\`imaka

a GLAO demonstrator for Maunakea

Mark Chun

University of Hawai\’i/ IfA

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wide-field AO on Maunakea

Maunakea is ideal for GLAO
- GL is highly confined
- FA seeing is excellent ~1/3"

How wide can we go?
Plots care of Yoshito Ono, Carlos Correia, and Raven team (2016, Private communication)

- Only GLAO version
- EE is in a 140max box
- H-band
- 3’ FOV
GLAO demonstrator on UH88"

A broken Offner optical design (Baranec)

~1m
mixture of old and new

Repurpose the Wavefront Sensors from CFHT mWFS Experiment - Five 8x8 subap SHWFSs

Repurpose the Deformable Mirror from Subaru AO36 - 36 curvature actuators
mixture of old and new

Carbon-fiber Structure - weight and CTE issues v. hygroscopic and machine tolerance issues

STA1600 – 10k x 10k CCD camera for UH88 (11’x11’)

Ø16” light-weighted mirror with carbon-fiber whiffle tree

D. Hall H4RG-15 camera (7’x7’
GLAO demonstrator on UH88”

imaka FWHM in SCI FOV

Open Loop (0.5µm)
GLAO demonstrator on UH88"

imaka Strehl in SCI FOV

Distance from Field Center (arcmin)

Strehl Ratio

- g
- Y
- r
- J
- i
- H
- z
- K
A demonstrator/testbed for GLAO

- Operational constraints
  - Need natural guide stars (3-5) $R < \sim 11$
  - WFSs are fixed on a “plug-plate”.
  - We will observe only 1-2 fields per night.
A demonstrator/testbed for GLAO

Experimental flexibility - Entrance and exit focal planes can be configured for whatever we want - supports multiple science cameras, additional/high-order WFSs, multiple calibration units, others...
Demonstrating GLAO

- Quantify GLAO v. GS field
- Measure PSF/Science Gain
  - wavelength/time/field dependence,
  - seeing/OTP dependence
- Test GLAO controls
  - GS asterism dependence
  - tomography/averaging

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Guide Stars

STA1600 camera
FOV 11’x11’

H4RG camera
FOV 7’x7’

0.4 degrees

STA10k

11’

Note: DOES NOT account for inverted image in focal plane
Demonstrating GLAO science

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Guide Stars

STA1600 camera
FOV 11’x11’

H4RG camera
FOV 7’x7’

0.4 degrees
Demonstrating GLAO science

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Guide Stars

STA1600 camera

H4RG camera

0.4 degrees

11'
Demonstrating other techniques...

- starbug WFSs (AAO)
  - push sky coverage
  - MOAO experiments
- starbug IFUs
  - demonstrating GLAO +dIFUs
- OTCCD
- R-LGS?
  - full sky coverage
  - LTAO experiments

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Schedule

- Integrating in lab now
- on-sky this fall
- GLAO ~ October
- start of demo science 17A
- We are interested in further collaborations to help ULTIMATE-Subaru

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0.4 degrees