# Atmospheric scale heights of red giants probed with Amber

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**Scientific rationale:**

*Larger context:* determination of fundamental stellar parameters ($T_{eff}$, diameter, luminosity, spectral type)

*Why study atmospheres?*

- every photon of stellar light comes from an atmosphere
- spectral and spatial information on stars appearance: lines, limb darkening, photocenter shifts,...

*Why red giants?*

- effects especially strong in giants
- not yet fully understood

*Additional importance:*

- use for interferometric calibration: MIDI and AMBER calibrators

**Immediate objective:**

Derive diameters and limb darkening as a function of wavelength for a sample of well-known late-G, K and M giants (from MIDI calibrator list)

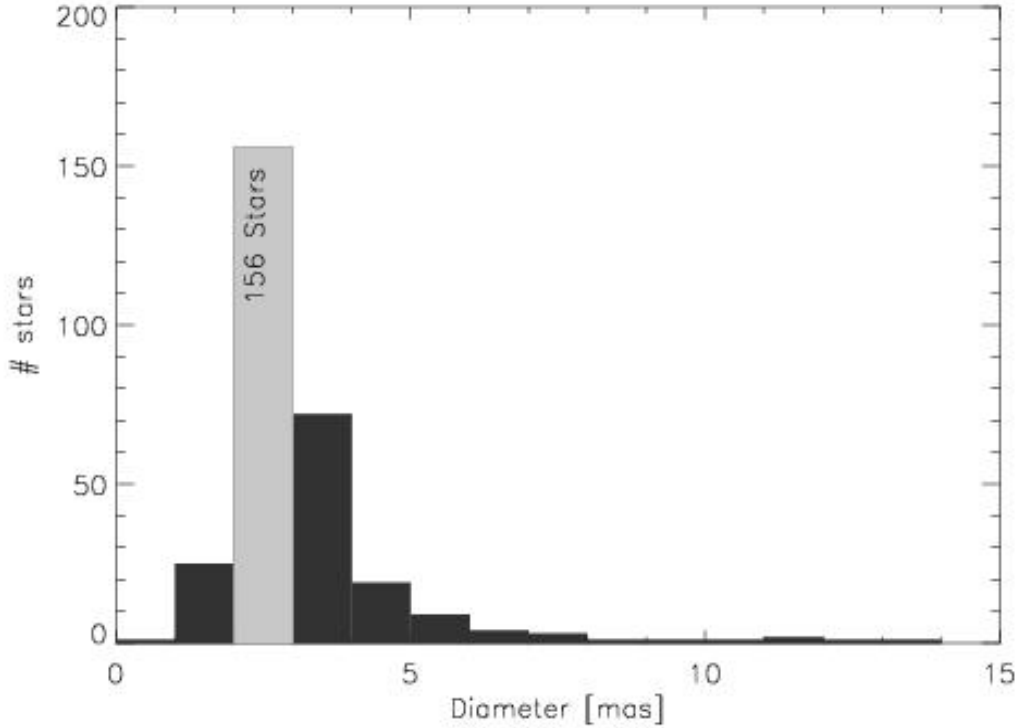
AMBER instrument because of spatial resolution and suitability of K-band (molecular bands, i.e. CO and $H_2O$, but no dust)

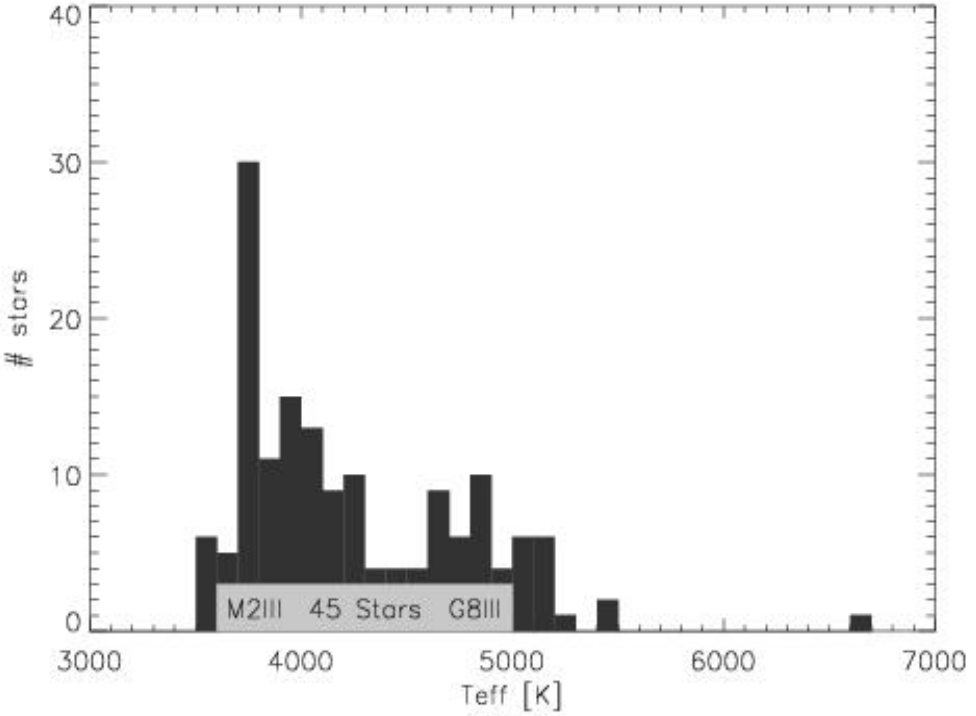
Selection criteria aimed at efficiency and homogeneity:

