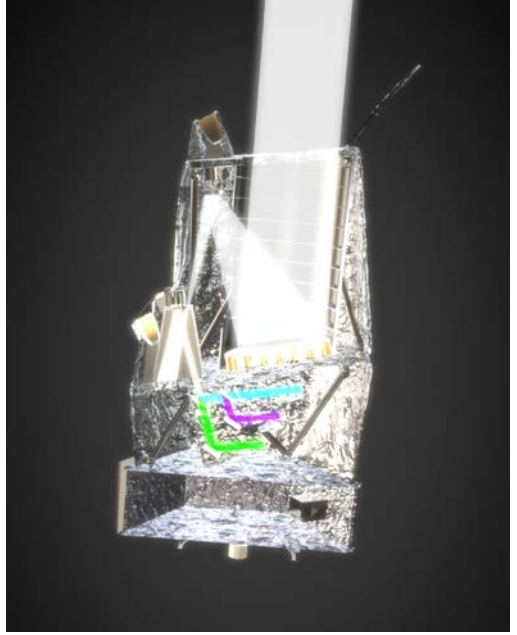
ULTRAVIOLET ASTRONOMY IN THE XXI CENTURY

e-Workshop 2020 – October 27-29

JcUVa

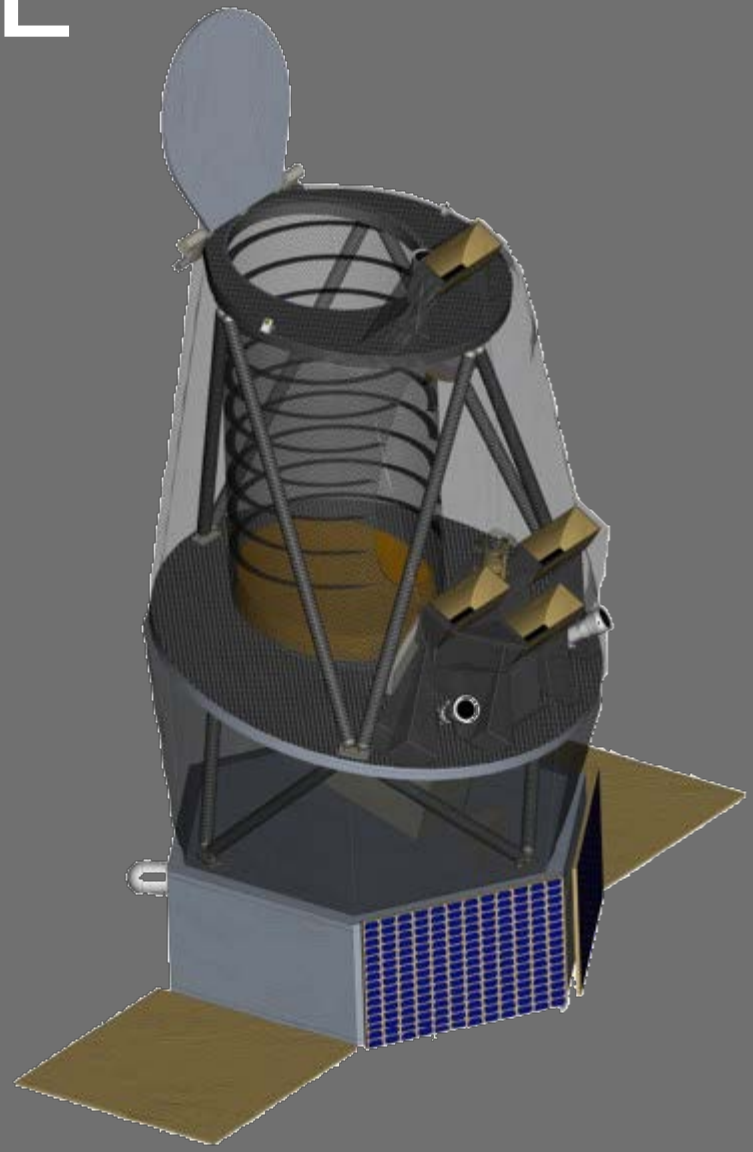


UPDATE ON THE CASTOR MISSION: DESIGN

AL SCOTT, ON BEHALF
OF THE CASTOR TEAM
(PI: PAT CÔTÉ)

