

# iLocator

## A Diffraction-Limited Doppler Spectrometer for LBTI

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LBT Users Meeting  
2014 March 24

# Seeing-Limited



Slit Spectroscopy

# Diffraction-Limited

1. Higher resolution.
2. Better temperature control.
3. Single-mode fibers.
4. Lower contamination.
5. Lower astrophysical jitter.



Fiber-Feed



iLocator

# A Diffraction-Limited Doppler Spectrometer for the LBTI

"Seeing" limited

All Previous Doppler Spectrometers

Diffraction-Limited



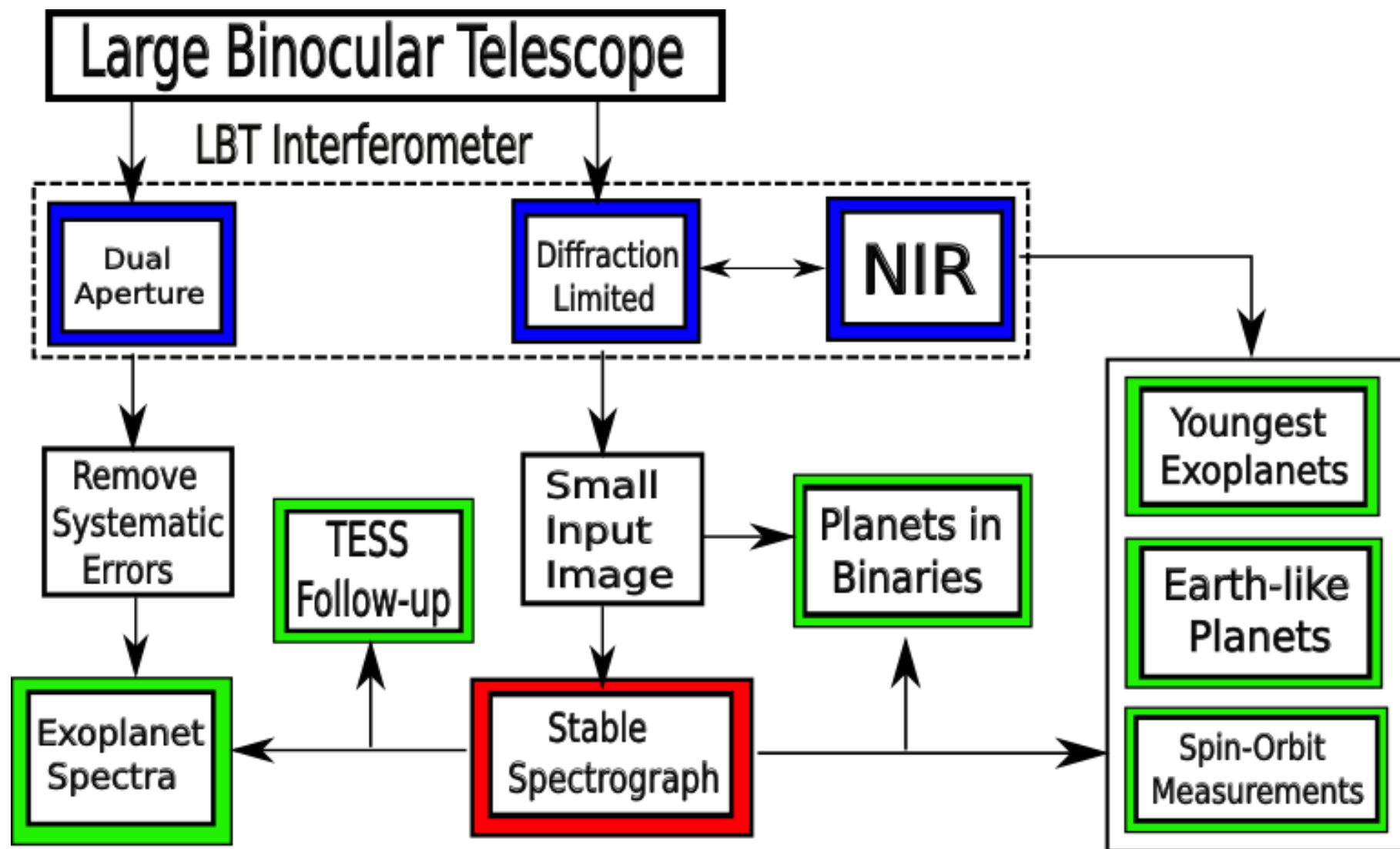
iLocator

# *iLocator*

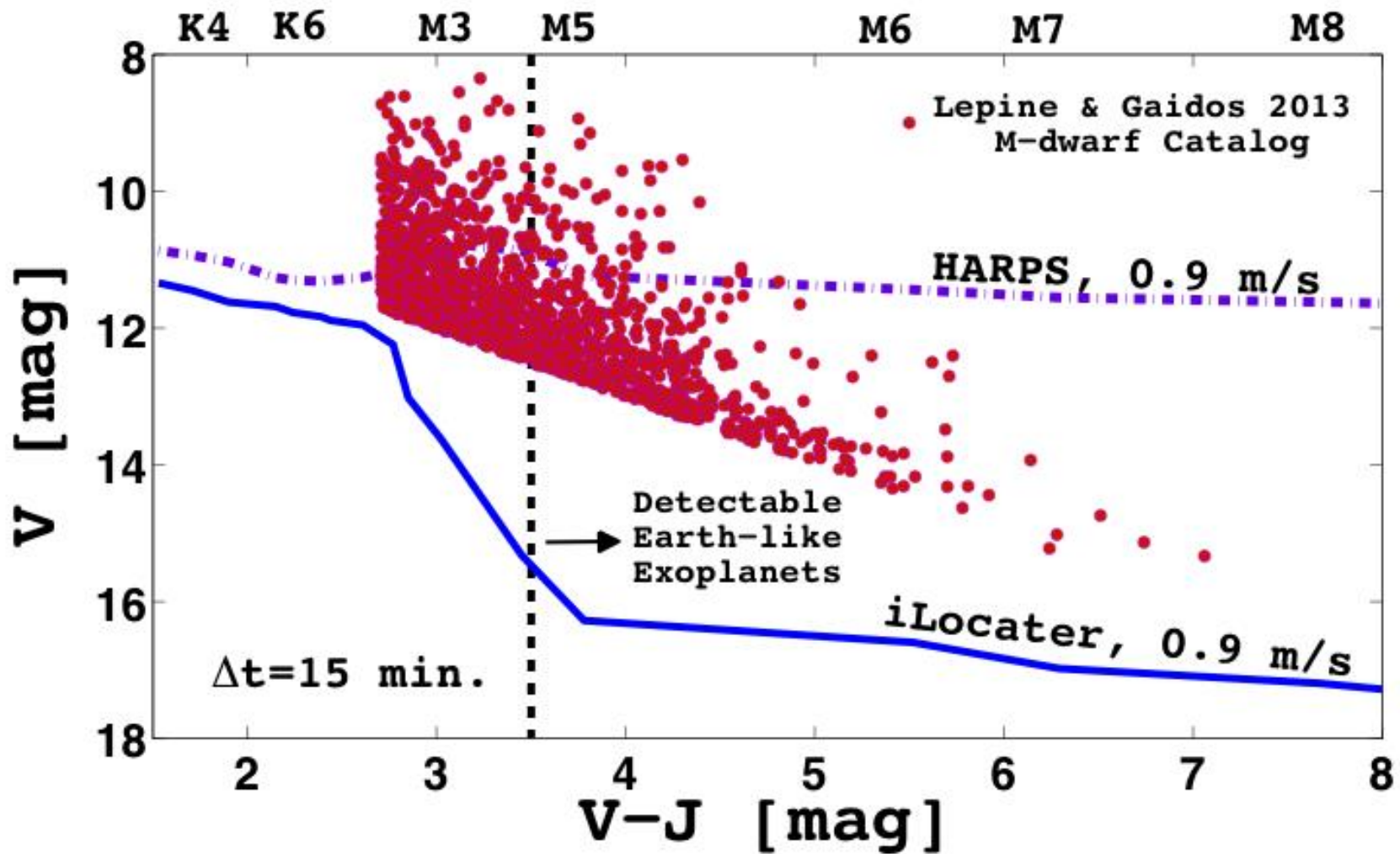


## The world's first **diffraction-limited** Doppler spectrometer:

- (Ex)AO fed, **single-mode** fiber
- **R=110,000** in Y-band [0.95-1.12  $\mu\text{m}$ ]
- Cryogenic, vacuum vessel
- Instrument volume: **0.1 m<sup>3</sup>**
- 900x **lower contamination** from OH
- Dual aperture: help **remove systematics**



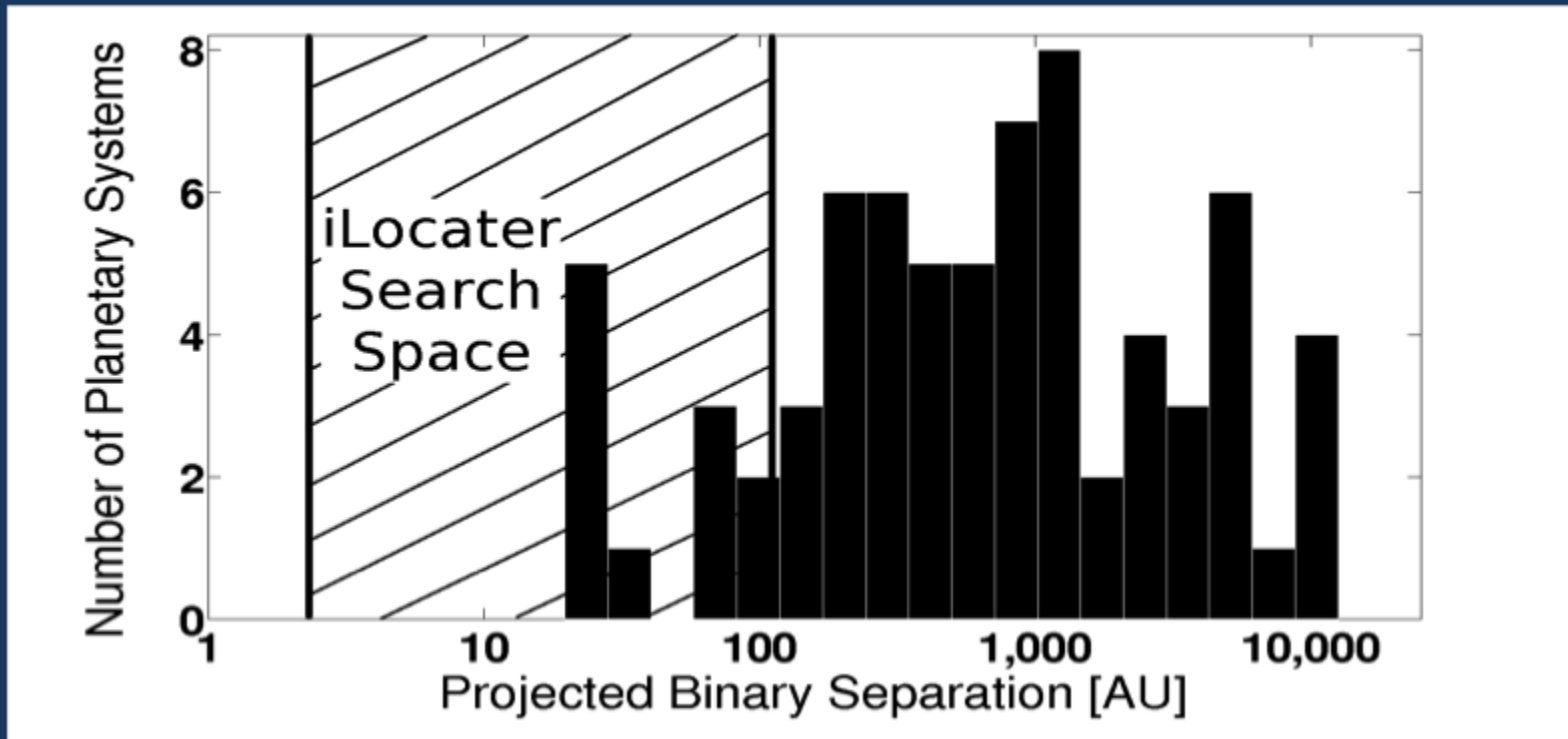
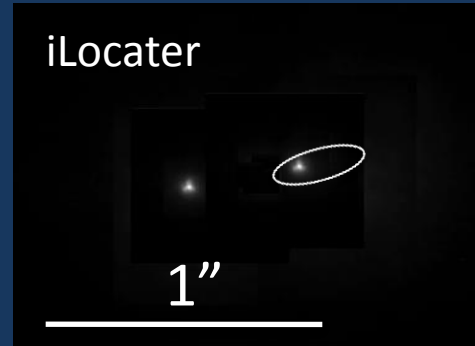
# The M-dwarf Opportunity

