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1b. Will the US contribution affect its capabilities?

2. Can you compare and contrast Euclid and WFIRST?

3. What is the current status of WFIRST planning?

4a. How does the planned launch of Euclid affect plans for WFIRST?

4b. Does the IR contribution alter this relation?

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Wide-Field InfraRed Survey Telescope
WFIRST
Interim Report

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James C Green 7-11-11
James Green, SDT Co-Chair Date

Paul Schechter
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Location: MIT Cambridge MA 02139
Date: 2011.07.11 12:48:52 -04'00'
Paul Schechter, SDT Co-Chair Date

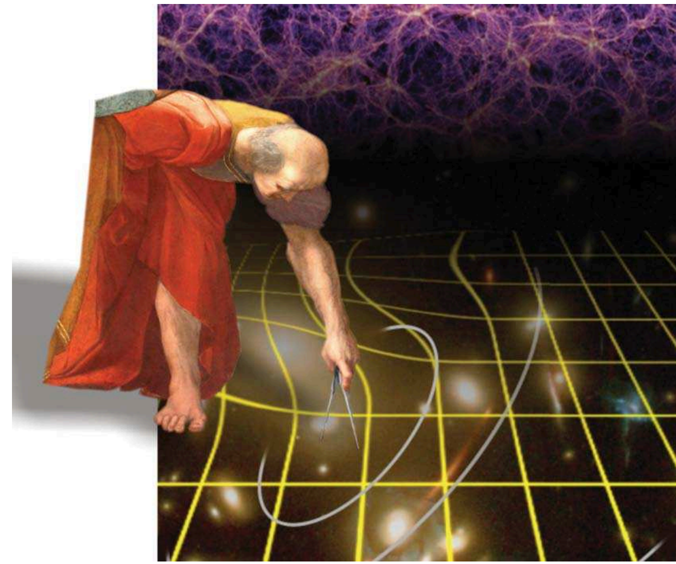
Wide-Field Infrared Survey Telescope
WFIRST
Dark Energy - Exoplanets - NIR Surveys

1 University of Colorado/Center for Astrophysics and Space Astronomy
2 Massachusetts Institute of Technology
3 Yale University
4 Cornell University
5 University of Notre Dame
6 Space Telescope Science Institute
7 University of Nottingham
8 Michigan State University
9 Ohio State University
10 National Optical Astronomy Observatory
11 University of California Berkeley/Lawrence Berkeley National Laboratory
12 NASA/Goddard Space Flight Center
13 Jet Propulsion Laboratory/California Institute of Technology
14 NASA/Ames
15 Osaka University
16 Georgia State University
17 University of Oklahoma
18 University of California Los Angeles
19 NASA Headquarters
20 Lawrence Livermore National Laboratory
21 Johns Hopkins University
22 California Institute of Technology
23 University of Washington
24 University of Manchester
25 Las Campanas Observatory
26 University of Arizona
27 Conceptual Analytics

esa

ESA/SRE(2011)12
July 2011

Euclid
Mapping the geometry of the dark Universe



Definition Study Report

PROGRAM ALLOCATIONS

program	WFIRST	Euclid
exoplanet microlensing	1.5 years	0 years
guest investigator	1.0 year	0 years
supernovae	0.5 year	0 years
BAO + weak lensing*	2.0 years	5 years