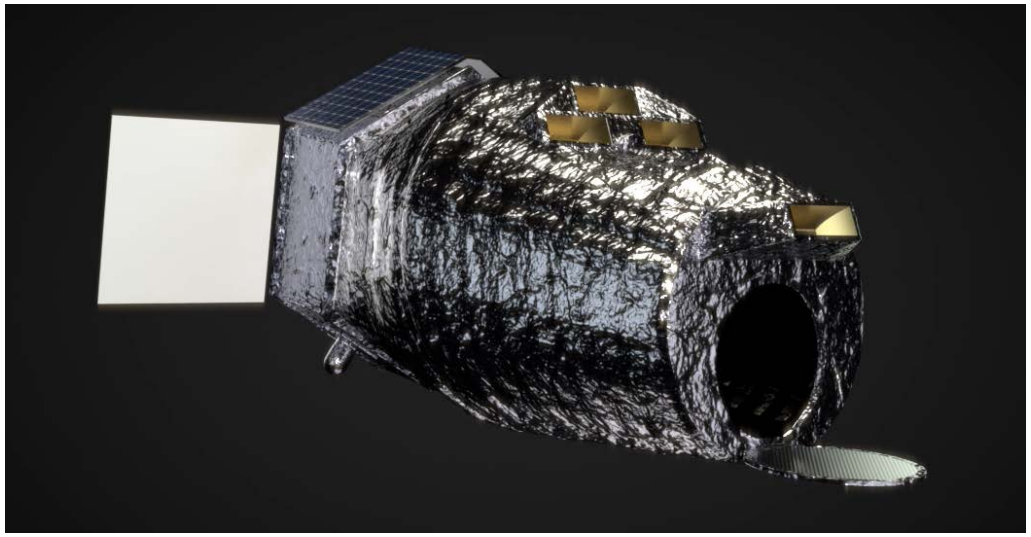
Honeywell

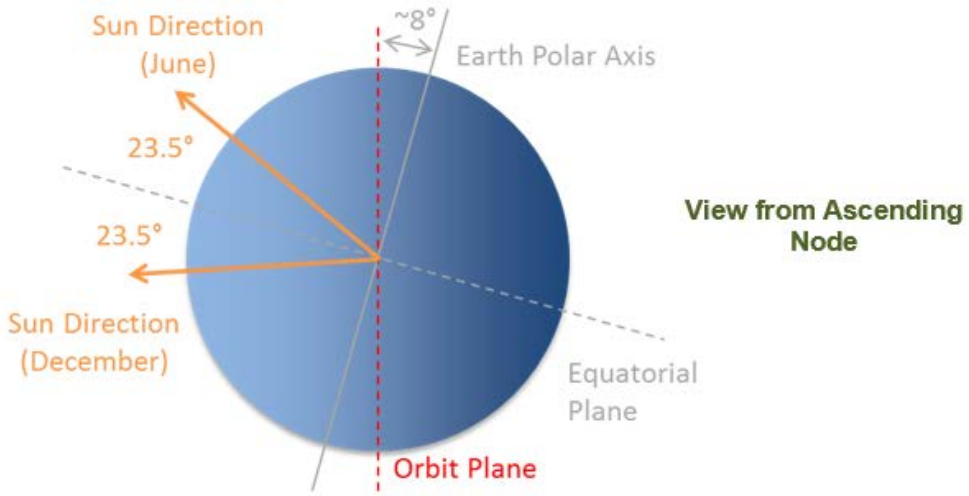
THE COSMOLOGICAL ADVANCED SURVEY TELESCOPE FOR OPTICAL AND ULTRAVIOLET RESEARCH



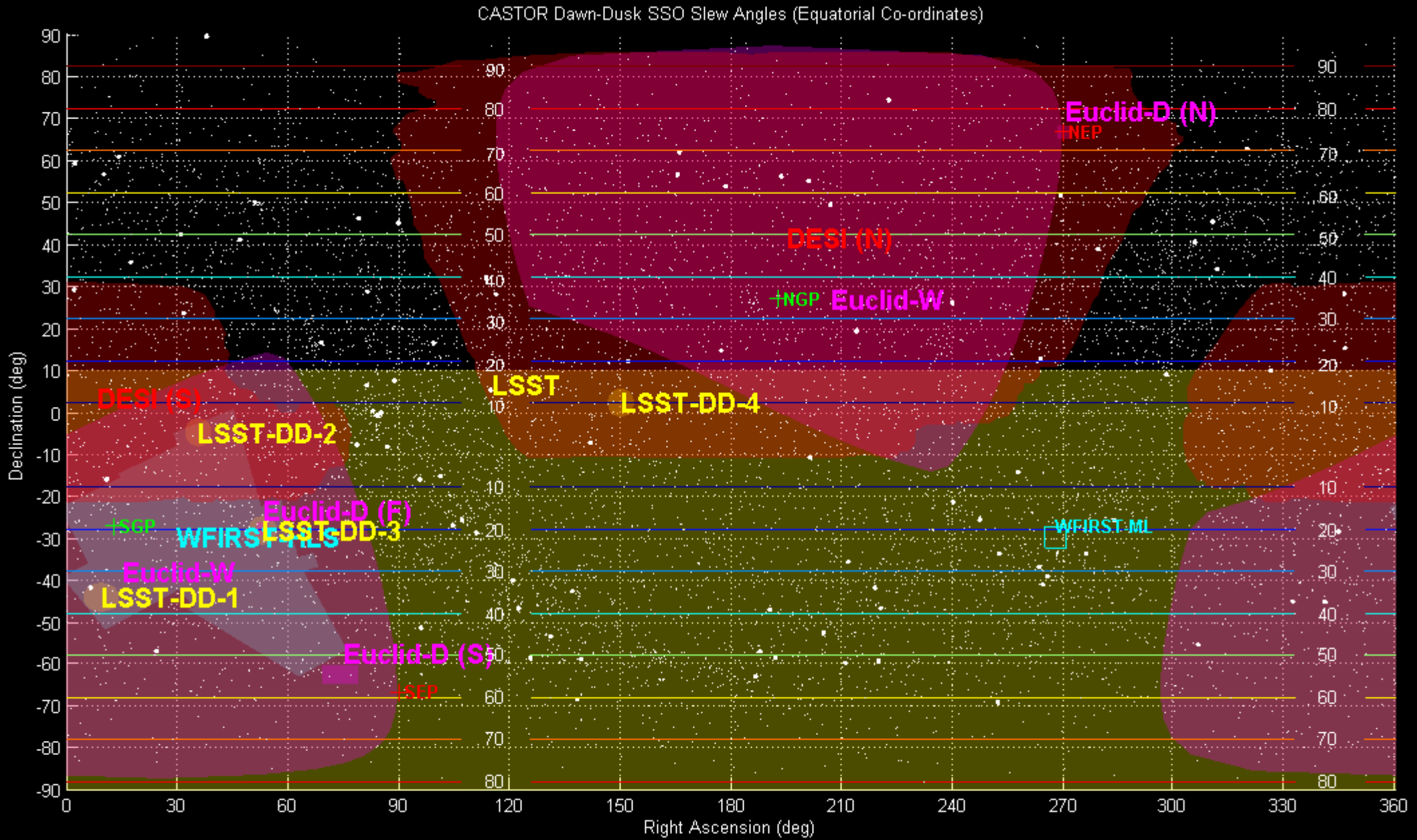
MISSION DESIGN

- **800 km polar sun-synchronous orbit to survey Euclid-Wide/LSST-WFD/Roman-HLS fields in g (27.1), u (27.4), & UV (27.4)**
- **1063 kg spacecraft with electric propulsion & 10 Gbps optical science data downlink**
- **Dichroic separation of wavebands onto 3 x 240 Megapixel arrays (0.66º x 0.36º @ 0.15”)**
- **Passive radiators cool large BICMOS focal plane arrays**
- **5-year mission includes 1.8 year baseline survey 7800 deg^2**





