

# First on-sky demonstration of the C-BLUE One camera and the HEART RTC platform on REVOLT

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# REVOLT

## Research, Experiment, and Validation of Adaptive Optics with a Legacy Telescope

- ◆ REVOLT is an SCAO system for the HAA 1.2m McKellar telescope
- ◆ Operates at the Coudé focus, just like VOLT in 2008
- ◆ REVOLT is intended as a test bench to test new AO technologies developed by or critical to HAA on sky.
- ◆ Complements HAA AO Lab
- ◆ Two successful runs so far
  - Aug 2022 (one night)
  - Sep 2022 (two nights)
- ◆ Site characteristics:
  - Seeing = 1.5" (best) / 2.1" (mean) / 2.5" (90%tile) / 4.2" (worst) 2



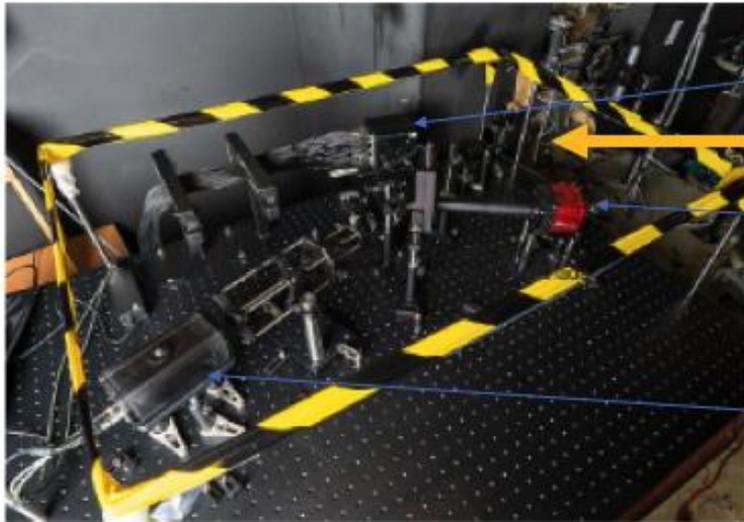
# AO technologies to be tested

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- ✓ ◆ First Light C-Blue One camera
  - NFIRAOS LGS WFS camera)
- ✓ ◆ HEART RTC Platform
  - To be used in NFIRAOS, GNAO, GPI2, GIRMOS and possibly MORFEO and ANDES
- ◆ Fiber-fed photonic spectral correlation sensor
  - Remote gas detection and identification technique
  - Developed by NRC-AEP and NRC-HAA, based on correlation spectroscopy with a piezoelectric tunable fiber-optic Fabry-Perot filter
- ◆ Open-loop AO (GIRMOS), PWFS control, Advanced control algorithms
- ◆ 20x20 Low-voltage DM prototype (NRC-NanoTechnology)
- ◆ 512x512 Saphira NIR APD camera



