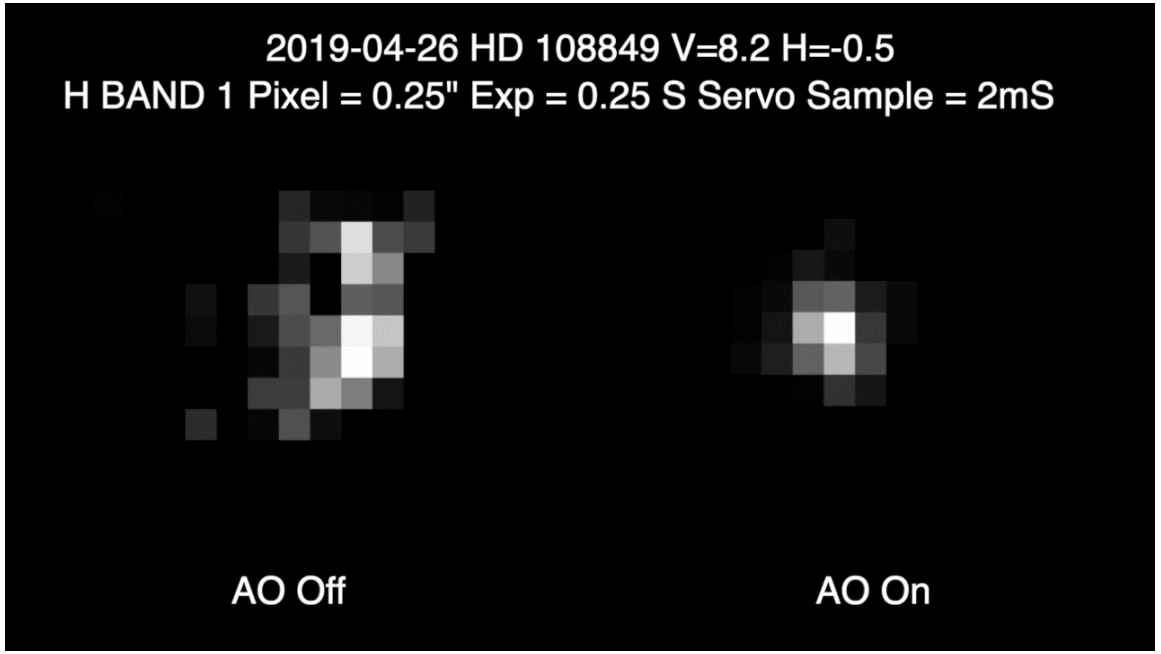
News from CHARA

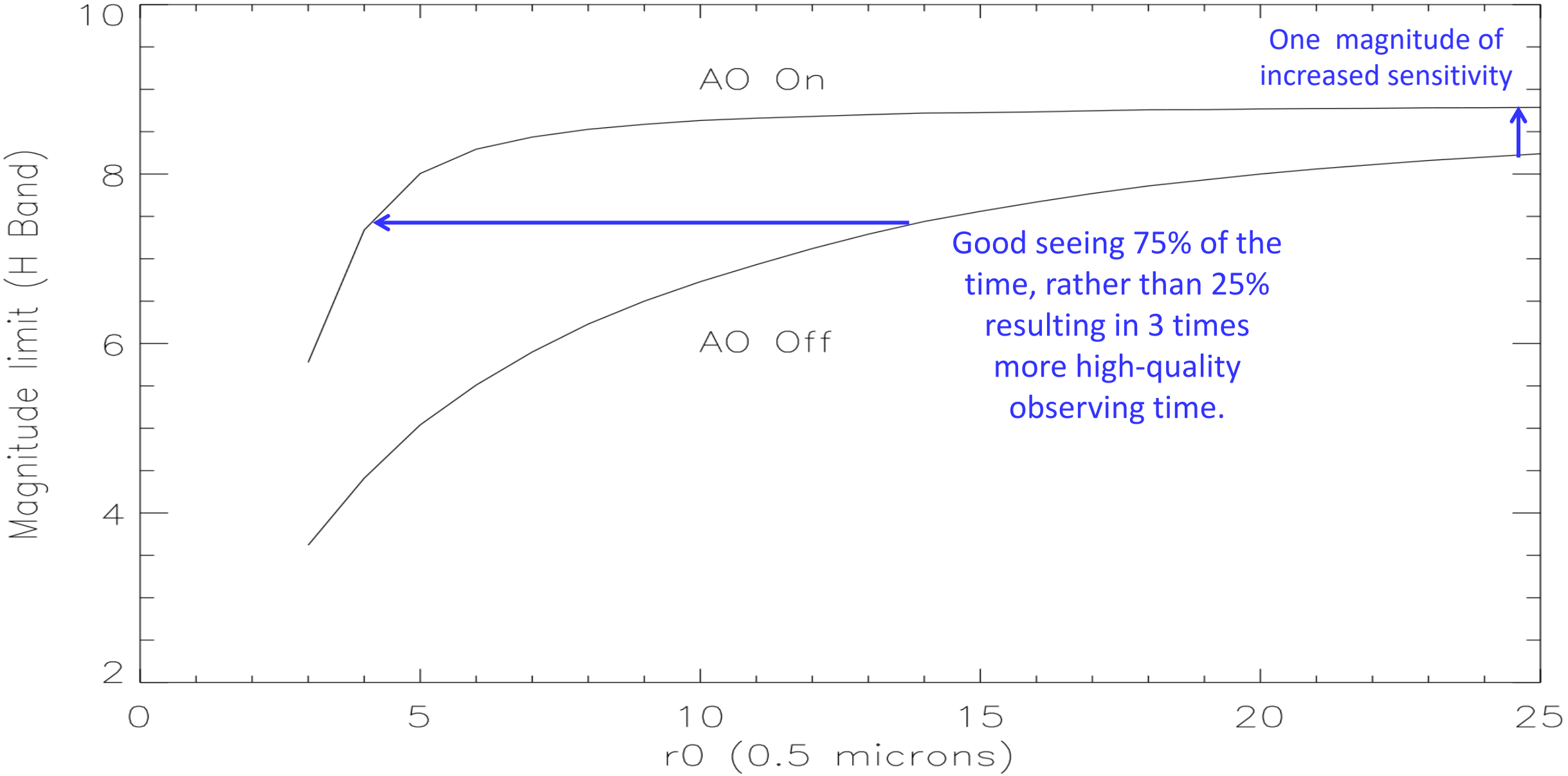
AG JMMC 2020

By Cyprien Lanthermann

AO implementation



- All six telescopes are AO-ready. All hardware is installed.
  - Currently 2 Telescopes are regularly using AO.
  - Providing diffraction limited images at science detectors.
- Lab-AO is currently in regular use on all 6 telescopes.
  - Lab-AO has demonstrated long term stability.
- AO exacerbates alignment shortfalls in the beam-train.
  - Automated alignment maintaining procedures are in place.
- 3 DMs have developed problems and have been removed.
- Laboratory AO test bed is under construction to diagnose DMs.