CASTOR is designed to launch on the Indian PSLV

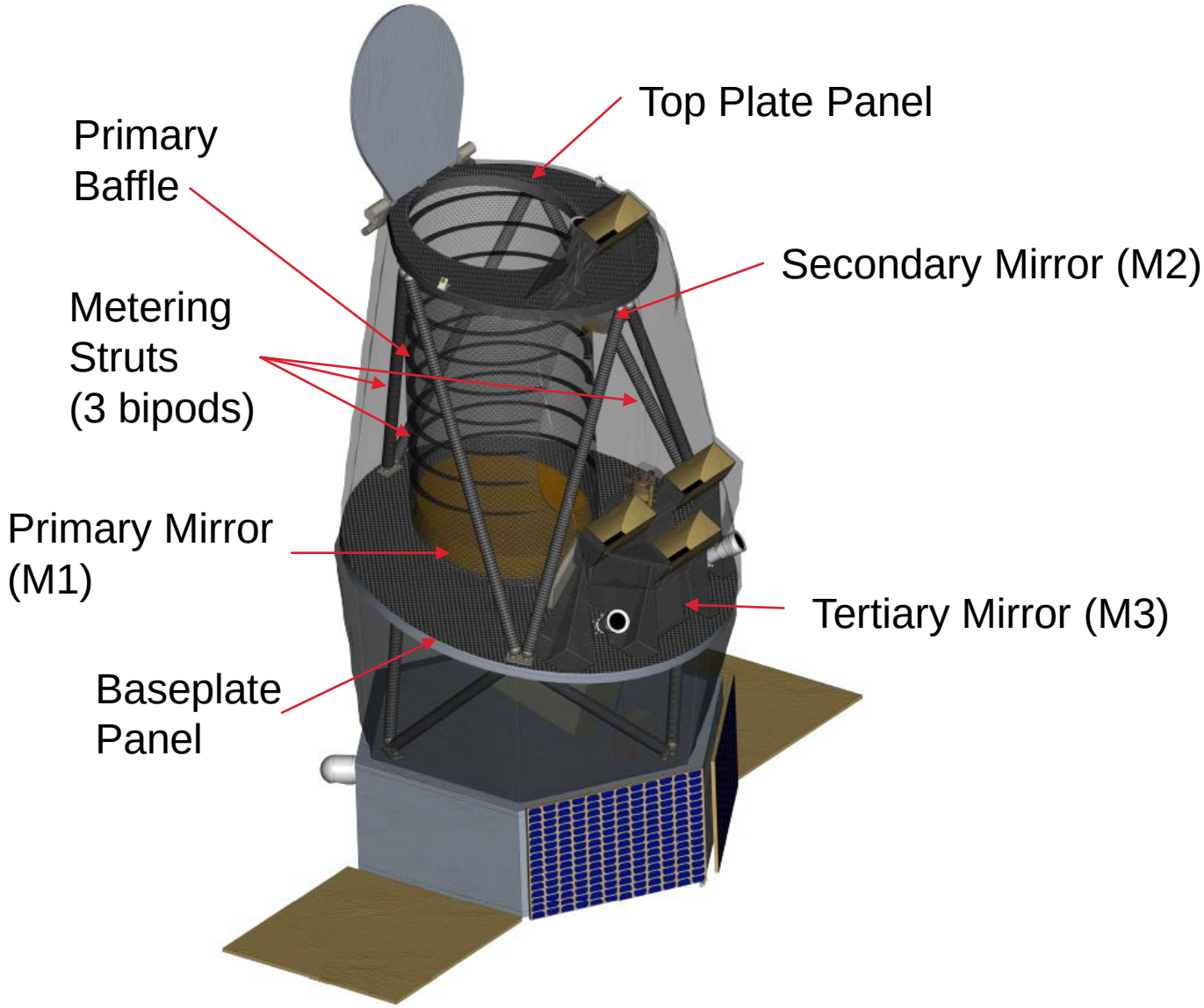


TELESCOPE DESIGN

- **ULE Three Mirror Anastigmat**
- **M2 WFE compensation**
- **Deployable cover/earth-shield**
- **Fine steering mirror for image stabilization**
- **Science array subwindow guiding on stars down to 14th magnitude**