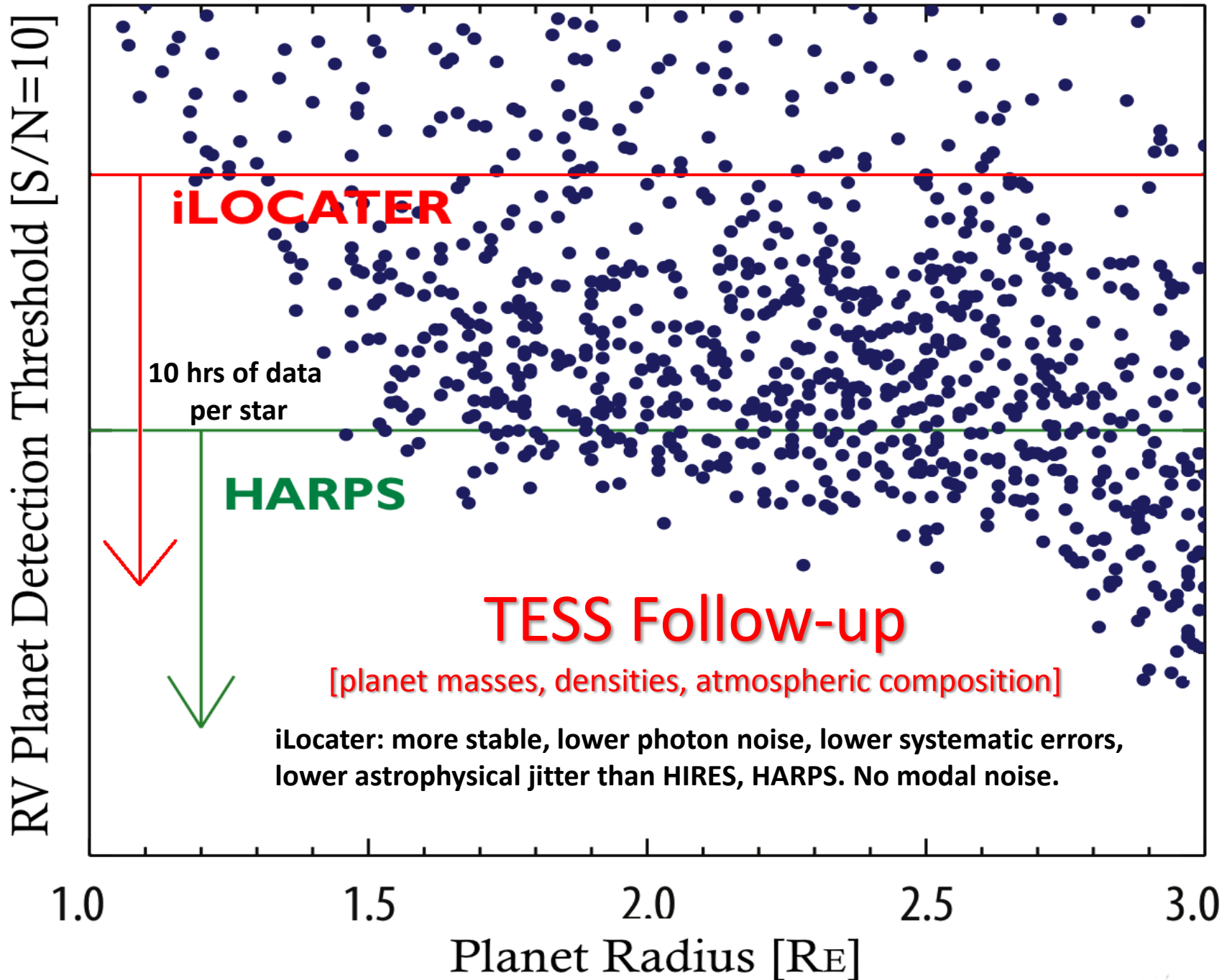


Note: LBTI AO wavefront sensor is red-optimized (RIZ-bands)