- Working with ALPAO to diagnose problems to avoid shipping costs and dangers.


Magnitude limit (H Band)
10
8
6
4
2
0
5
10
15
20
25
r0 (0.5 microns)
AO On
AO Off
One magnitude of increased sensitivity
Good seeing 75% of the time, rather than 25% resulting in 3 times more high-quality observing time.

New generation instruments

- MIRC-X
- MYSTIC
- SPICA
- CLASSIC/CLIMB++

MIRC-X

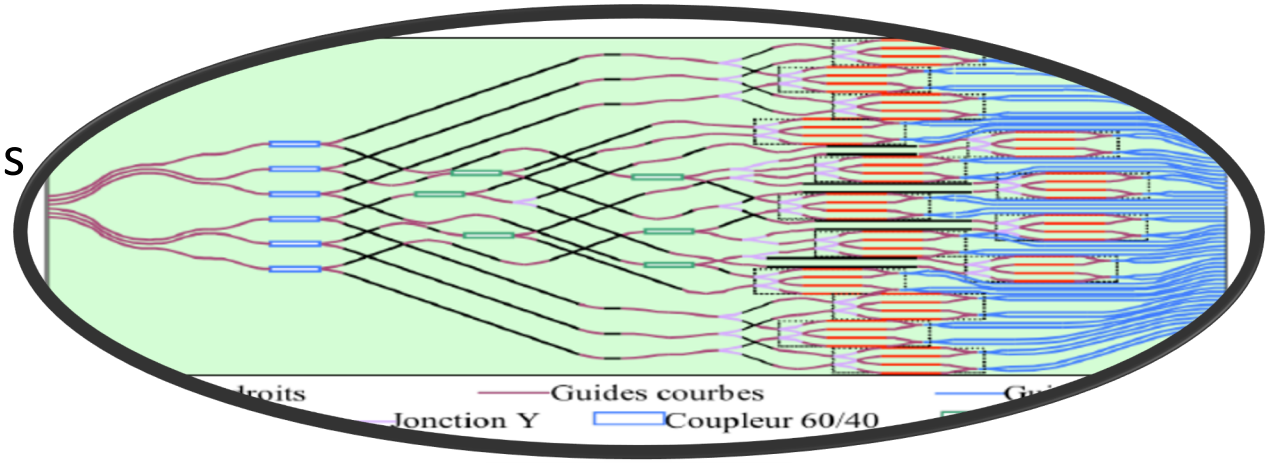
- 6-telescope interferometric beam combiner built for imaging planet-forming discs
- Enables imaging at highest resolution in H-band:
  $\lambda/2B=0.0005$” (λ=1.6μm)
- 6T efficiency enables multi-epoch imaging of temporal variability on sub-AU scales