Telescope specifications

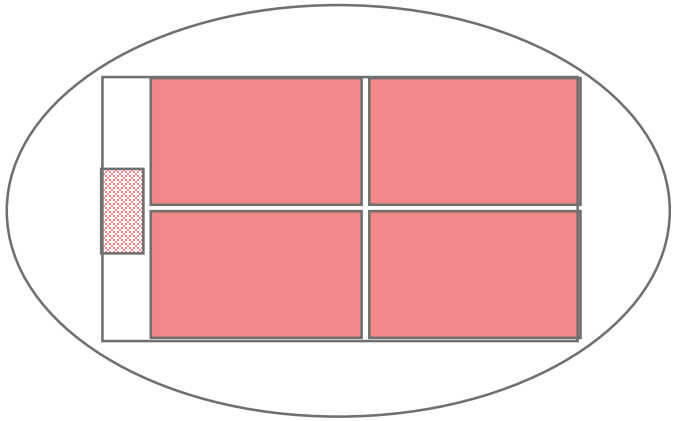
Entrance Pupil Diameter	1000 mm
Field	0.6646 x 0.36 degree
Focal Length	20 m
Image Size	225 x 125 mm
Image Wavebands	G (400 – 550 nm) U (300 – 400 nm) UV (150 – 300 nm)



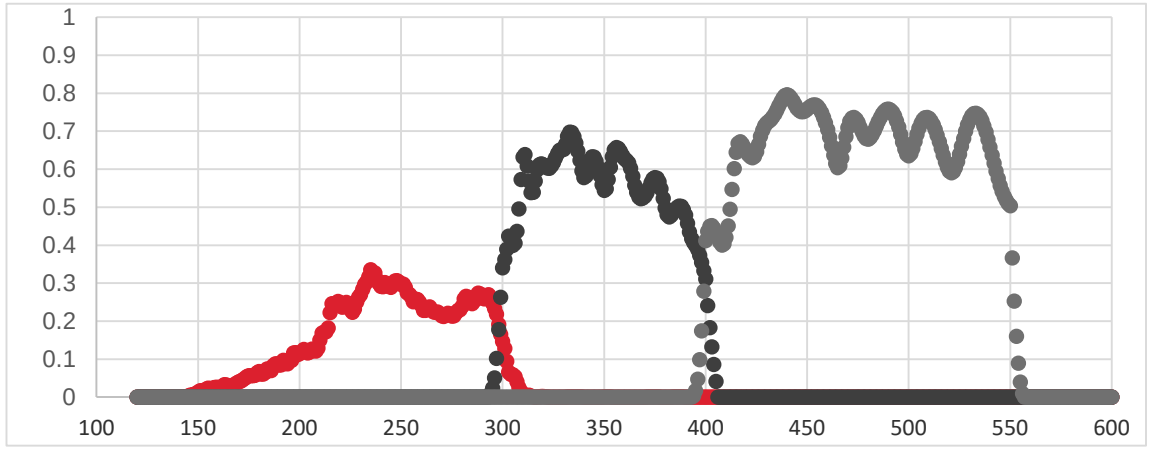
Un-obscured aperture eliminates diffraction spikes