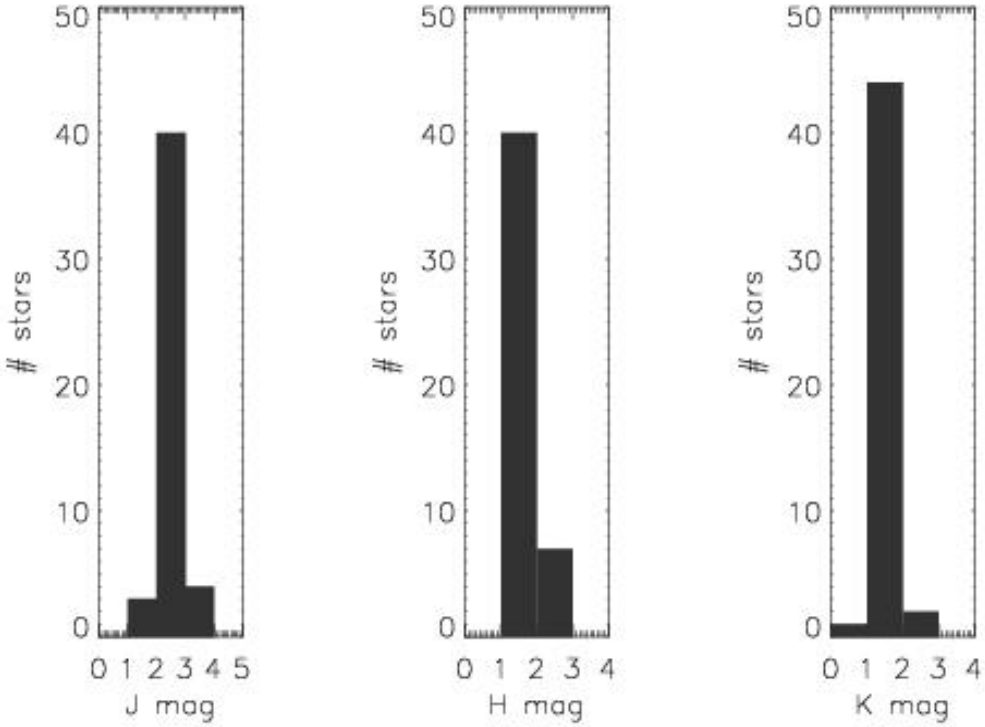
- 1 AT configuration for all objects
- baseline configuration to probe first lobe, first zero and second lobe simultaneously (including differential phase)