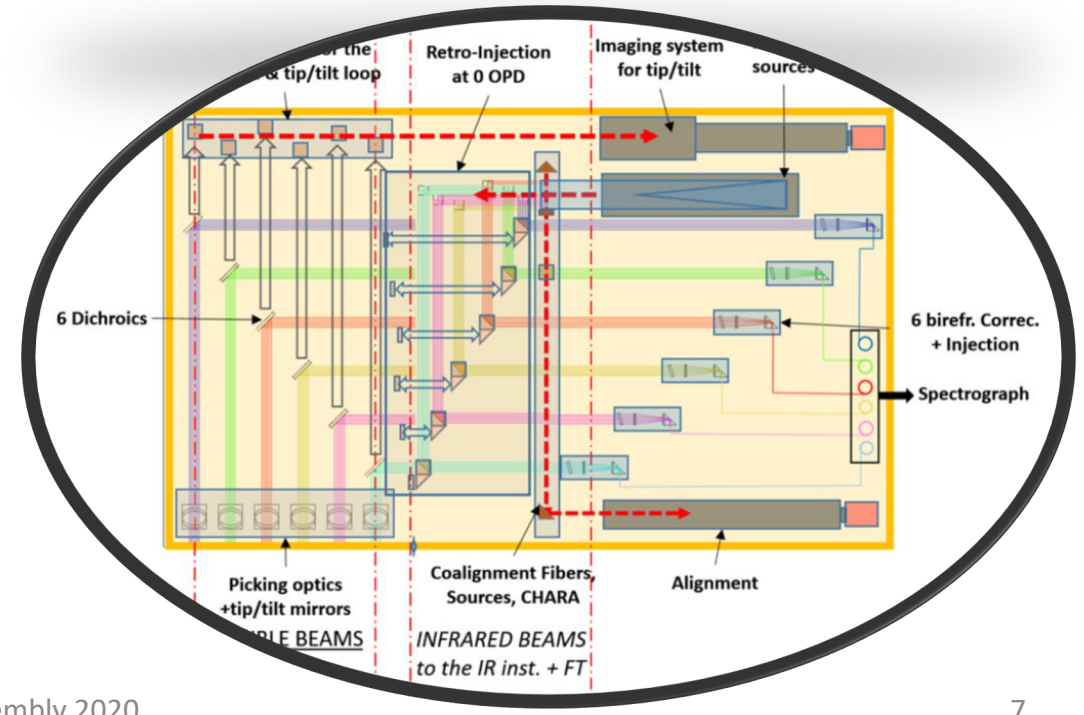
MYSTIC

- NSF/ATI Funded at the University of Michigan. PI John Monnier.
- Cryogenic beam combiner with fiber feedthroughs optimized for K band (1.95-2.38microns).
- Uses a CRED-ONE e-APD array camera.
- The 6-beam combiner has been tested warm.
- Final integration stage is on-going at Michigan led by graduate student Benjamin Setterholm.
- The planned shipping to CHARA is Summer 2021.

SPICA

- Project based at the University of Nice, PI Denis Mourard. A replacement for the VEGA instrument now being decommissioned.
- An H-band 6T-ABCD fringe sensor aiming at performing a group delay and phase delay tracking of the fringes.
- A visible instrument combining All-In-One the 6 CHARA beams in the optical domain (600-850nm) and proposing two main modes of dispersion.
- R =140 for sensitivity and diameter measurements.
- R=3000 for spectral imaging.
- We plan to install SPICA in late in 2021.





CLASSIC/CLIMB++

- Improving sensitivity by 2 magnitudes
  - Replace PICNIC camera with a C-RED ONE
- Higher spectral resolution
- H and K-band simultaneously
- Polarization split