# REVOLT in the Coudé room



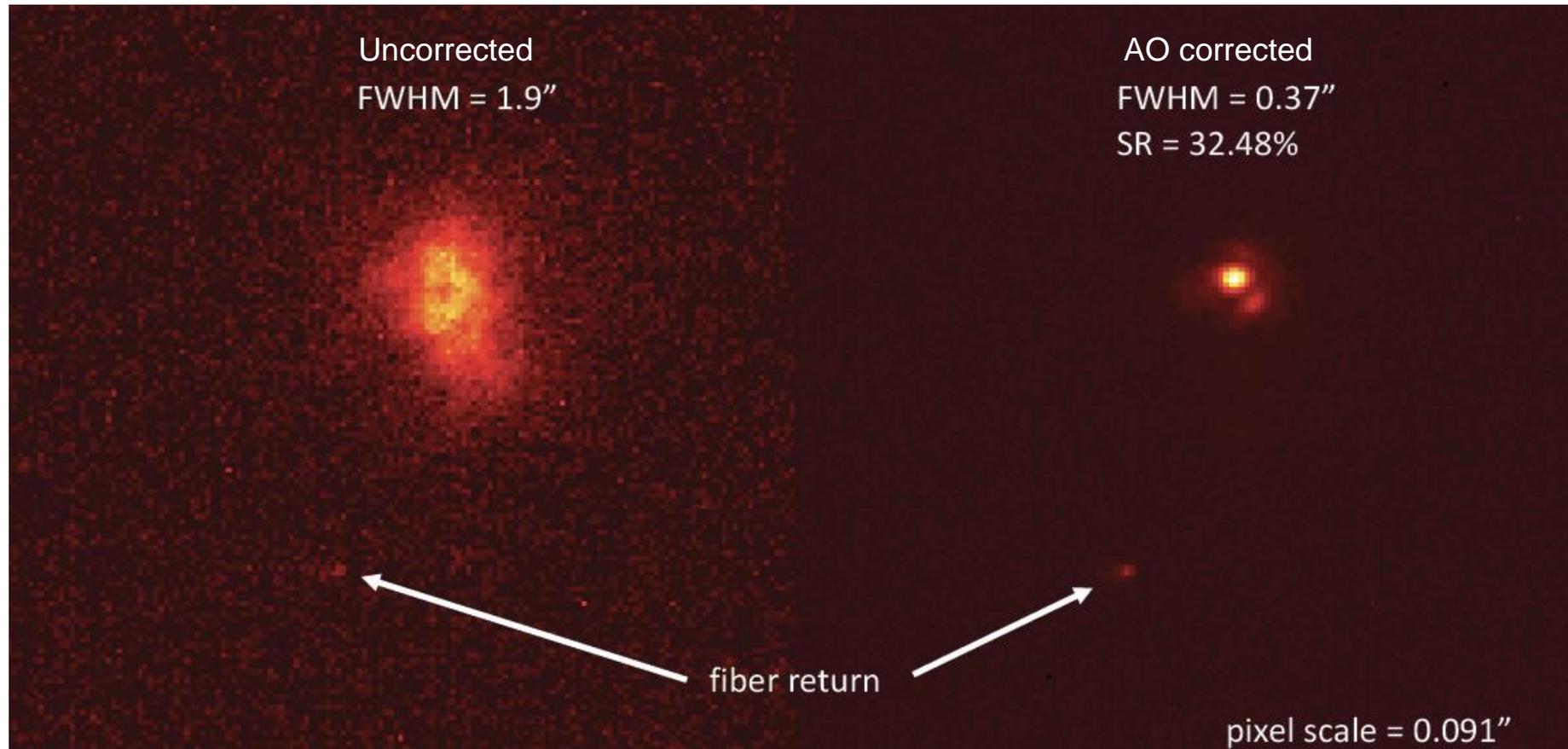
- Deformable mirror
- Light from telescope
- NIR Science Camera
- C-Blue One camera



