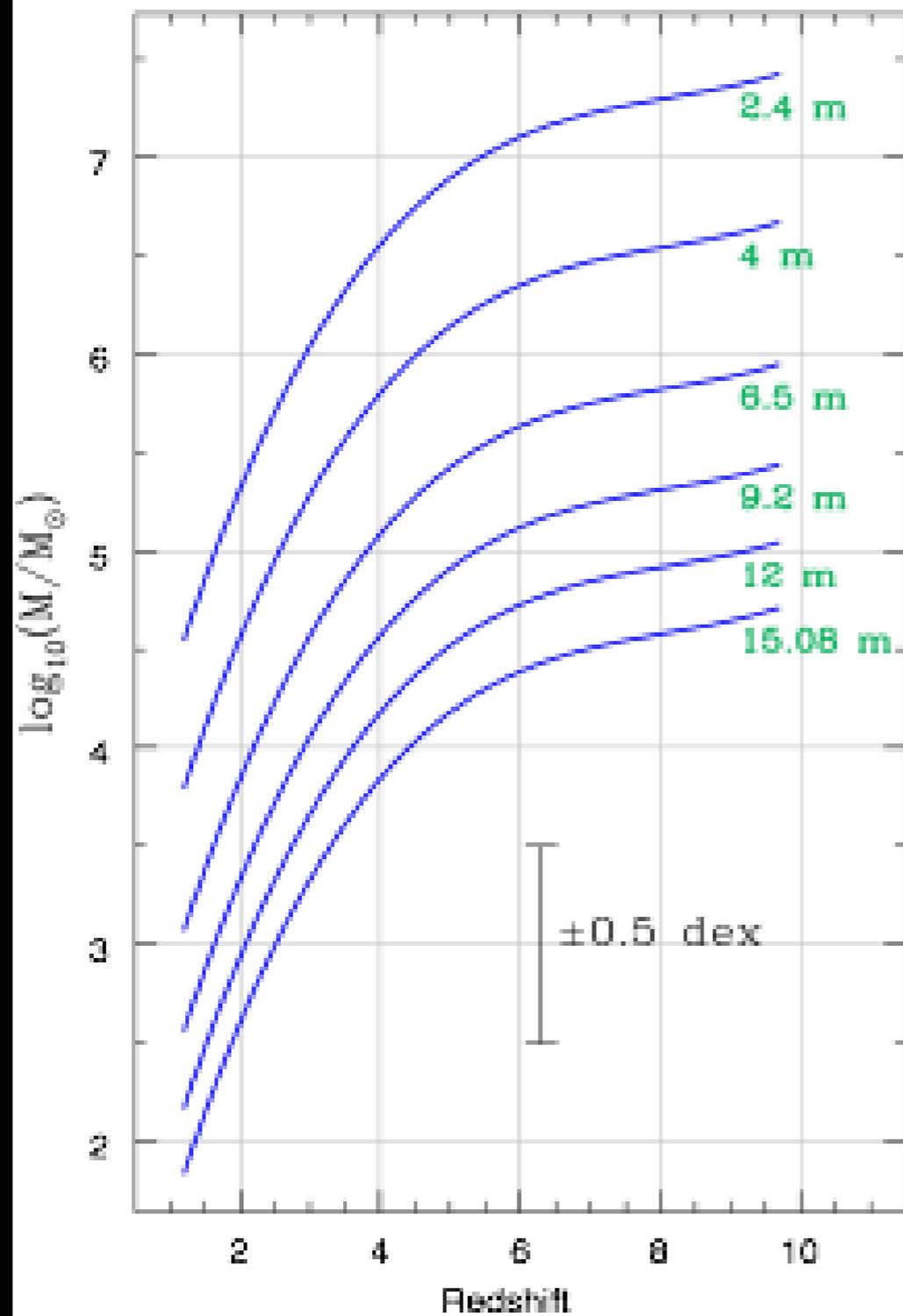
WHY YOU SHOULD CARE #2: SPATIAL RESOLUTION



RELEVANT LISA THEMES

- SMBH characterization: LUVOIR directly constrains the galaxy merger history out to $z \sim 7$ and beyond, *for nearly all galaxies*

