

A NIR MOAO MOS for MK?

(A near-IR multi-object adaptive optics multi-object spectrograph for Mauna Kea)



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A NIR MOAO IFU spectrograph concept

- Global AO provided by ASM or e.g. Offner relay
- Optical Specifications
 - FoV 8' diameter
 - Number of Spectrograph / IFU channels: 16 – 20
 - Wavelength pass-bands: (I), J, H, K
 - $R = 3000-5000$
- Integrated MOAO correction
 - Uses small stroke MEMS in open-loop for individual field correction
 - Corrects anisoplanatism only: typically a couple hundred nm
 - Individual FoV: 4.5"
 - Spatial sampling: 0.15" (50% of the flux in one pixel)

Object selection mechanism concept (from TMT)

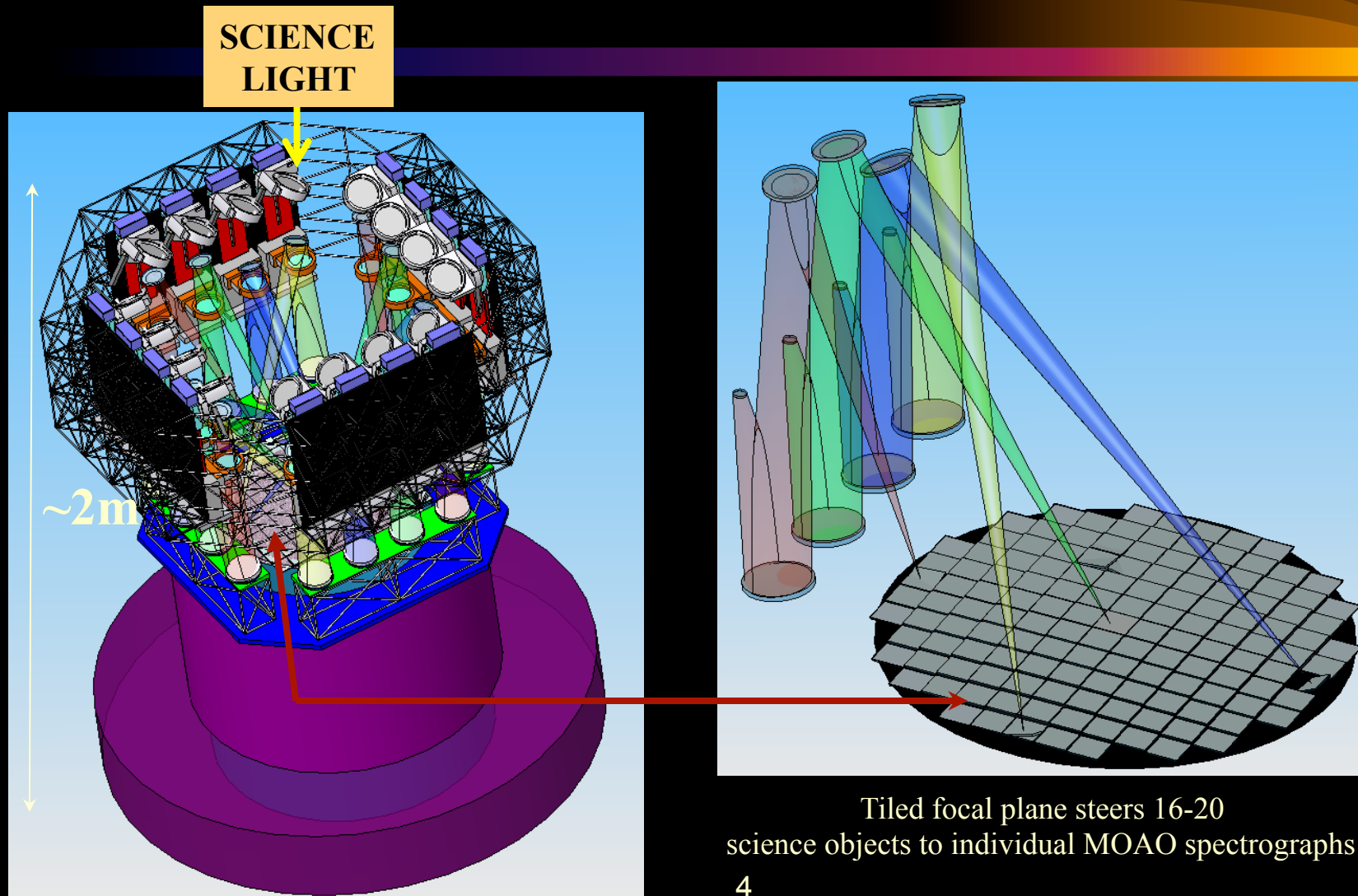
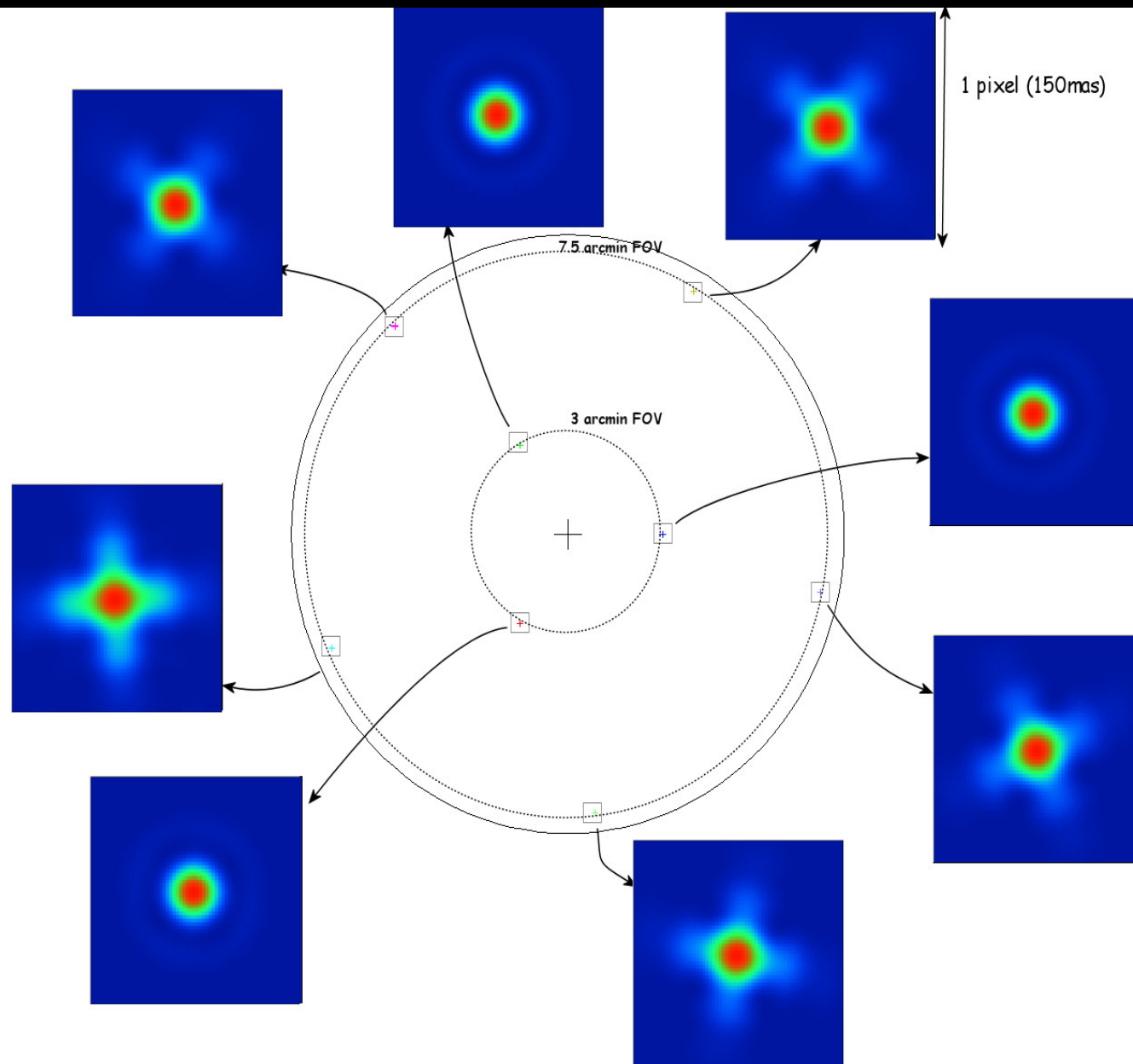
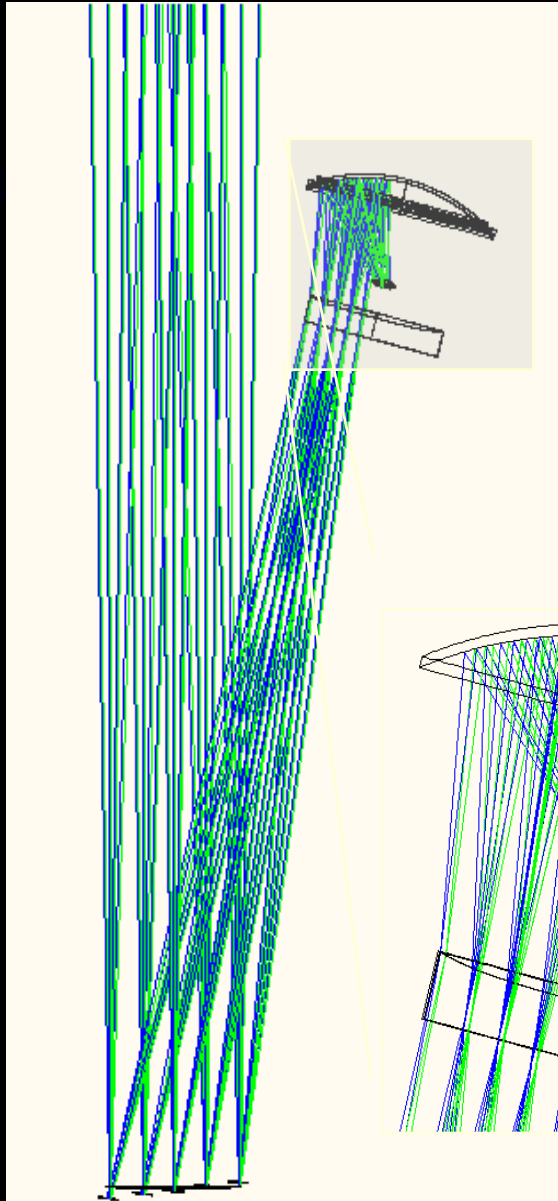