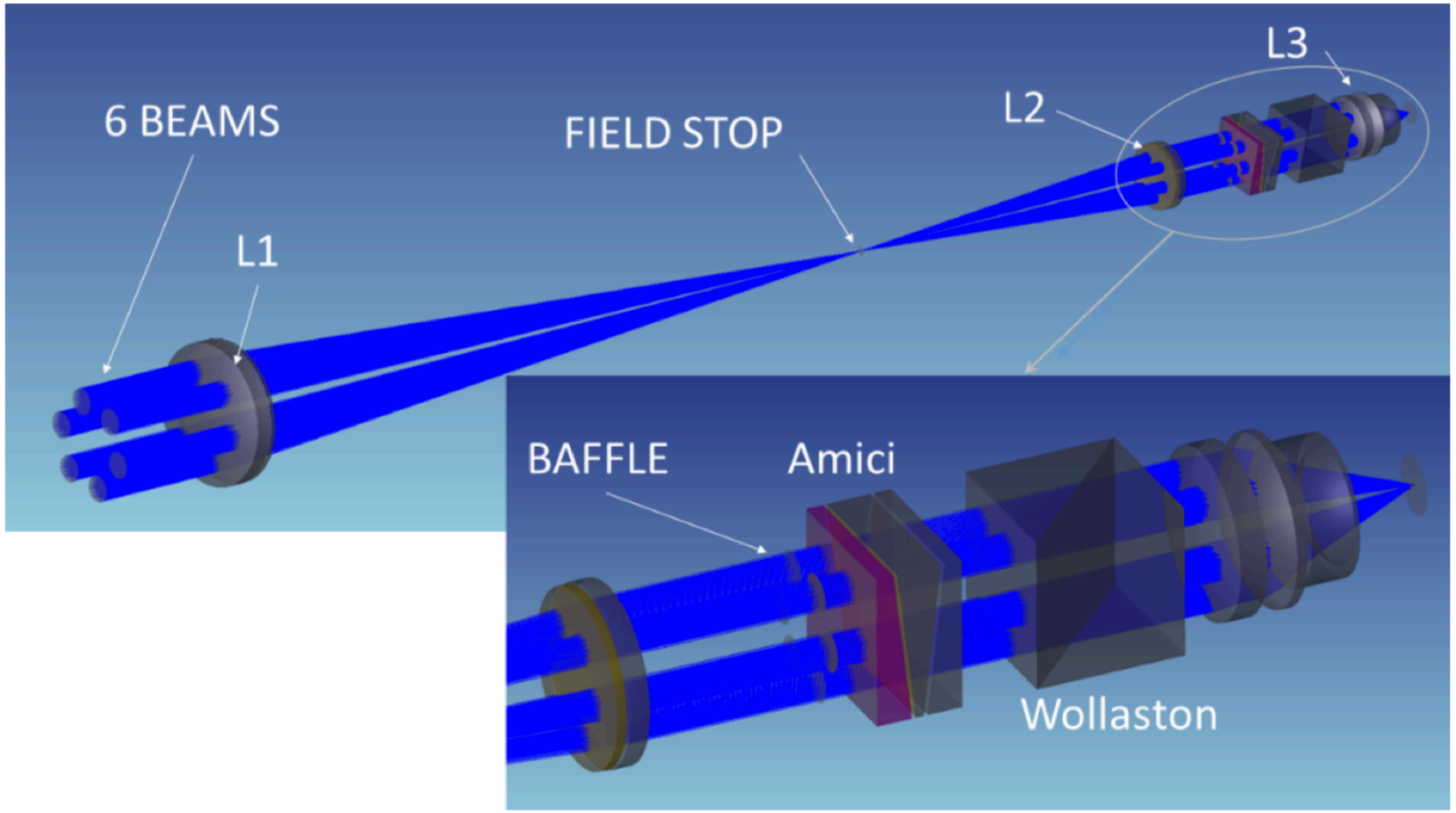
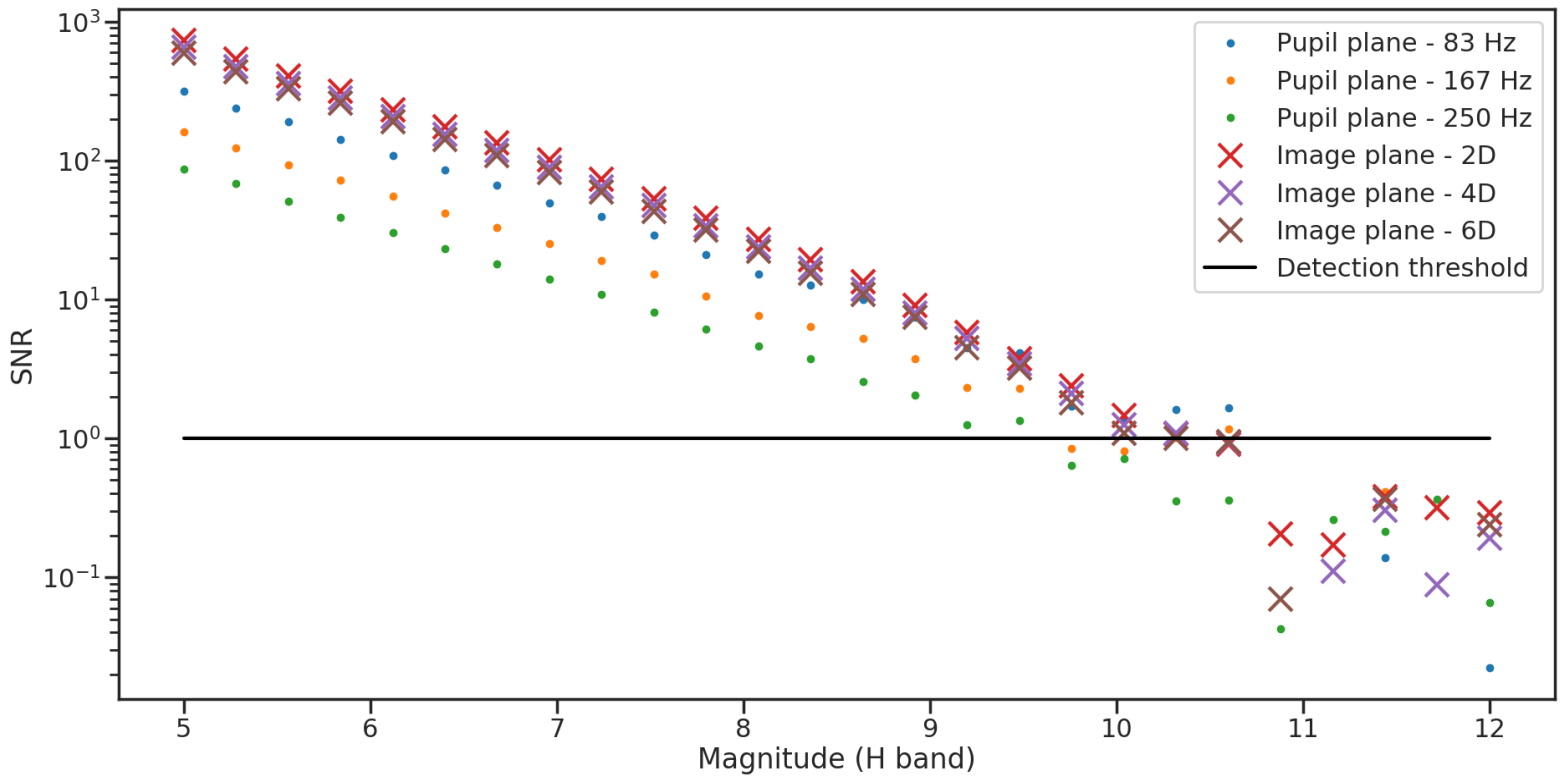


Figure 11. ZEMAX model of the optical design. L1 is part of the existing system, while the remaining cold optics are part of this proposal.