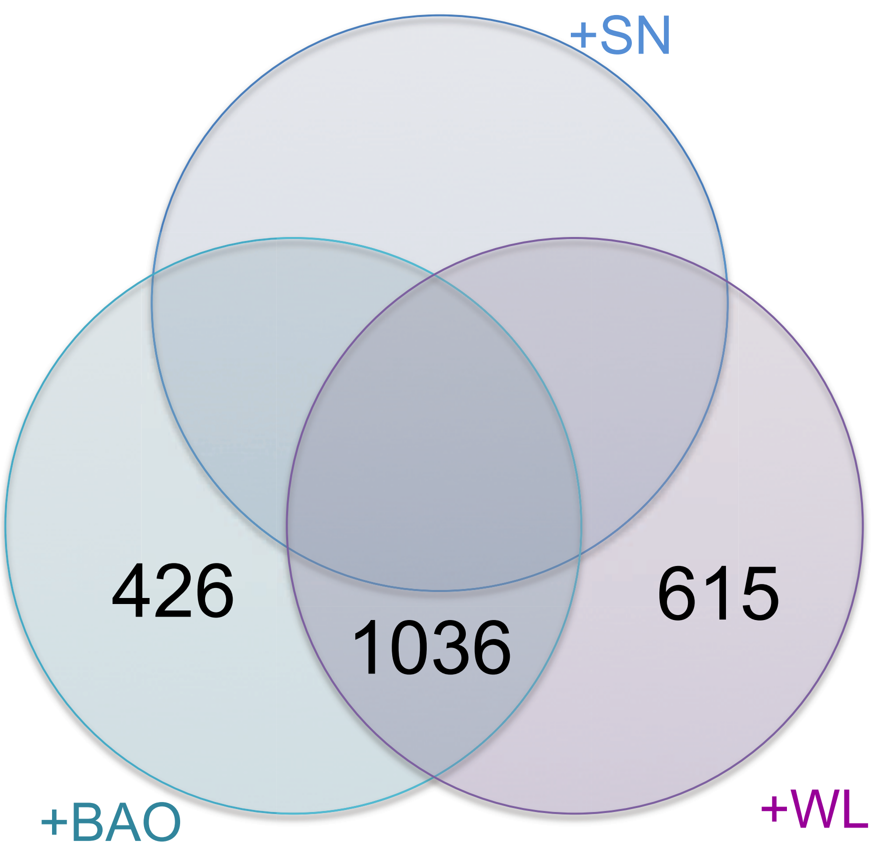
* imaging surveys proceed in parallel

HARDWARE

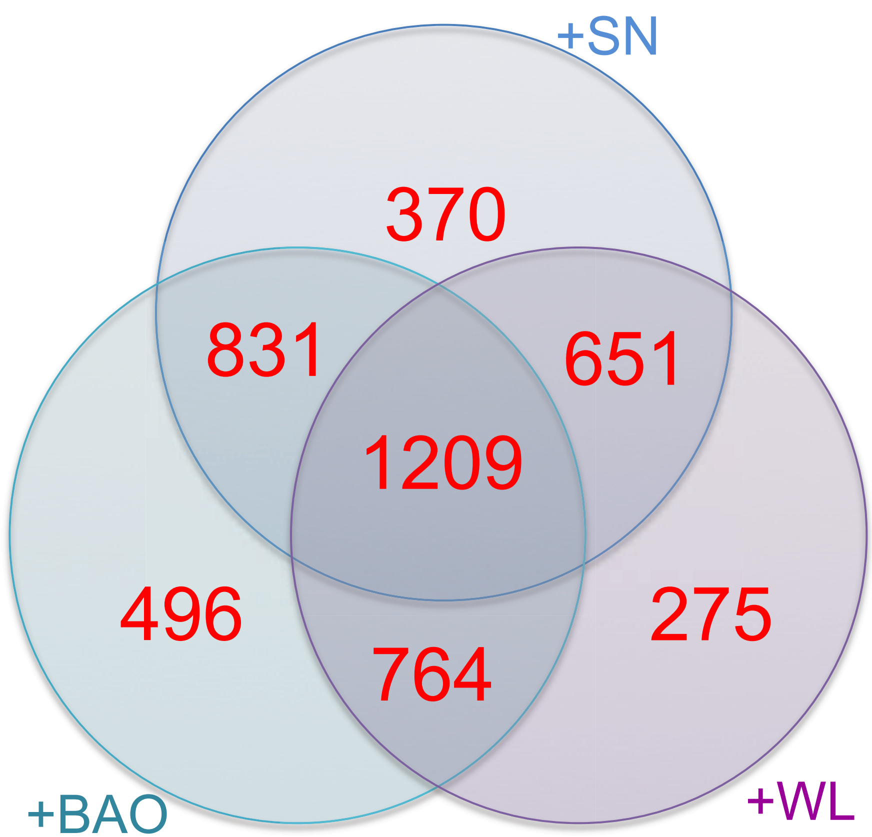
	WFIRST	Euclid
telescope		
design	1.3-m unobstructed	1.2-m obstructed
entrance pupil	$1.327\ \mathrm{m}^2$	$0.848\ \mathrm{m}^2$
solar angle	$90 \pm 36^\circ$	$90 \pm 3^\circ$
focal plane		
imaging CCDs (4096^2 pixels)	0	$36 \times (0\farcs10)^2$
imaging HgCdTe (2048^2 pixels)	$28 \times (0\farcs18)^2$	$22\% \times 16 \times (0\farcs30)^2$
spectroscopic HgCdTe (2048^2 pixels)	$8 \times (0\farcs45)^2$	$78\% \times 16 \times (0\farcs30)^2$