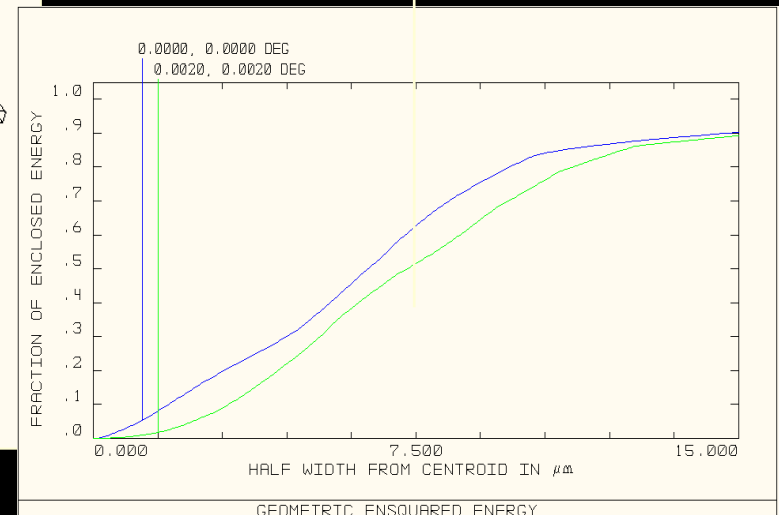
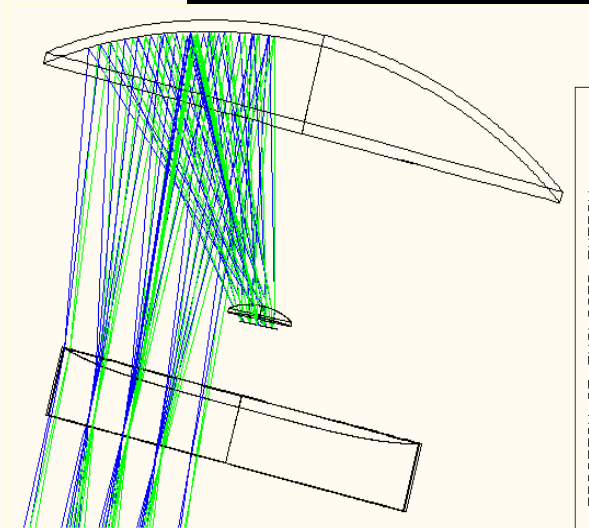
Image quality over the Keck pathfinder FOV