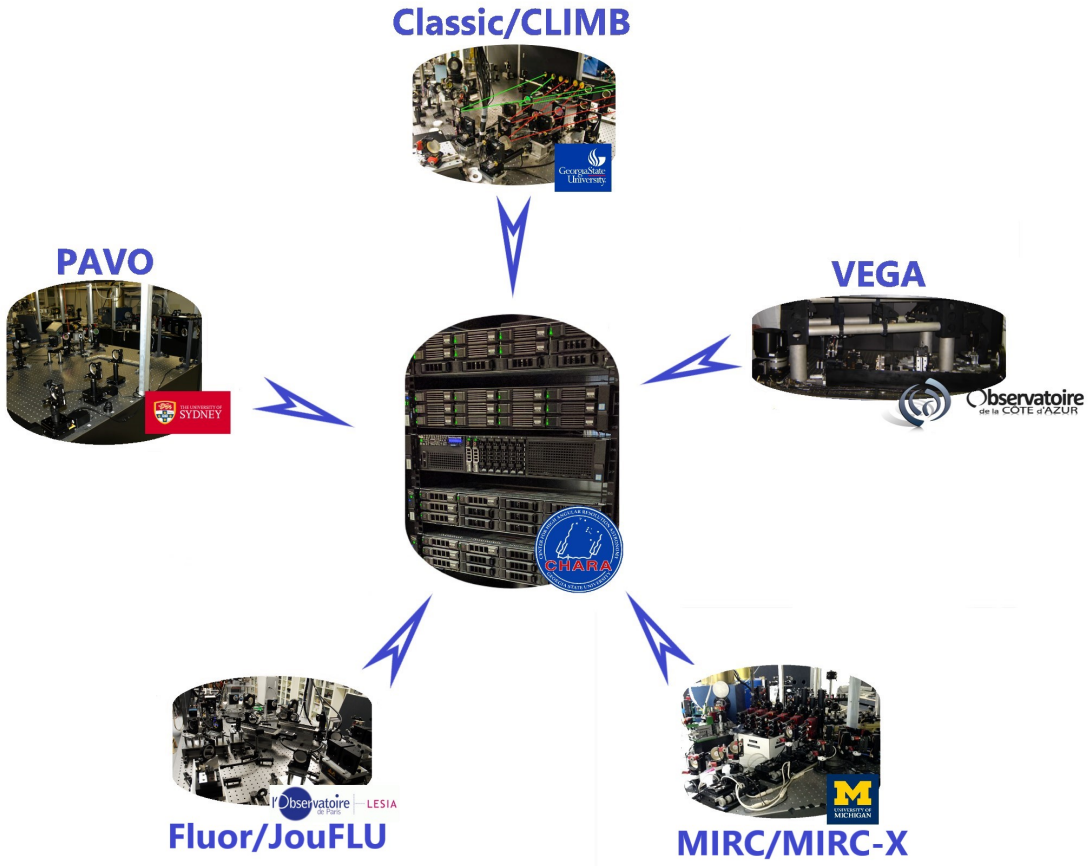
CLASSIC/CLIMB++



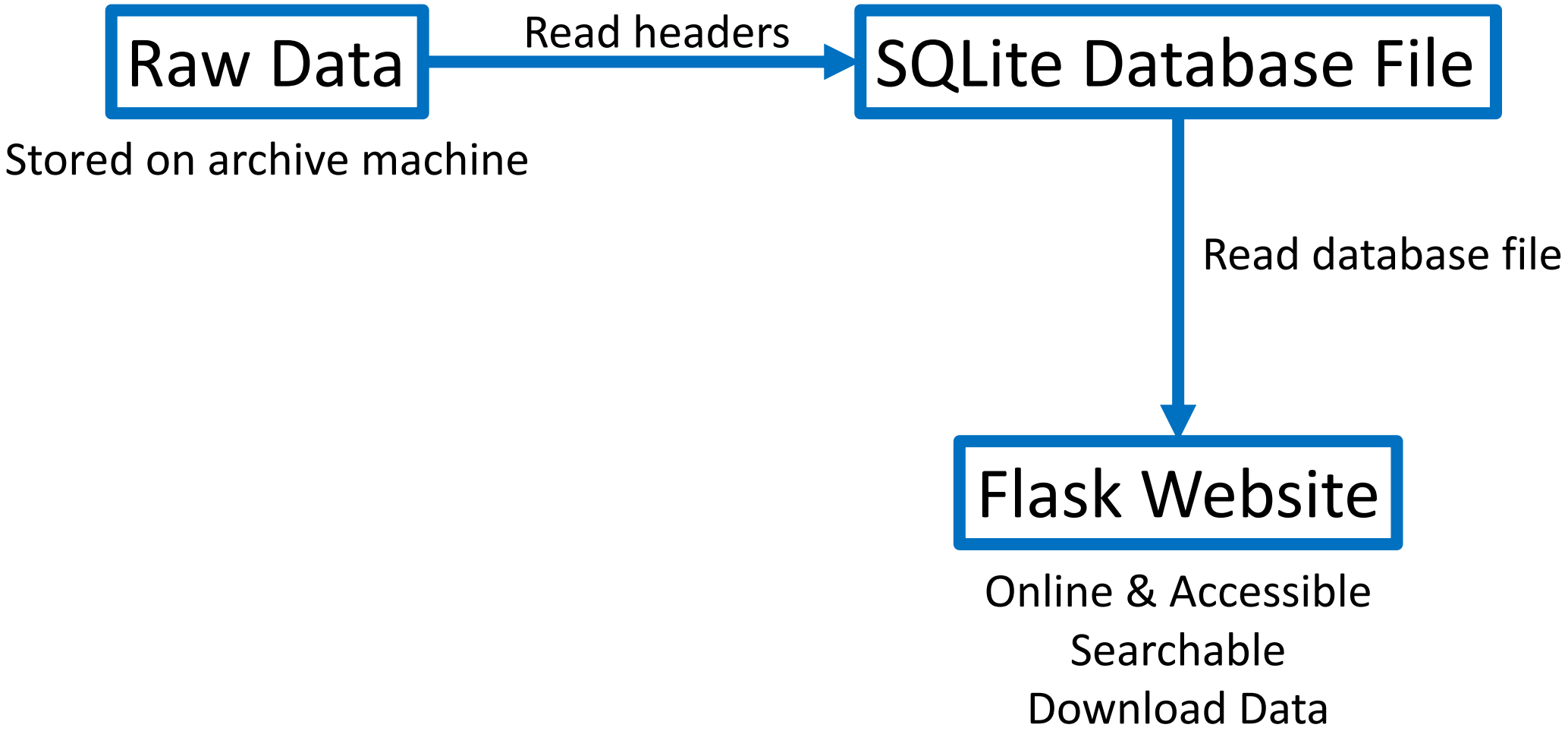
- Study to determine if going from a pupil plane interferometer to an image plane is worth
  - Image plane plane slightly better