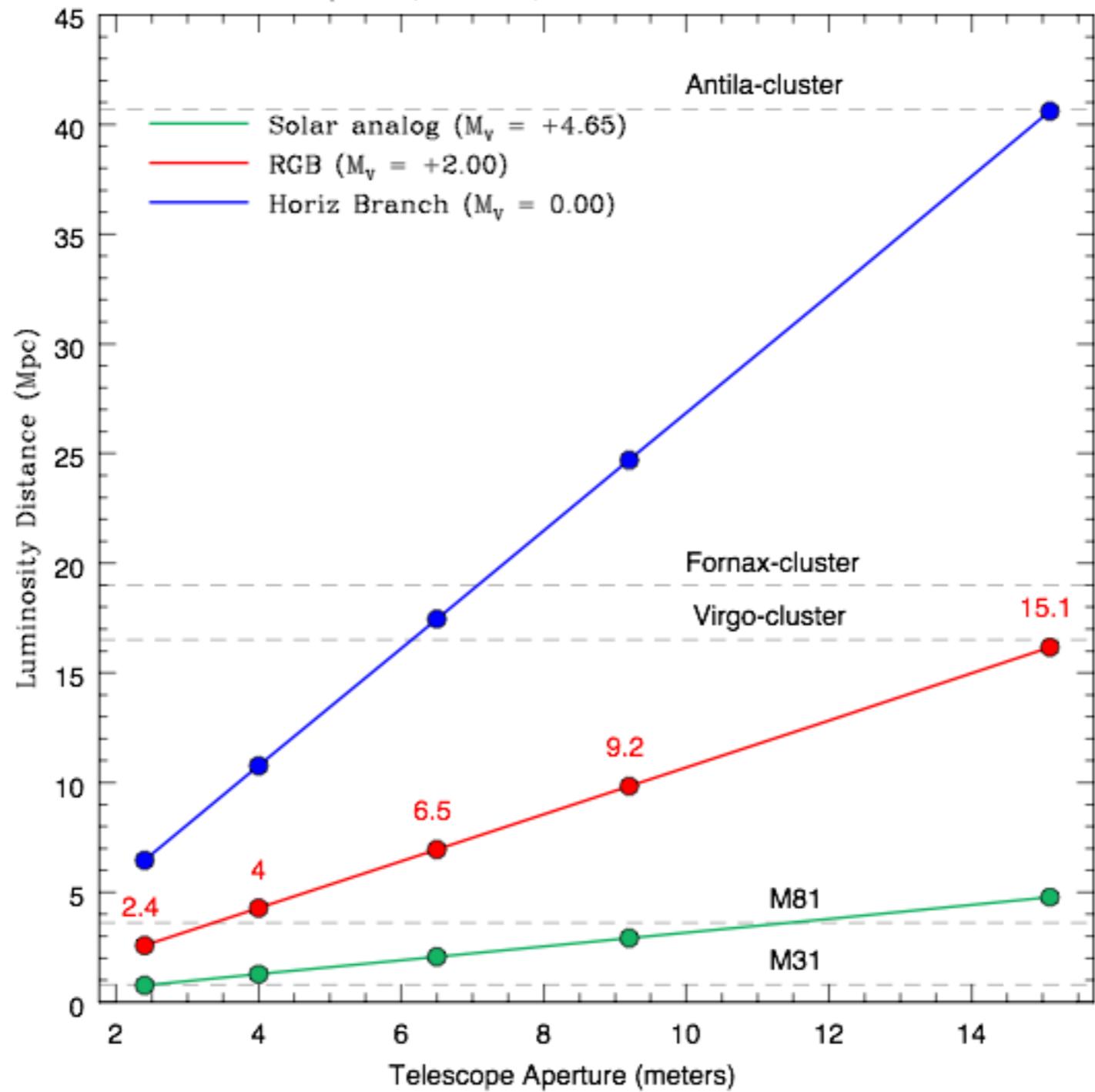
SNR = 5, $T_{\text{exp}} = 500$ ksec, HDI Performance