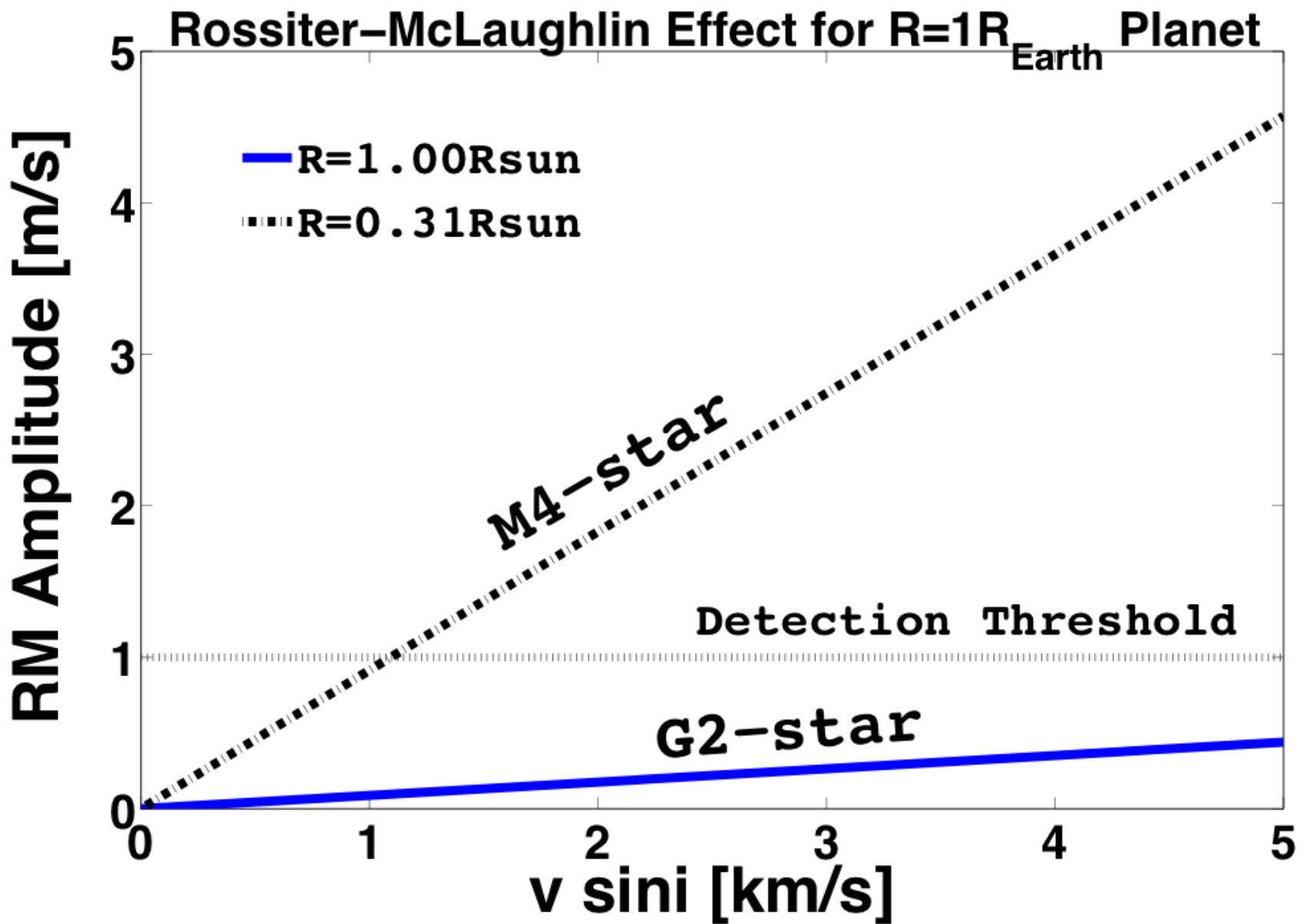
# Planets in Close-Separation Binaries

*No other telescope facility in the world can perform these measurements.*







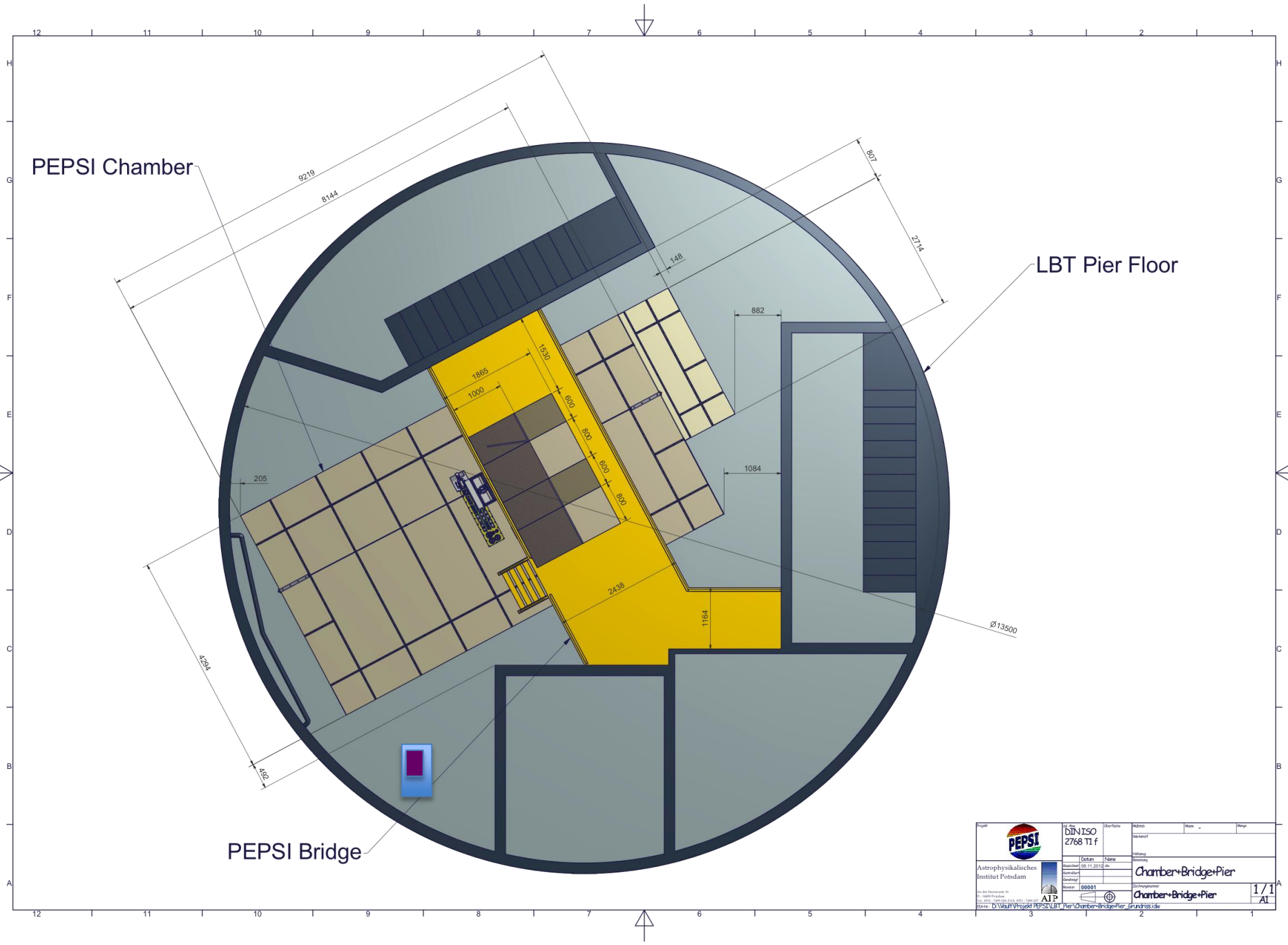


First RM measurements for Terrestrial Planets(!)

