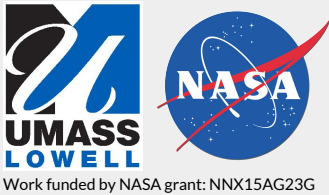


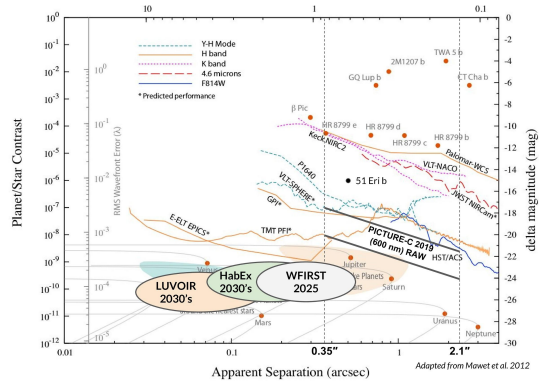
PICTURE-C: A NASA Balloon Mission to Directly Image Exozodiacal Dust Around Nearby Stars

Christopher Mendillo¹, Kuravi Hewawasam¹, Glenn A. Howe¹, Jason Martel¹, Susanna Finn¹, Timothy Cook¹, Supriya Chakrabarti¹ 1: UML



Abstract: The Planetary Imaging Concept Testbed Using a Recoverable Experiment - Coronagraph (PICTURE-C) mission will directly image debris disks and exozodiacal dust around nearby stars from a high-altitude balloon using a vector vortex coronagraph (VVC). The mission will consist of two flights, the first in September, 2018 and the second in September, 2019. The second flight will also include a microwave kinetic inductance detector (MKID) to provide spectral imaging. We present a progress report for the mission, which recently completed its critical design review. This will include a description of recent major optical design changes that occurred due to a change in the deformable mirror vendor.

Aperture	Bandpass	FOV	Contrast
24"	560-660 nm	0.35" - 2.1"	$< 10^{-7}$



2017 DM Change

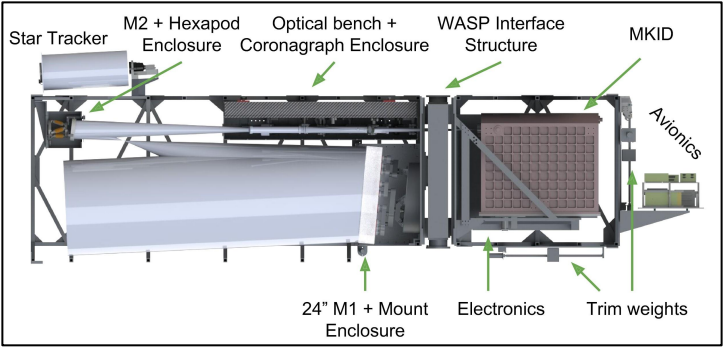
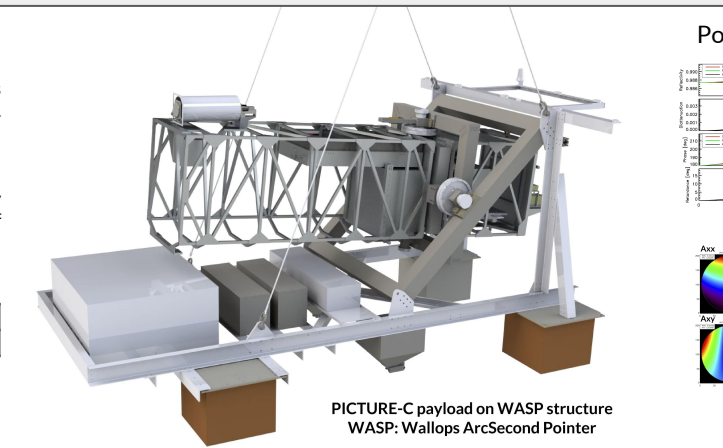
Xinetics DMs

76ch + Tip/Tilt (IWC)
45mm Clear Aperture

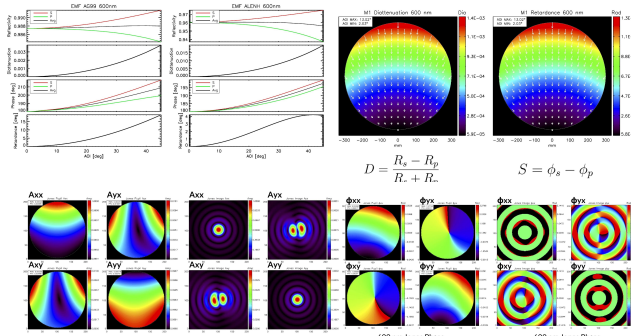
ALPAO 97ch DM + Tip/tilt
13.5mm Clear Aperture

32x32 DM
32mm Clear Aperture

BMC Kilo DM (952ch) + NASA Ames Controller
10mm Clear Aperture

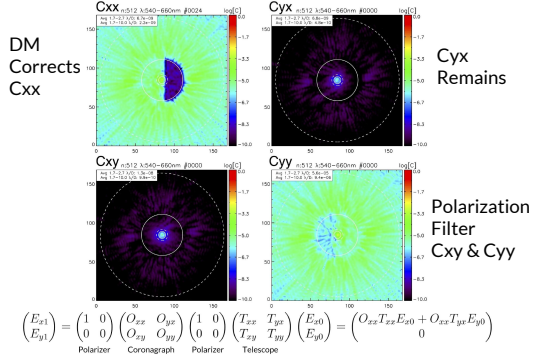


Polarization Aberration



$$\begin{pmatrix} E_{s1} \\ E_{p1} \end{pmatrix} = \begin{pmatrix} A & B \\ C & D \end{pmatrix} \begin{pmatrix} E_{s0} \\ E_{p0} \end{pmatrix} = \begin{pmatrix} AE_{s0} + BE_{p0} \\ CE_{s0} + DE_{p0} \end{pmatrix}$$

4 Incoherent PSFs



MKID

Microwave Kinetic Inductance Detector

Clone of DARKNESS

125 x 80 pixels

R~20

DARKNESS @ Ben Mazin Lab, UCSB