CHARA database

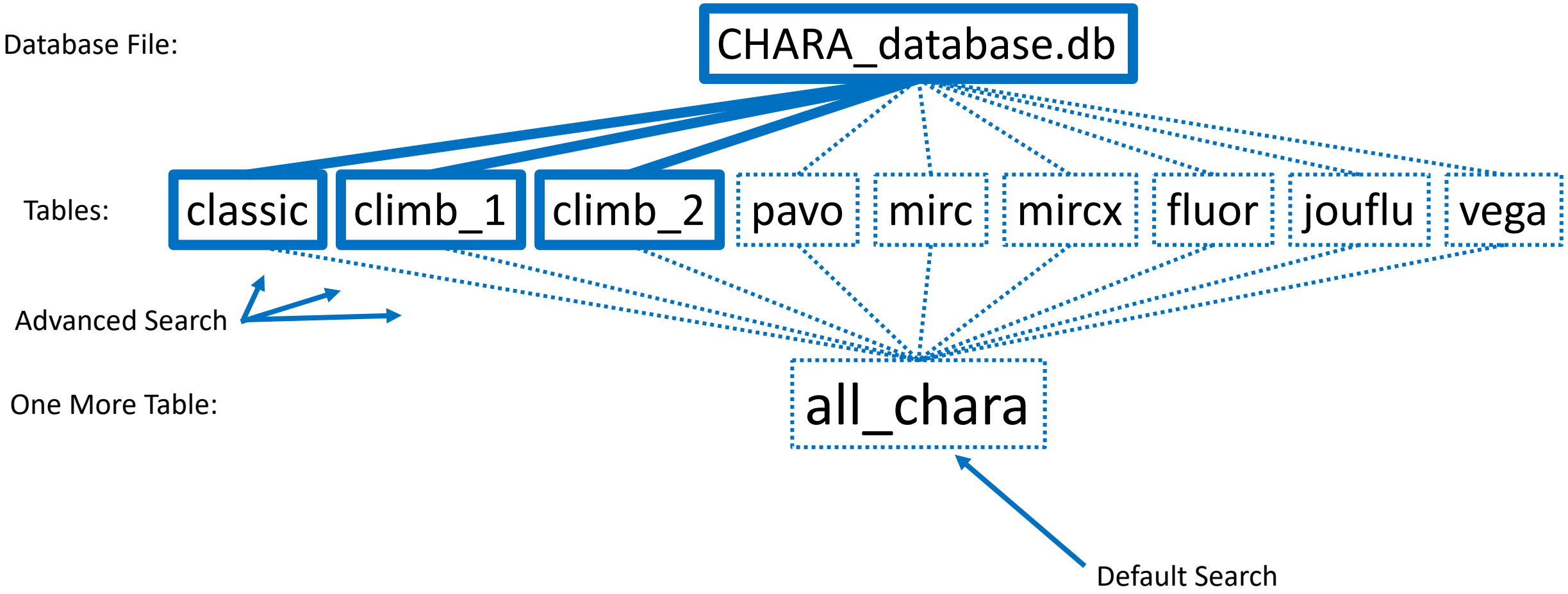
- Consolidated Archive
- 100 TB, with room for more
- We have:
  - Most raw data
  - Some “auto-reduced” data
  - Some published data