Comparison with EUCLID (DETF FoM(

EUCLID Optimistic:
5 year Dark Energy Measurement



WFIRST Optimistic:
2.5 year Dark Energy Measurement



Why is the WFIRST approach preferred for weak lensing?

weak lensing is the riskiest program:

$$\left(\begin{array}{c}\textbf{uncertainty in local}\\ \textbf{mean image ellipticity}\end{array}\right) < \mathbf{0.0002}$$

1. **Progressive CCD charge transfer inefficiency elongates images.**
2. **CCDs allow only one very broad "riz" filter; galaxy shapes and PSF vary within bandpass.**
3. **Requirements on optics and jitter are specified relative to diffraction limit and are a factor of two less demanding in IR.**
4. **Unobscured design produces cleaner diffraction pattern.**
5. **Galaxies are less irregular in the red than in the blue.**
6. **Unless systematic ellipticity errors are within the requirement, additional area provides little or no benefit.**

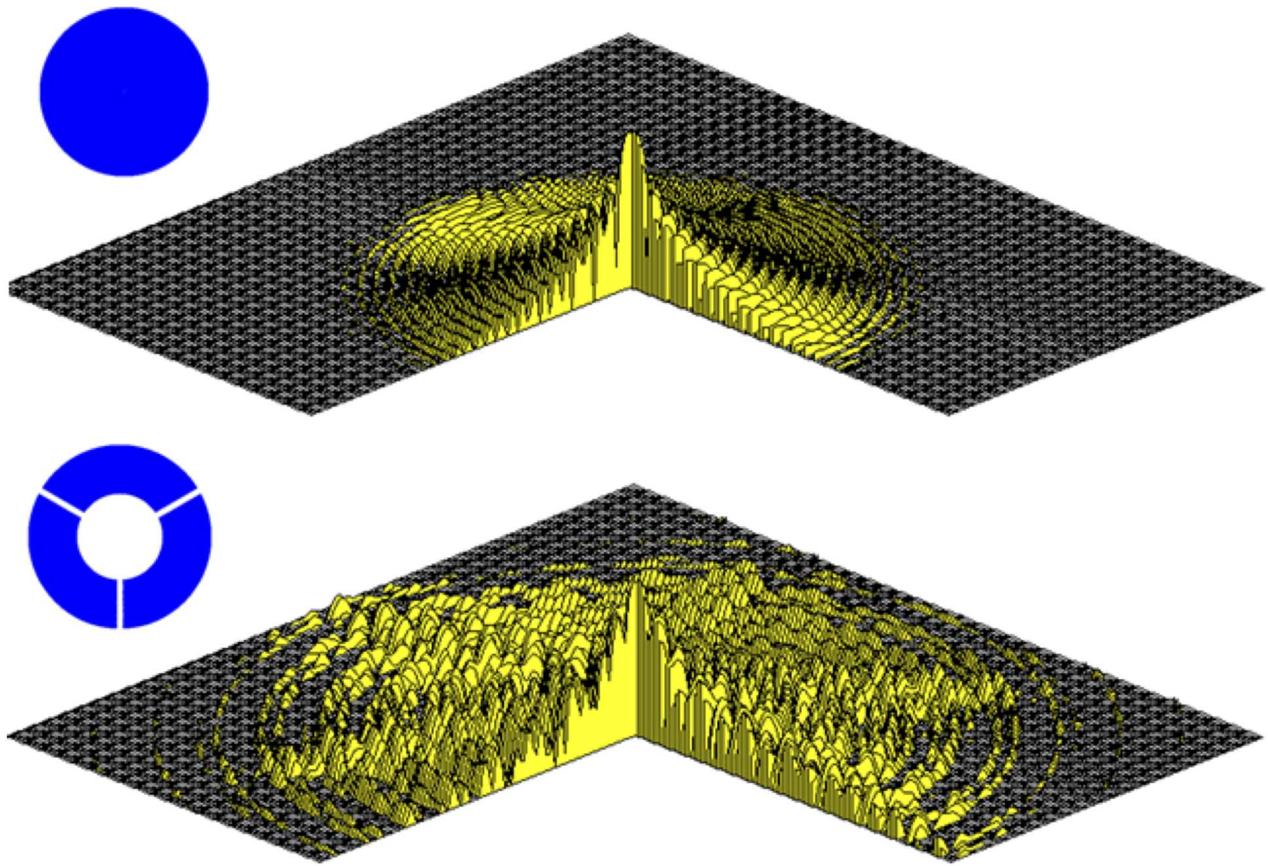


Figure 7: Monochromatic diffraction for unaberrated pupils. Top: an unobscured pupil. Bottom: pupil obscured by a centered 50% linear disk and three spider legs. Pupils are shown at the upper left. Logarithmic vertical scale spans four decades. Fresnel-Kirchoff diffraction assumed.