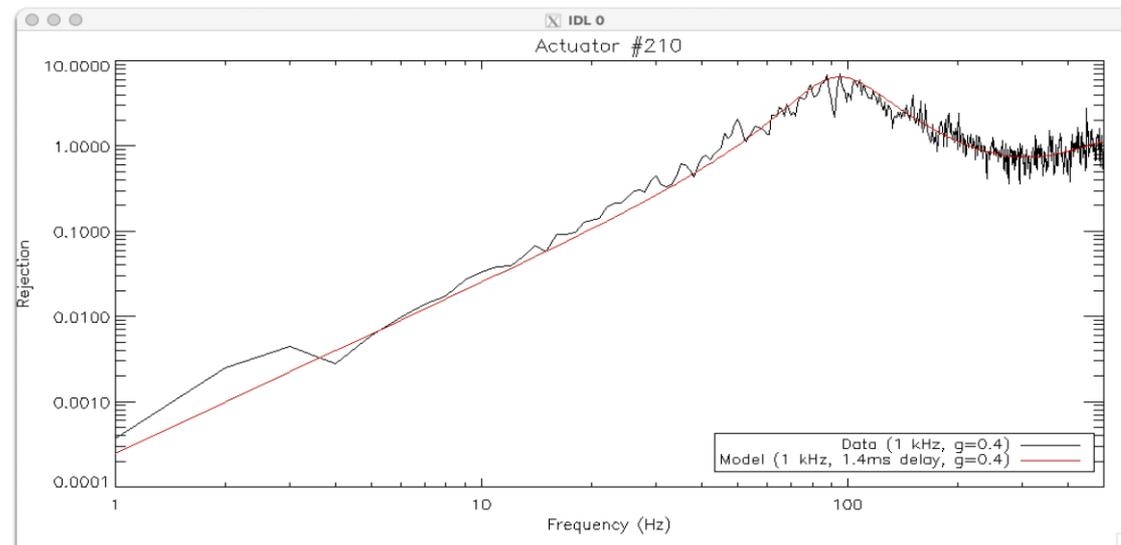
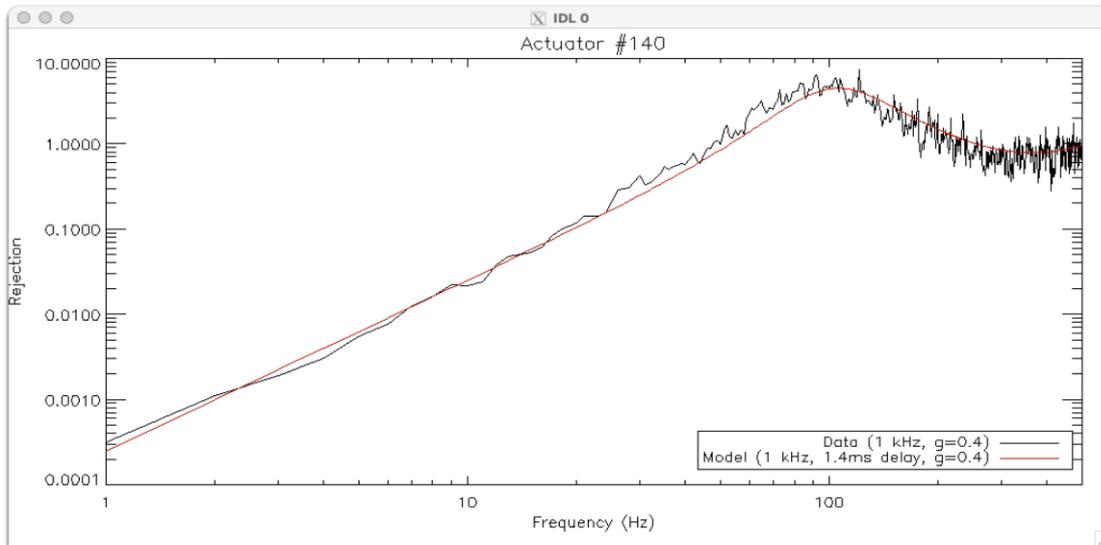
# First results

## Alpha Persei (Mirfak) Aug 12

- “H-Band” (1600nm  $\pm$  50nm)
- Frame rate = 1 kHz
- Airy: FWHM = 0.28”