## iLocator Deliverables:

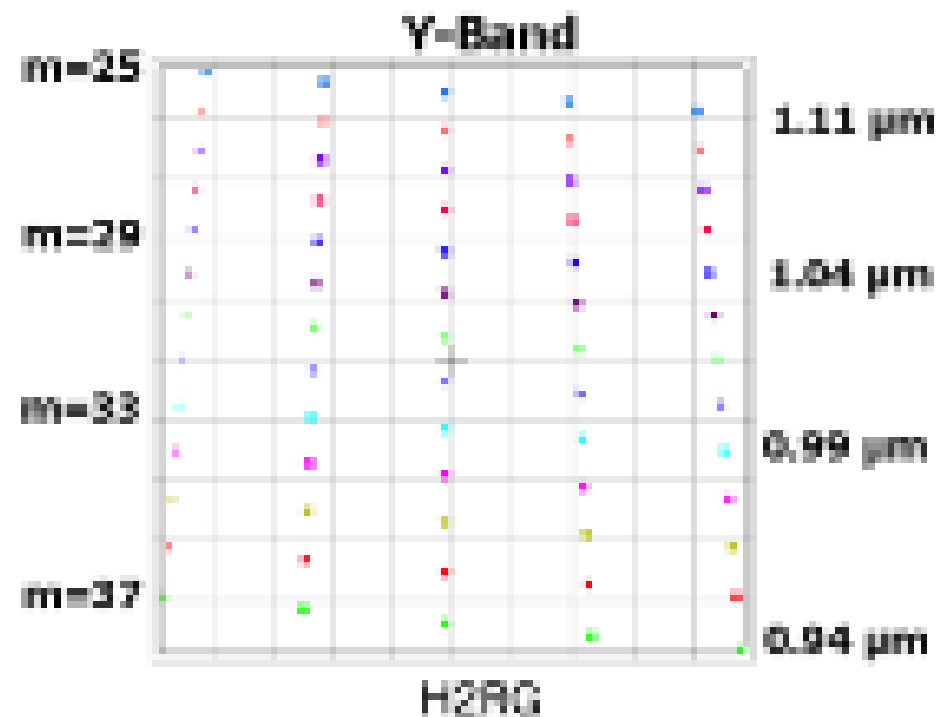
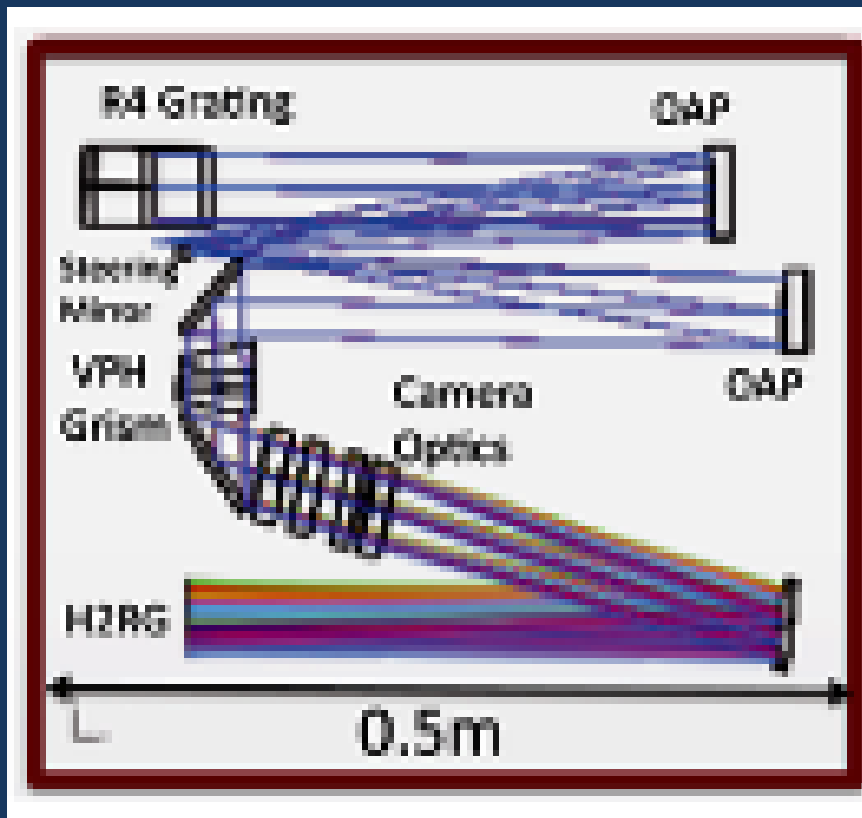
- LBTI acquisition camera
- Stabilized IR spectrometer





	Nr. des <b>bIN ISO</b> 2768 T1 f	Überfläche	Abstell	Blatt	Blatt
	Datum 08.11.2016	Name	Abstell	Blatt	Blatt
Astrophysikalisches Institut Potsdam		Zeichner 00001	Chamber+Bridge+Pier		
Dr. Heide Schmitt Dr. Heide Schmitt Dr. Heide Schmitt Dr. Heide Schmitt	Dr. Heide Schmitt Dr. Heide Schmitt Dr. Heide Schmitt Dr. Heide Schmitt	Dr. Heide Schmitt Dr. Heide Schmitt Dr. Heide Schmitt Dr. Heide Schmitt	Chamber+Bridge+Pier		
Projekt: D:\Virt\Projekt\PEPSI\LBT_Pier\Chamber+Bridge+Pier_Grundriss.rvt		Zeichnungsnummer Chamber+Bridge+Pier		1 / 1 AI	