FOCAL PLANE ARRAYS

- **Huge 3 x 240 Megapixel array sampling at 0.1”/pixel**
- **Back-illuminated large format CMOS with MBE-defined bandpass filtering**
  - Good radiation tolerance
  - Low on-chip thermal dissipation (~500 mW per band)
  - Subwindow capability for 100 Hz asynchronous guide star tracking
  - Low noise < 8 electrons readout
  - Low dark current < 0.01 e/p/s

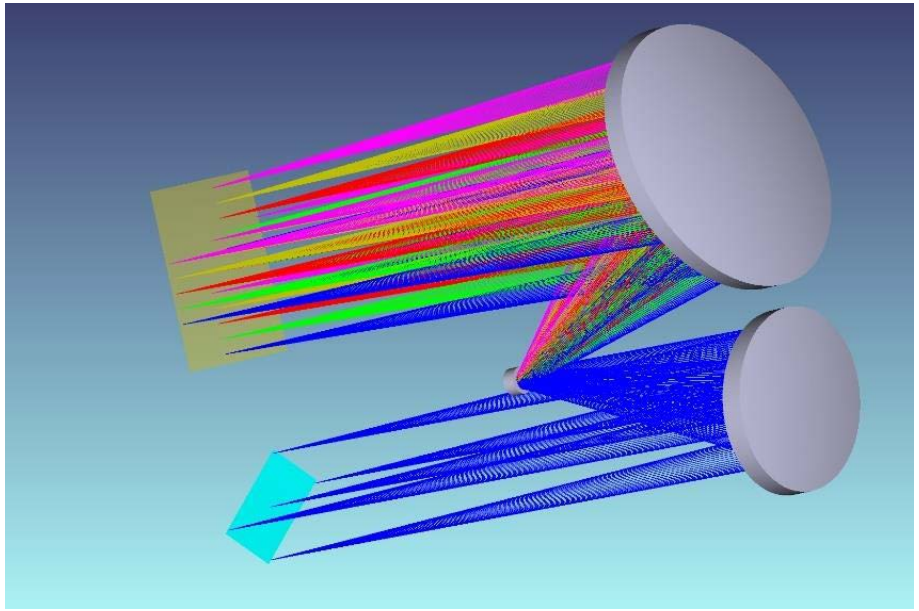


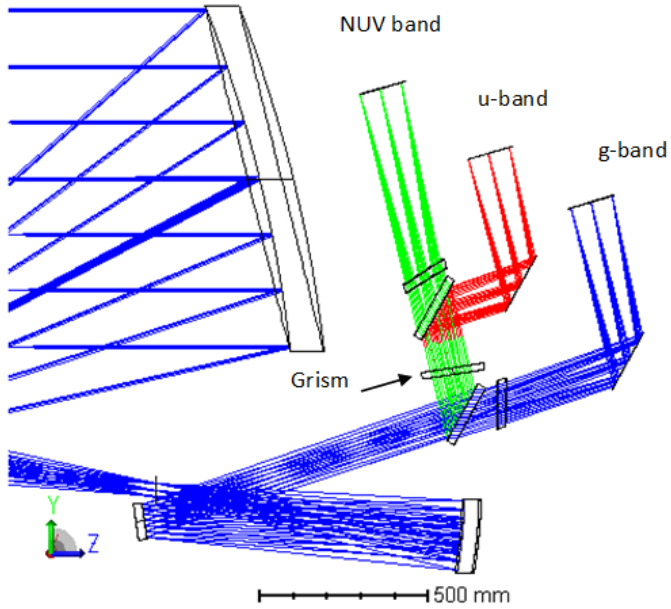
Achievable system QE



ADDITIONAL PAYLOAD INSTRUMENT CONCEPTS

- **NUV multi-object spectrometer R ~ 1500, 213” x 121” using DMD selector**
- **Deployable u & UV slitless grism spectrometer R ~ 300-420**
- **Dispersed photometer in each band with 10 ppm precision**





THANK YOU!