RELEVANT LISA THEMES

- LUVOIR can characterize the environments of IMBH in the “local” neighborhood

For 10 hour Exposure, SNR = 5, Passband = 606 nm

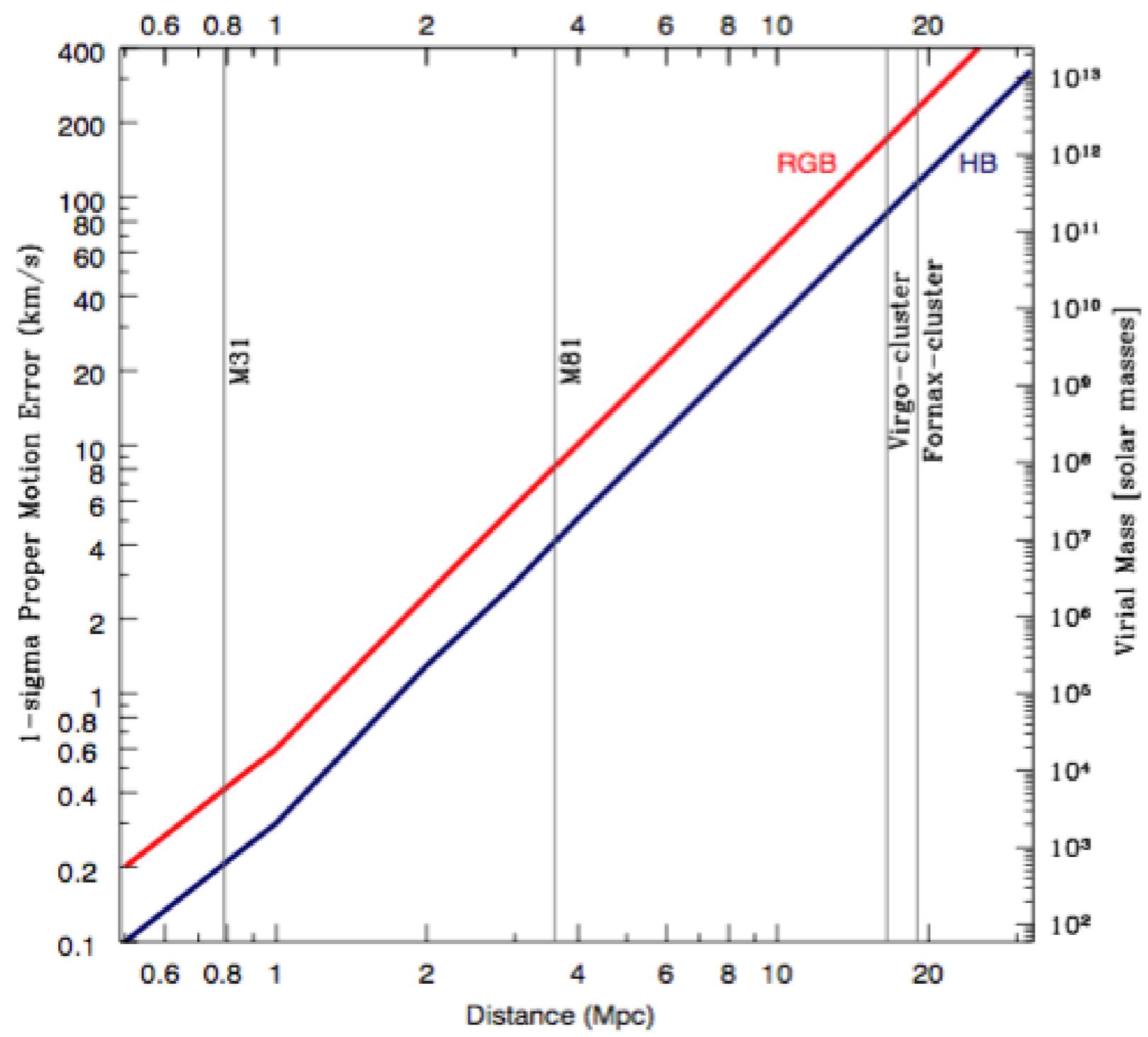


RELEVANT LISA THEMES

- Observatory will have fast slew/settle times: 45 minutes or less
- We don't know what the landscape is in the 2030s, but if we assume sources can be localized.....