# iLocator Optical Design

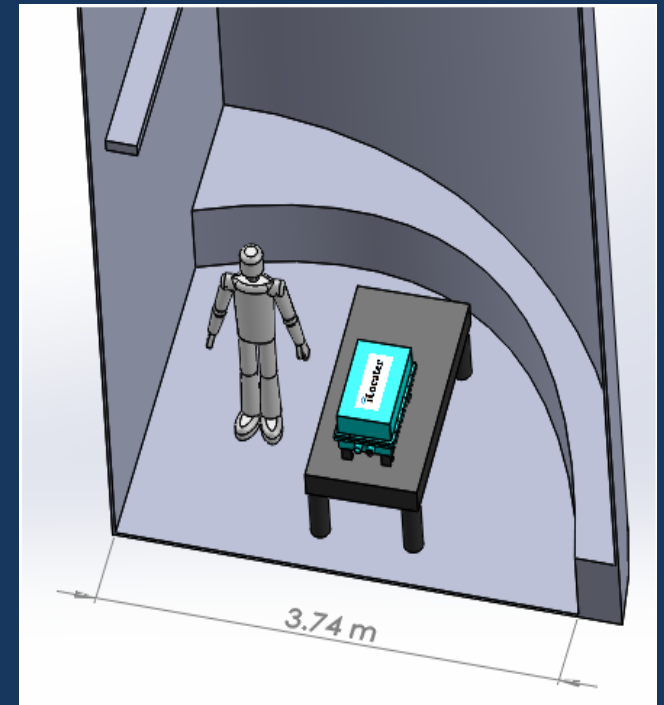
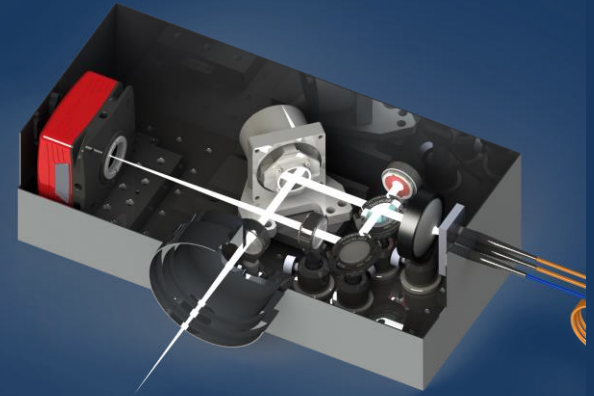




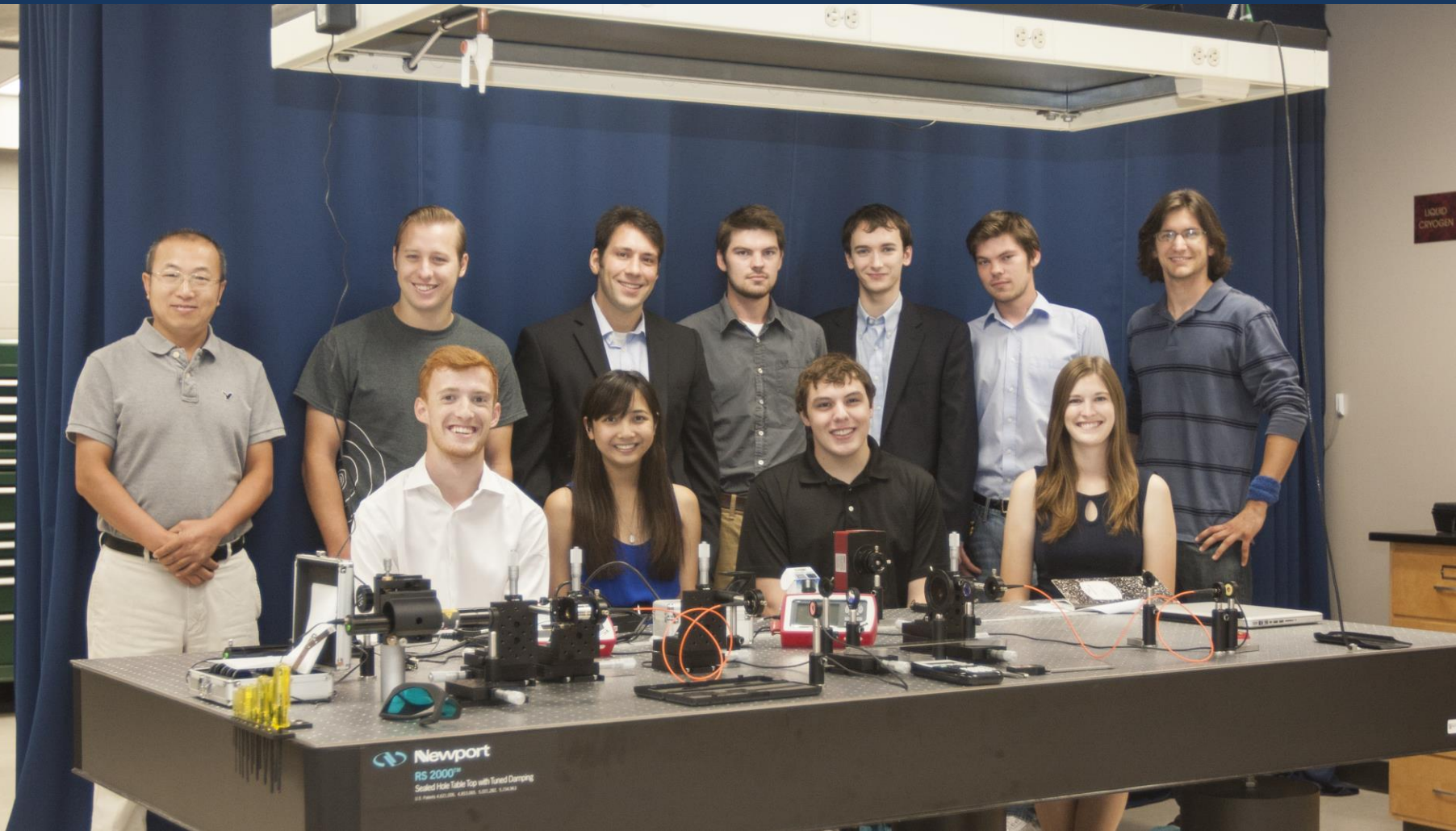
September 2013



## JHS 0.8m Acquisition Camera



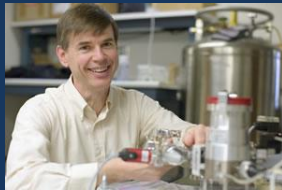
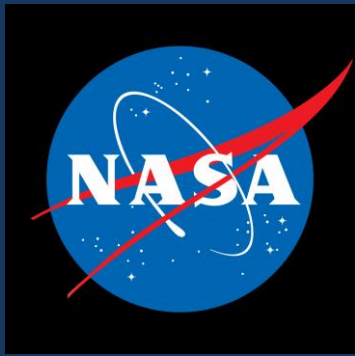
# Local iLocater Team



Bo Zhao, Robert Stoddard, Justin Crepp, Eric Bechter, Ed Kielb, Andrew Bechter, Ryan Ketterer, Jay Carroll, Taylor Corpuz, Keegan Collins, Michelle Berg, + postdoc, + project manager



# Senior Scientist Collaborators



# Observatory Considerations

- Takes advantage of world-leading AO capabilities
- Complementary wavelength range to PEPSI  
[0.38-0.91  $\mu\text{m}$  compared to 0.95-1.10  $\mu\text{m}$ ]
- Low power consumption [3 kW]
- Low maintenance
- Low risk, High reward(!)