CHARA database



CHARA database



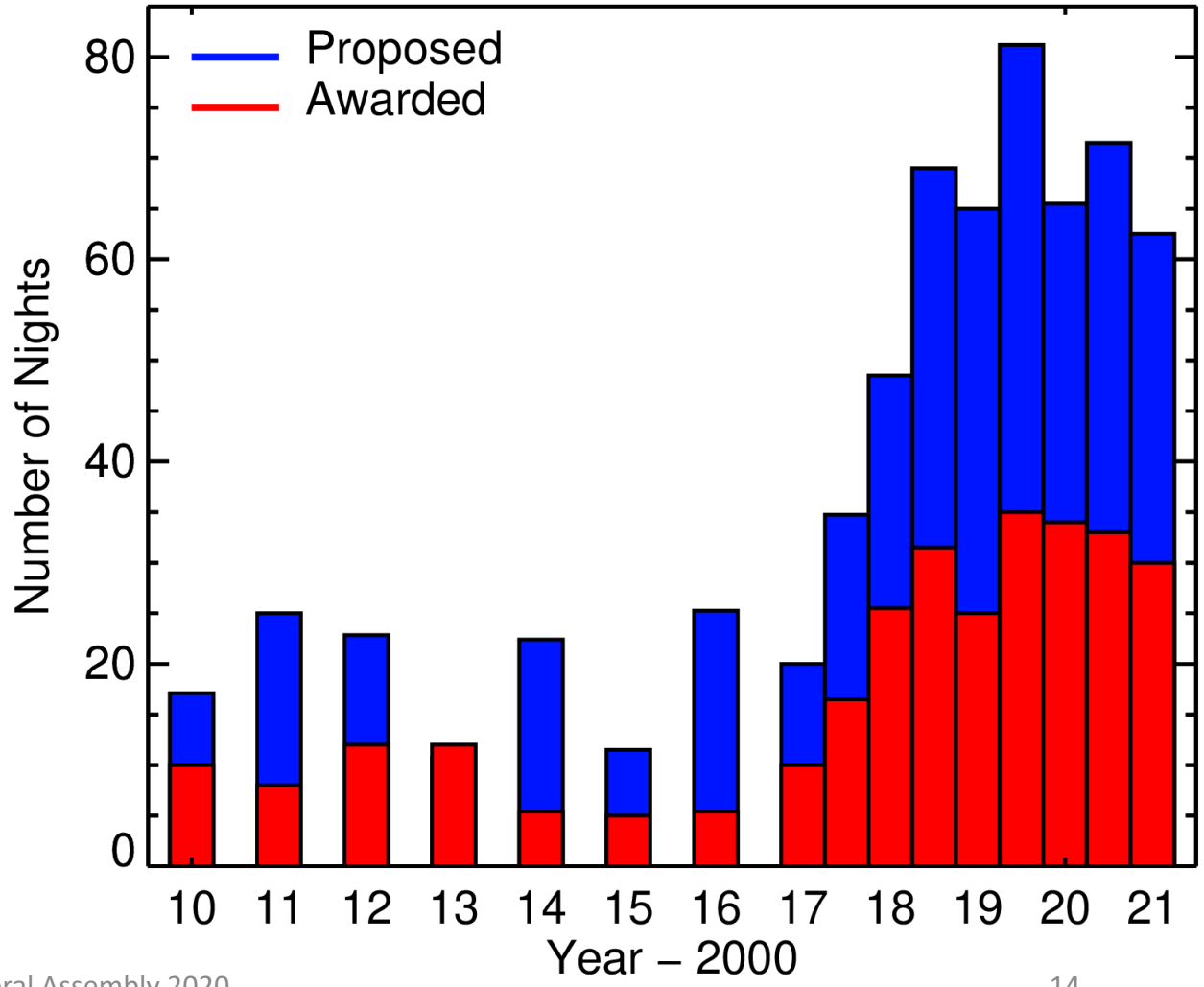
CHARA database: synergy with JMMC OIDB

- Currently:
  - CHARA upload CLIMB/CLASSIC logs
  - VEGA groups upload their

- With CHARA database
  - All combiners will get their logs generated to be upload to JMMC OIDB

Open access

- 60 nights/year (to be extended to 100)
- Oversubscription rate = 2.4
- Deadlines
  - Semester A (Feb – Jul): last day in September
  - Semester B (Aug – Dec): last day in March
- Applications through NOIR Lab (previously NOAO)