IRMOS pathfinder acquisition/GLAO camera

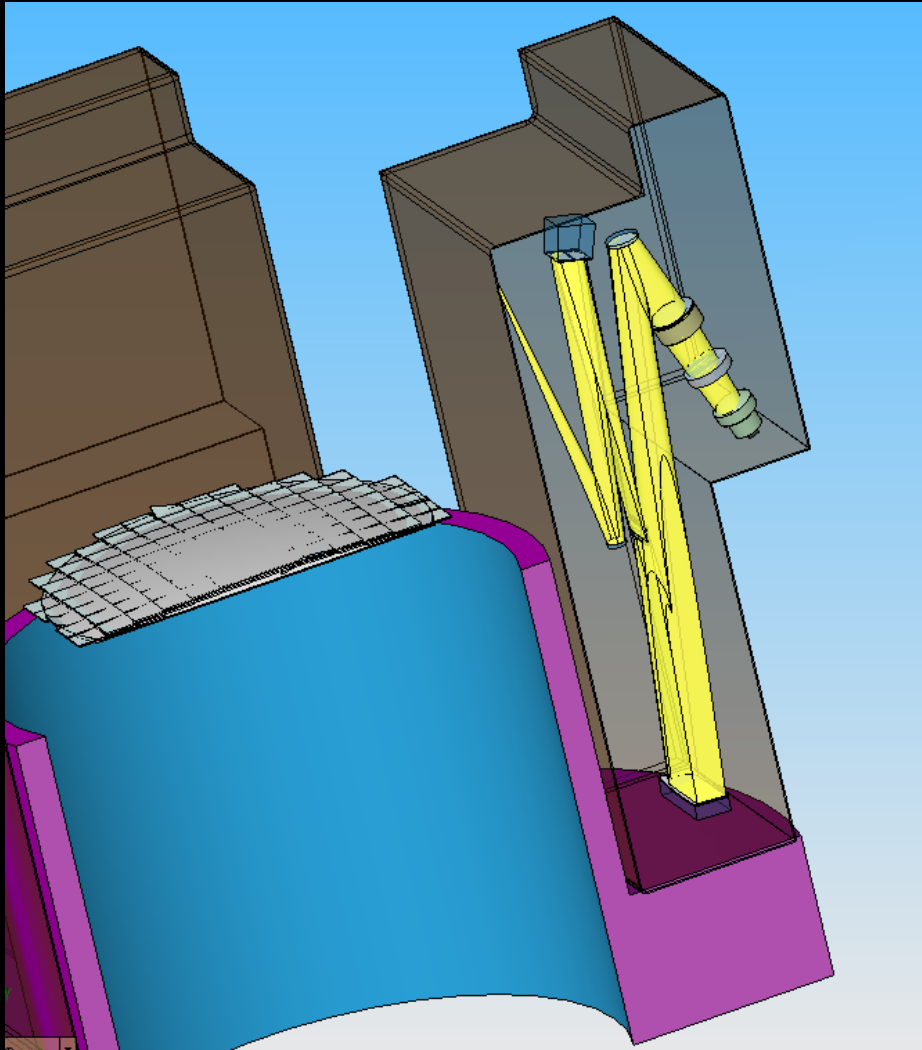


- Proof of concept for large FoV imager
 - Half of a Schmidt camera (to preserve the full pupil)
 - 2k x 2k detector (15 μ m): 0.2"/pix
- Image quality:
 - 30 to 50% EE in one pix
 - 70 to 90% EE in two pix



Spectrograph design

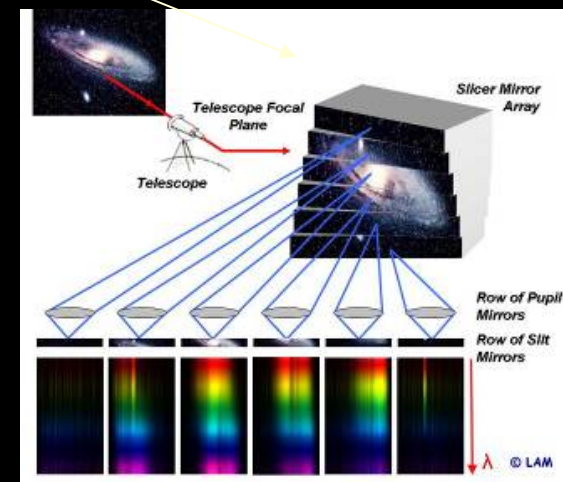
16 simple channels...



Cryostats (4) surround OSM

There are 4 channels per cryostat
(50mm beam diameter, F/2.5 camera,
no aspherics = simple)

Each channel has 30 segment
image slicer



Conclusions



- An IRMOS pathfinder at Keck
 - Technically feasible; benefits from ASM
 - May be scientifically compelling to investigate
 - Maintains Keck competitiveness through multiplex and field of regard
- Cost effective?
 - Utilizes existing TOPICA laser
 - Ensquared energy goal is technically easier than precision wavefront correction
 - Instrument development cost share with TMT?