## Fund Raising

\$103k NASA Early CAREER Fellowship [iLocater]

\$75k Notre Dame “Rapid Response”

+ start-up funds

+ moderate personnel support

\$800k NSF ATI [submitted **November 2013**]

\$960k NSF MRI [submitted January 2014]





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## We are the Fighting Irish



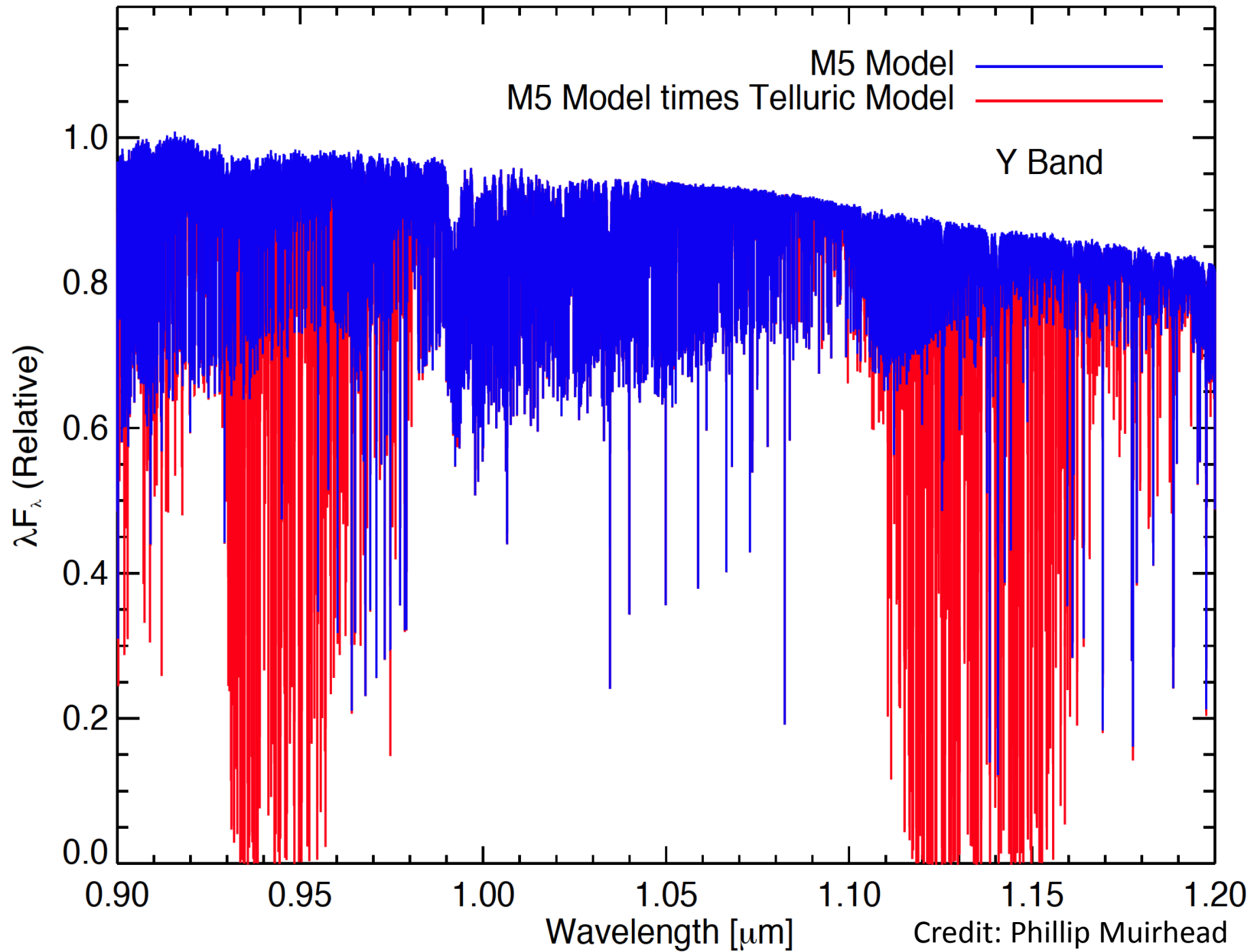
### What Would You Fight For?

The University of Notre Dame's award-winning "What Would You Fight For?" series, now in its seventh season, showcases the work, scholarly achievements, and global impact of Notre Dame faculty, students, and alumni. These two-minute segments, each originally aired during a home football game broadcast on NBC, highlight the University's proud moniker, the Fighting Irish, and tell the stories of the members of the Notre Dame family who fight to bring solutions to a world in need.