Kocevski et al. http://www.arxiv.org/pdf/1109.2588

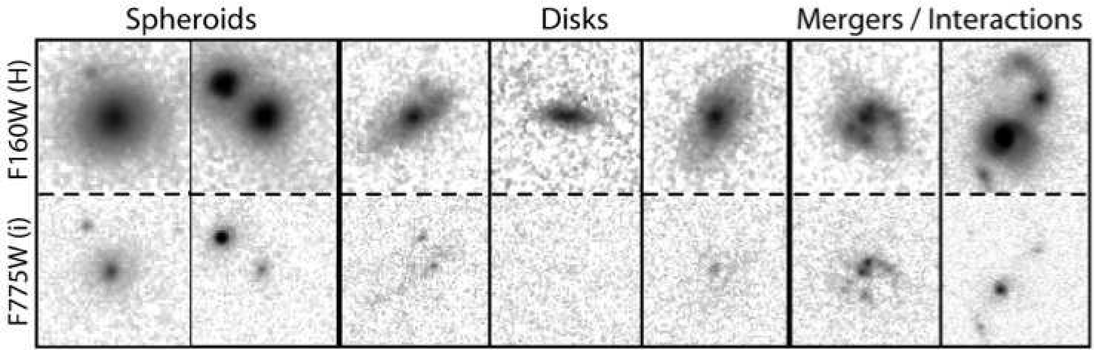
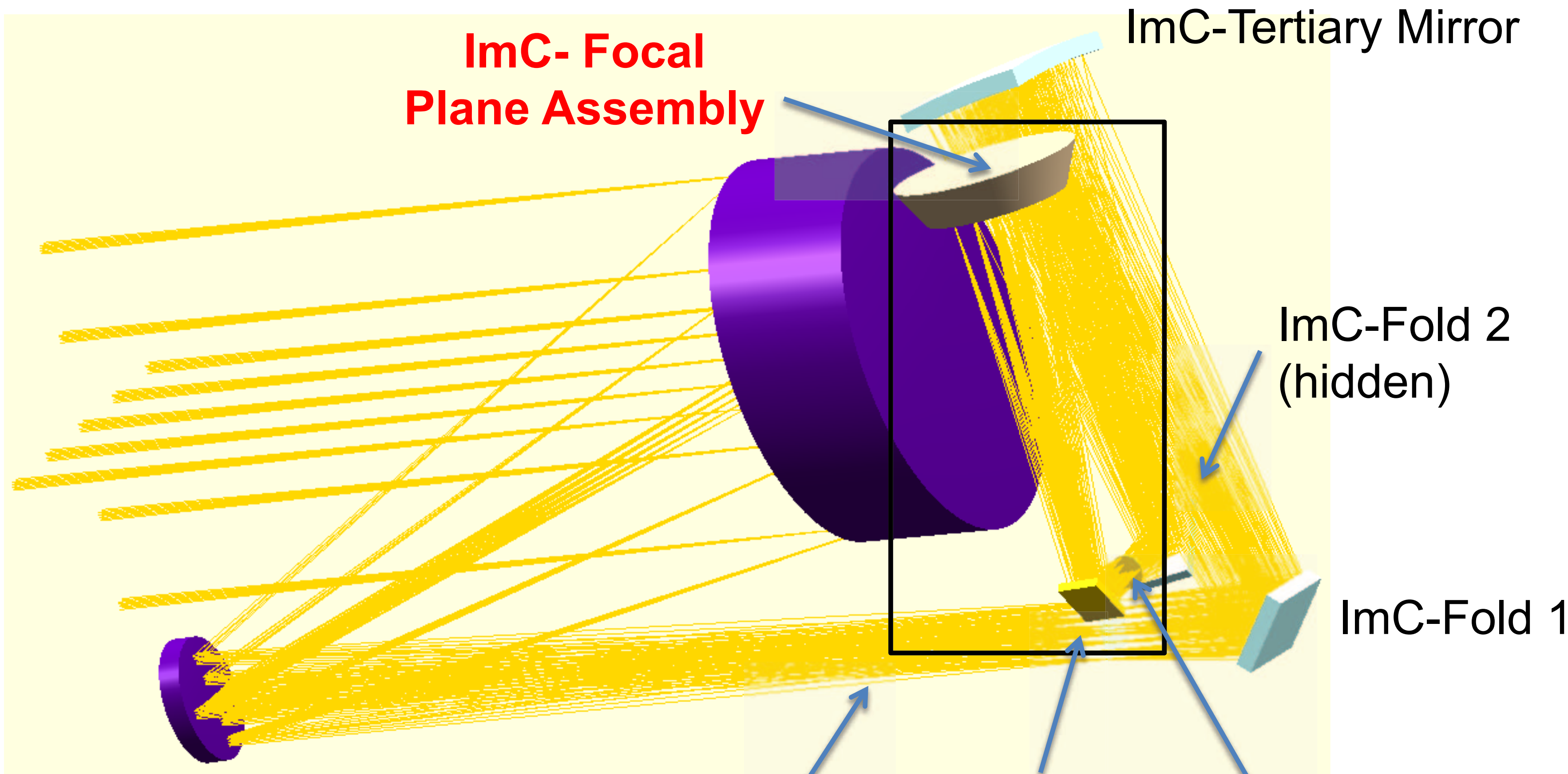


FIG. 3.— Examples of AGN host galaxies that were classified as having spheroid and disk morphologies, as well as two galaxies experiencing disruptive interactions. Thumbnails on the top row are WFC3/IR images taken in the F160W (H) band (rest-frame optical), while those on the bottom row are from ACS/WFC in the F775W (i) band (rest-frame ultraviolet). These images demonstrate that accurately classifying the morphology of these galaxies at $z \sim 2$ requires H-band imaging.