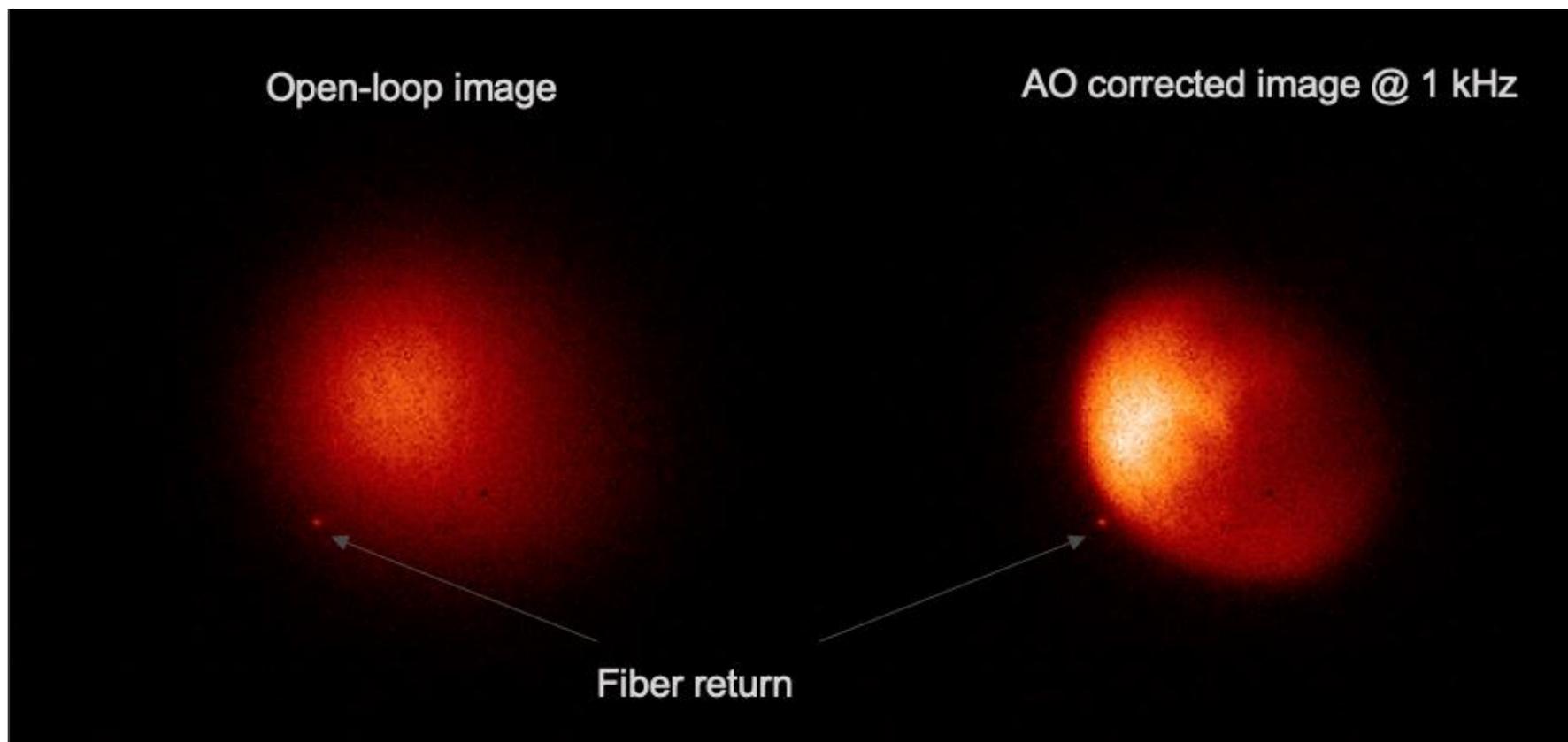
# Rejection transfer functions



- Using open-loop and closed loop data with  $r_0=5\text{cm}$  disturbance
- Very clean fit
- Interface to C-Blue One is CoaXPress 2.0
  - No pixel streaming – frame must be complete to be available
- ROI 352x352 pixels read from camera @ 1 kHz
  - Integration time = 891  $\mu\text{s}$

# MARS !

- Mars (10.29" diameter – Sep 9, 2:45am PDT)
  - Sub-aperture FOV: 15.3"
- 50 images, 0.75s per image H-band