RELEVANT LISA THEMES

- Exquisite UV capabilities (LUMOS) and precision astrometric modes (HDI) open up new parameter spaces



LUVOIR + LISA = AWESOME

- Accurate SMBH masses out to $z \sim 8$
- Trace the history of SMBH formation and the dependence on environment
- Binary SMBH?
- Observations of compact binaries
- Recoiling AGN

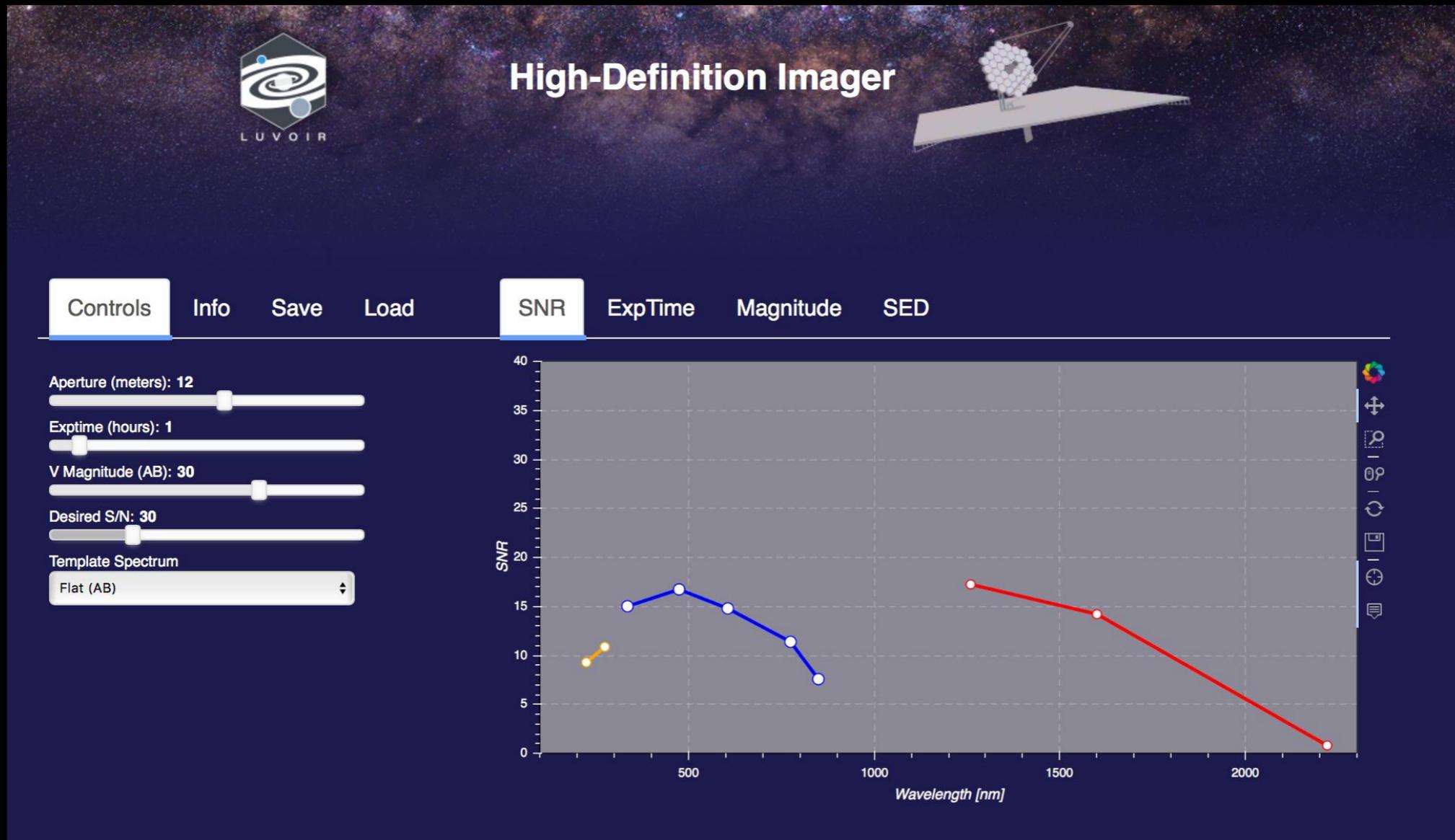
list via Kelly Holley-Bockelman

WHY I'M REALLY HERE



USE OUR TOOLS!

<http://luvoir.stsci.edu>



2-3:30 Chesapeake 7-8, STSci Booth, LUVVOIR booth

THIS IS JUST THE BEGINNING