Euclid and the NWNH Mandate

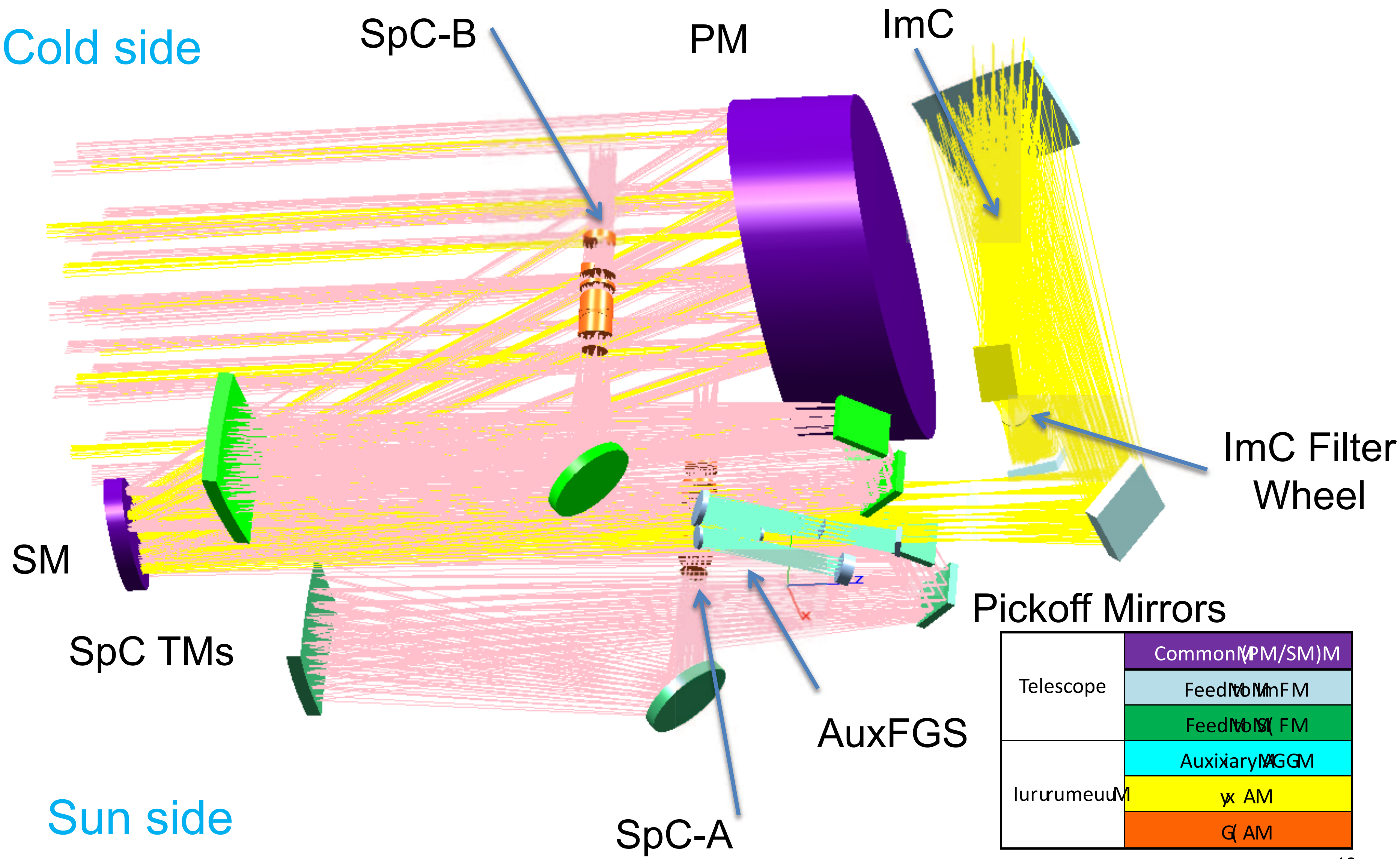
mandate	hardware	program
exoplanet microlensing	optical inferior	no
supernovae	optical inferior	no
general investigator		no
Near IR survey	fat pixels	inferior
BAO	comparable	comparable
weak lensing	optical inferior	high risk

IDRM ImC – Ray trace



Telescope	CommonM(PM/SM)M
	FeedMtoMInFM
	FeedMtoMS(FM
IururumeuuM	AuxiliaryMAGGM
	yx AM
	G(AM

IDRM Payload Optics – Ray trace



Telescope	CommonM(PM/SM)M
	FeedMtoMImFM
	FeedMtoMS(FM
lururumeuuM	AuxixiaryMAGGM
	yx AM
	G(AM