# MARS !

Open-loop image

AO corrected image @ 1 kHz

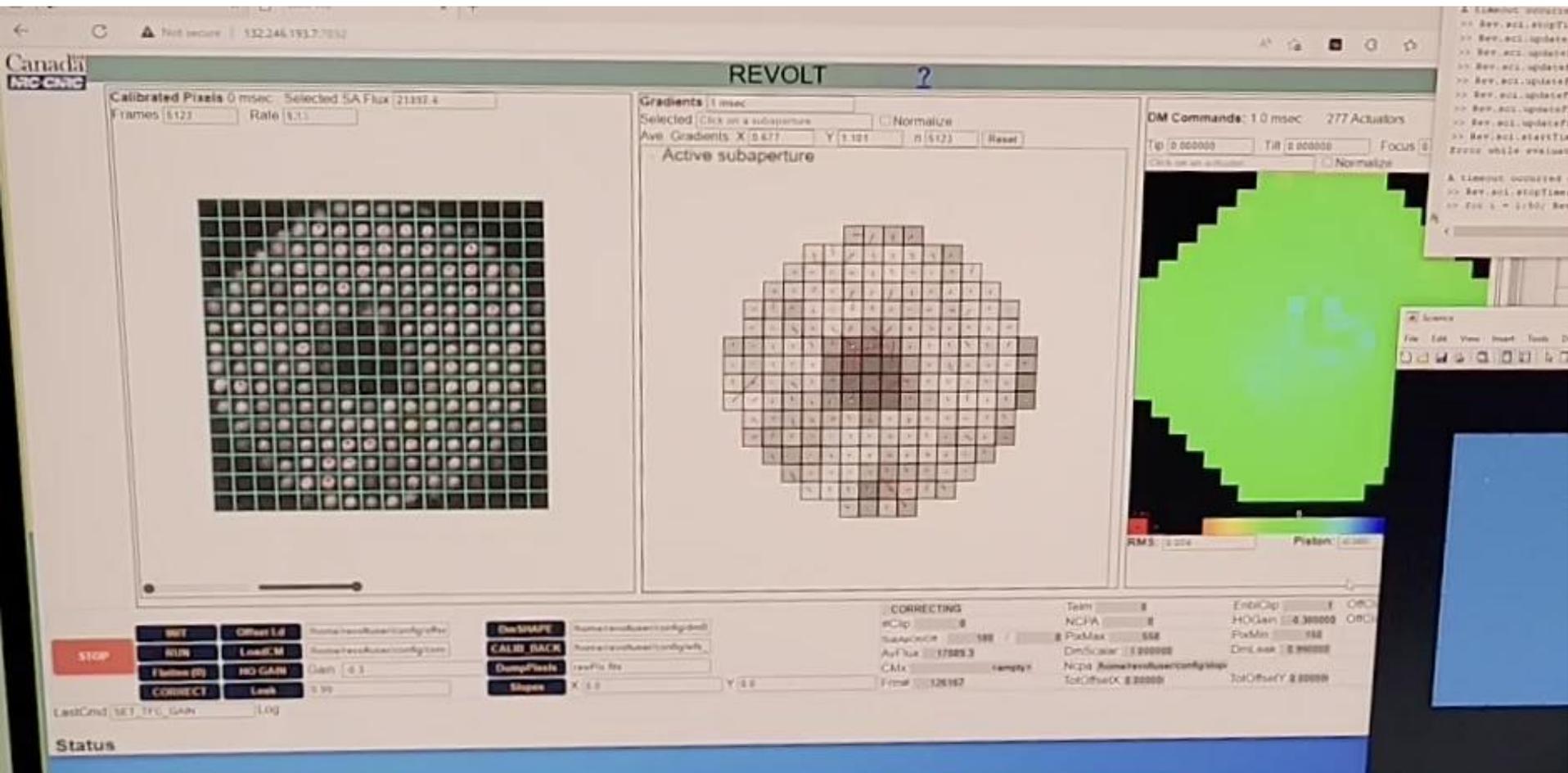


Fiber return



Mars map computed from Stellarium

# REVOLT GUI



# The REVOLT Team

- ◆ AO Group
  - Kate Jackson
  - Dave Andersen
  - Tarun Kumar (PhD student)
  - Daniel Muhwezi (co-op student)
  - Jean-Pierre Véran
- ◆ Optics Group
  - Olivier Lardière
- ◆ Software Group
  - Jennifer Dunn
  - Darryl Gamroth
  - Dan Kerley
  - Lianne Mueller
  - Malcolm Smith
  - Ed Chapin
  - Jonathan Stocks
- ◆ Telescope Group
  - Dmitry Monin
  - David Bohlender



1.2m telescope control room

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