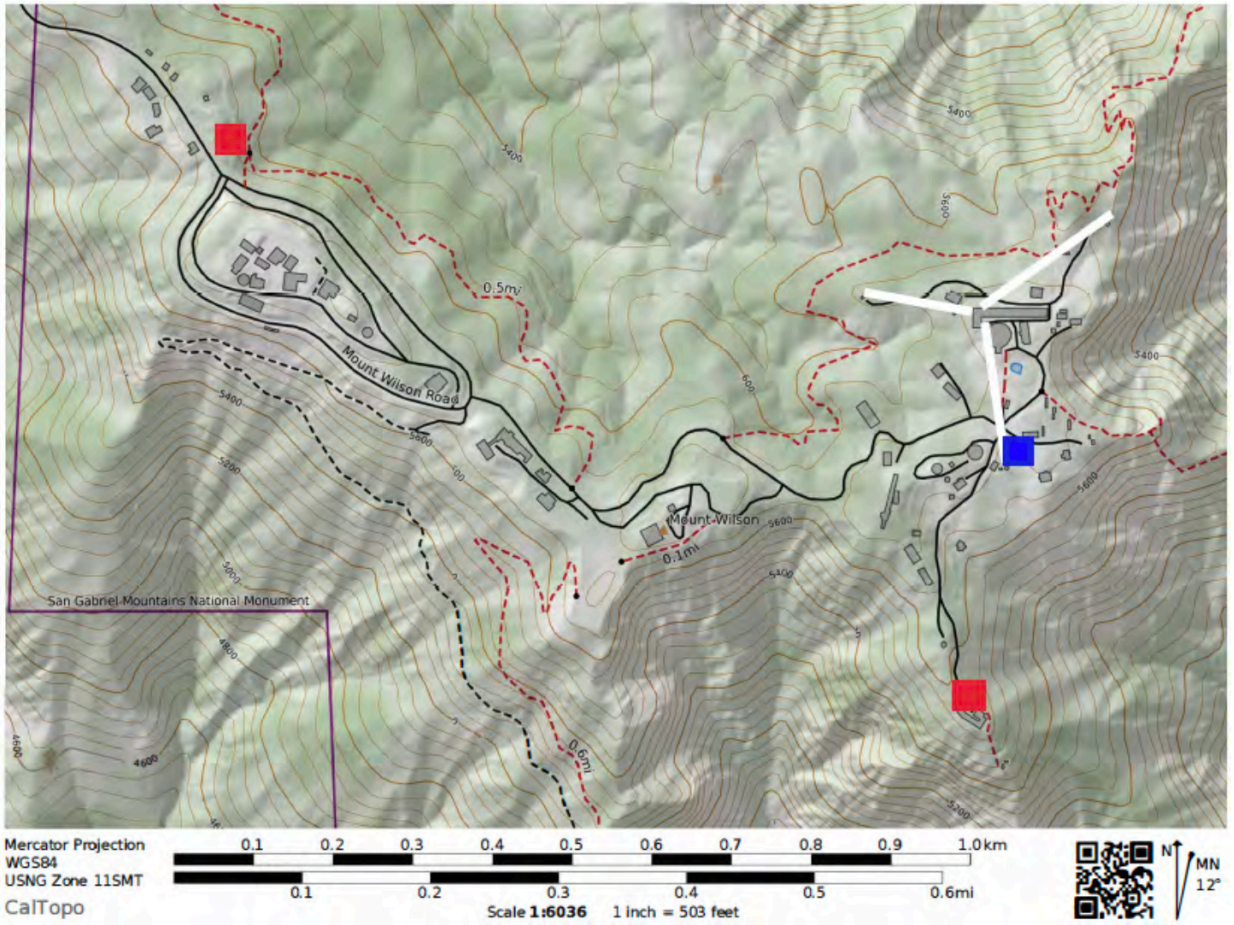
7th telescope

Add a seventh telescope to complete UV coverage

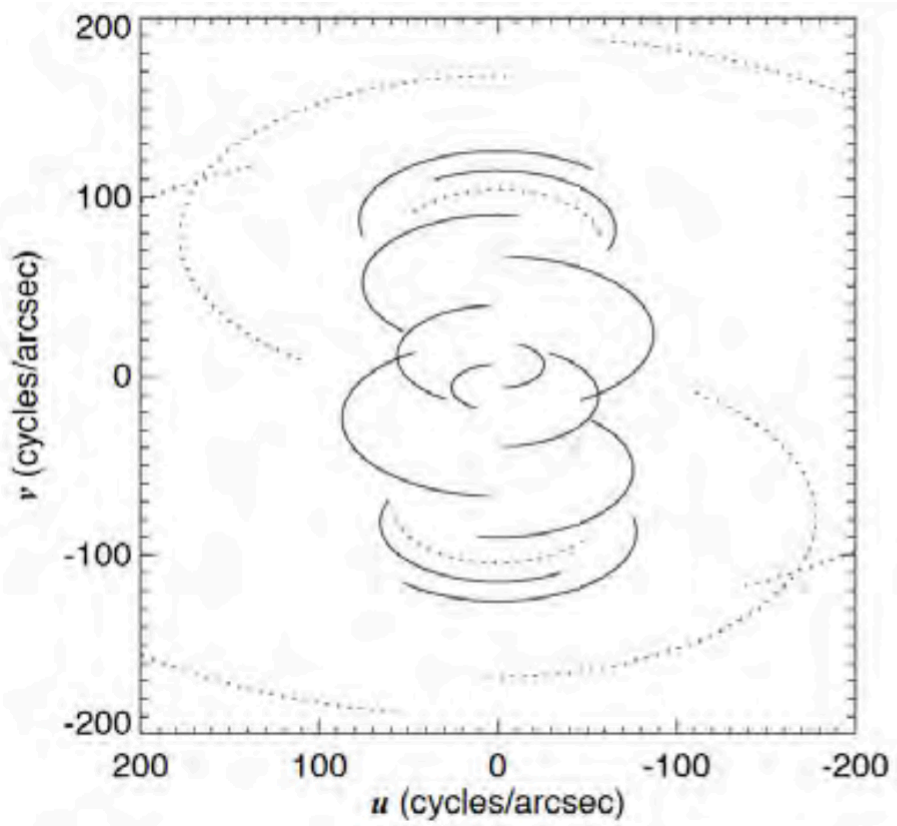
- Movable
- Linked with optical fibers

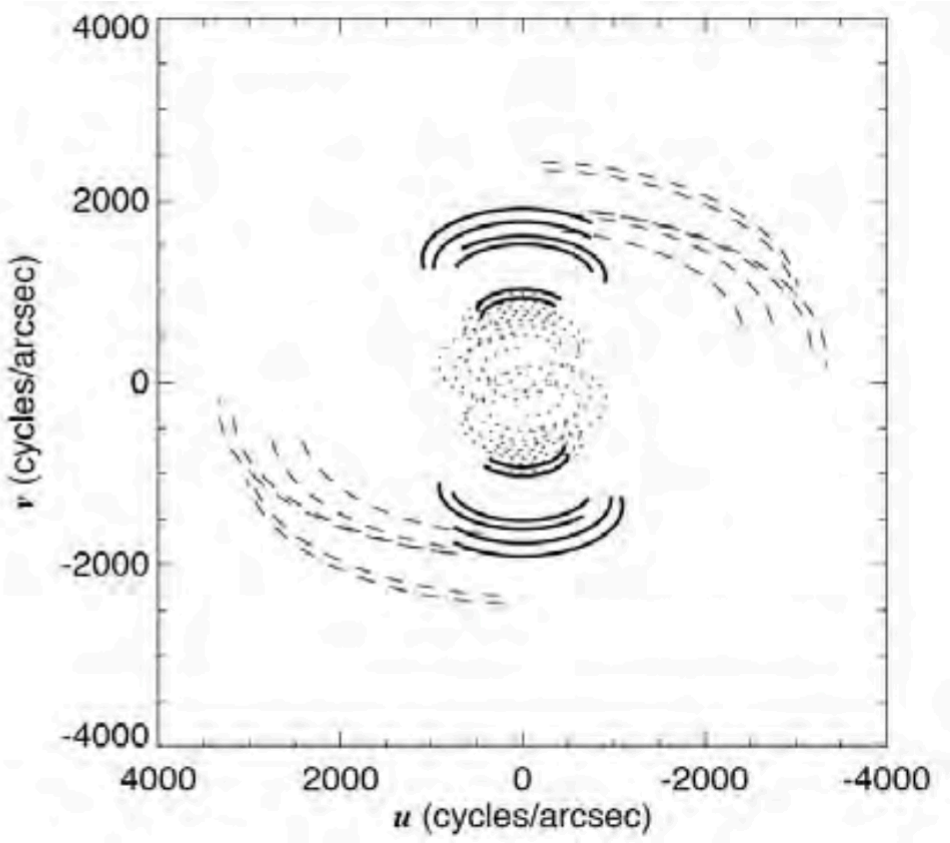
3 spots:

- Blue:
  - 3 pads, near S1 S2 (blue)
- Red:
  - Southern
  - Eastern



7th telescope: UV coverage





- 3 pads

- Southern: thick lines
- Western: dashed lines