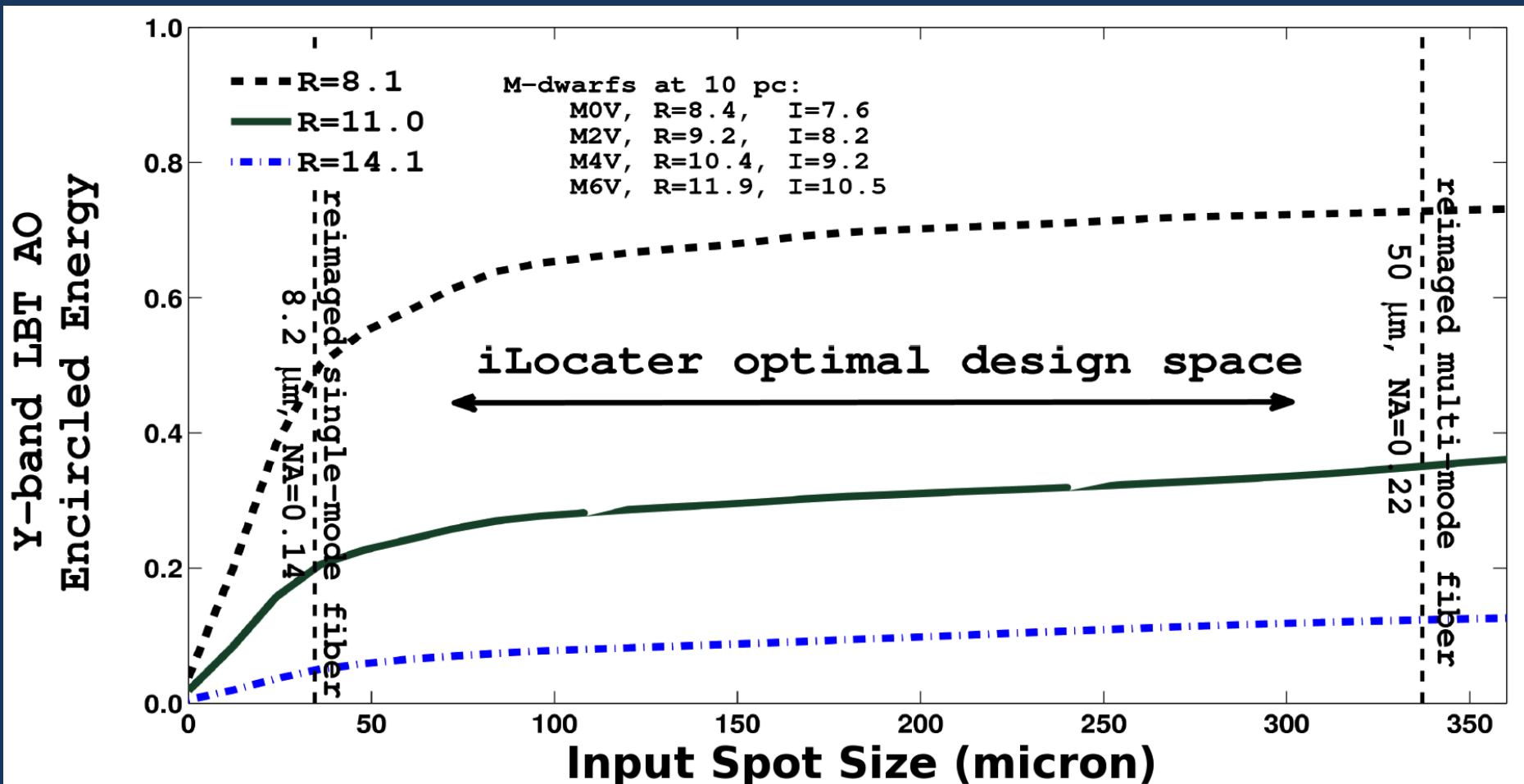
[Archive](#) >

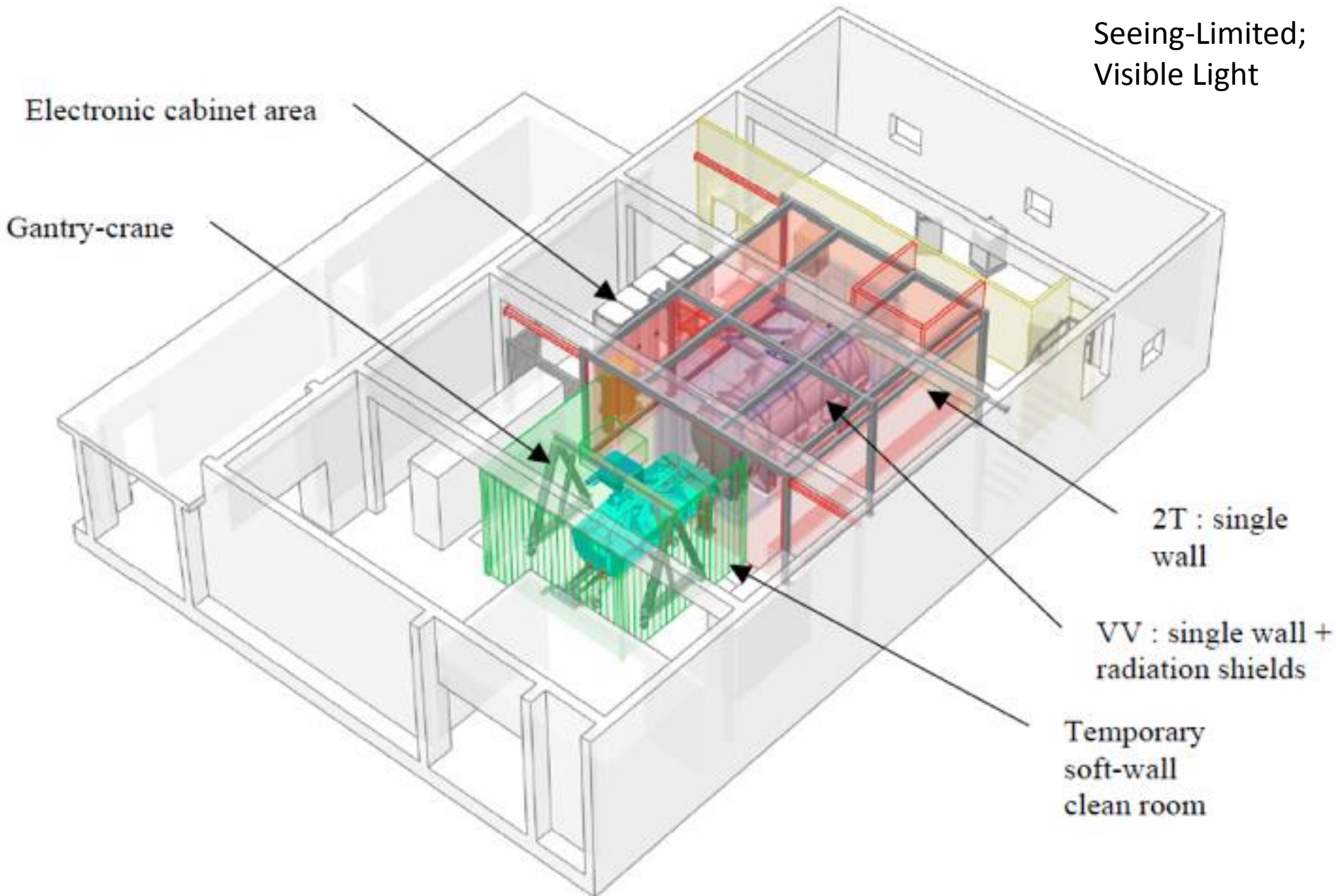
<https://www.nd.edu/fighting-for/>

Additional Slides



# Fiber Coupling





# Espresso: The Next Planet Hunter

Pepe et al. 2014