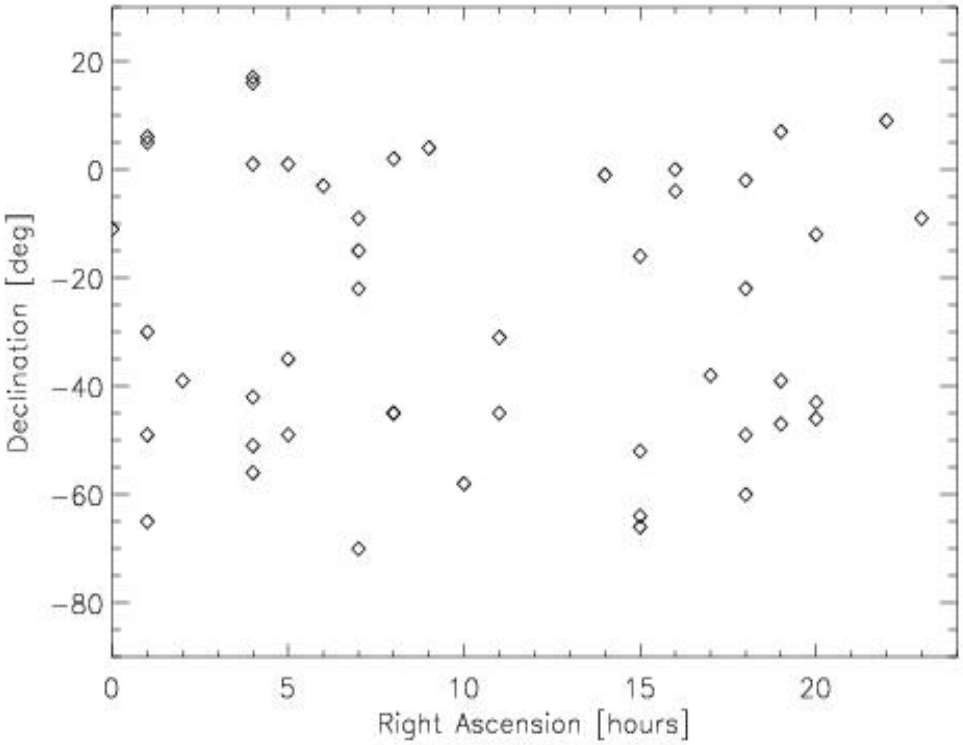
One visibility point per target

No schedule constraints (dark moon, part of the night)


156 Stars
# stars
Diameter [mas]

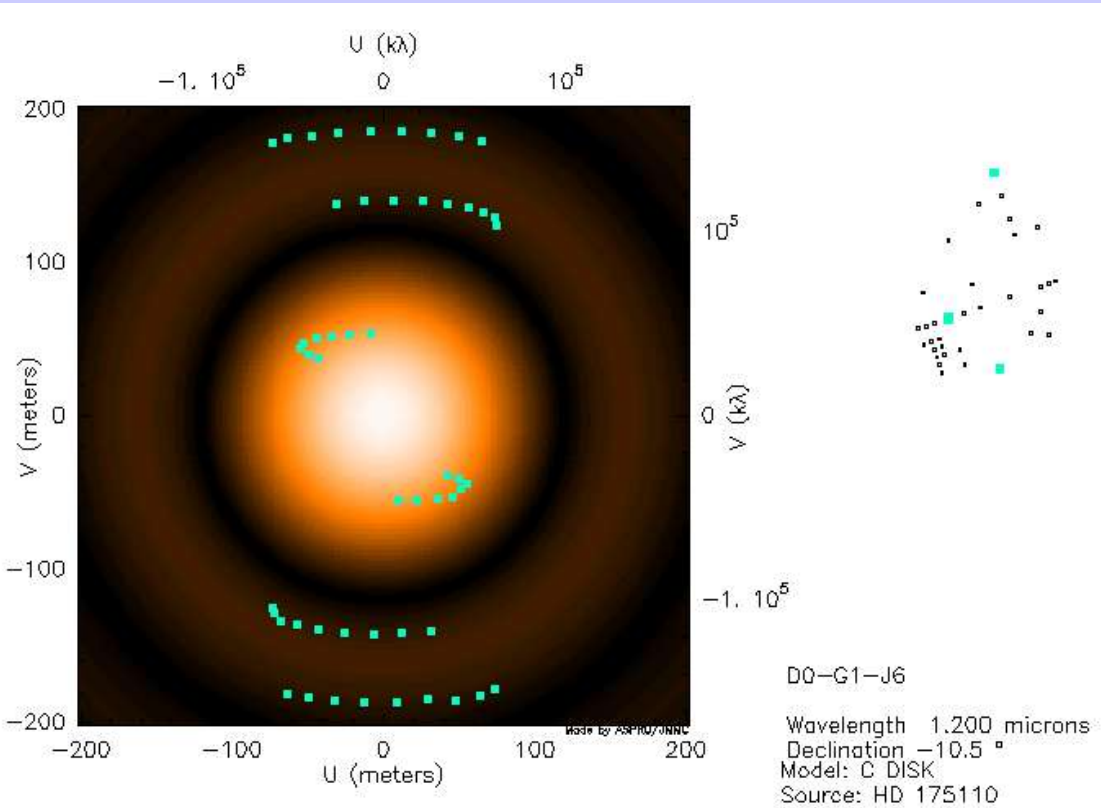

M2III 45 Stars G8III
# stars
Teff [K]

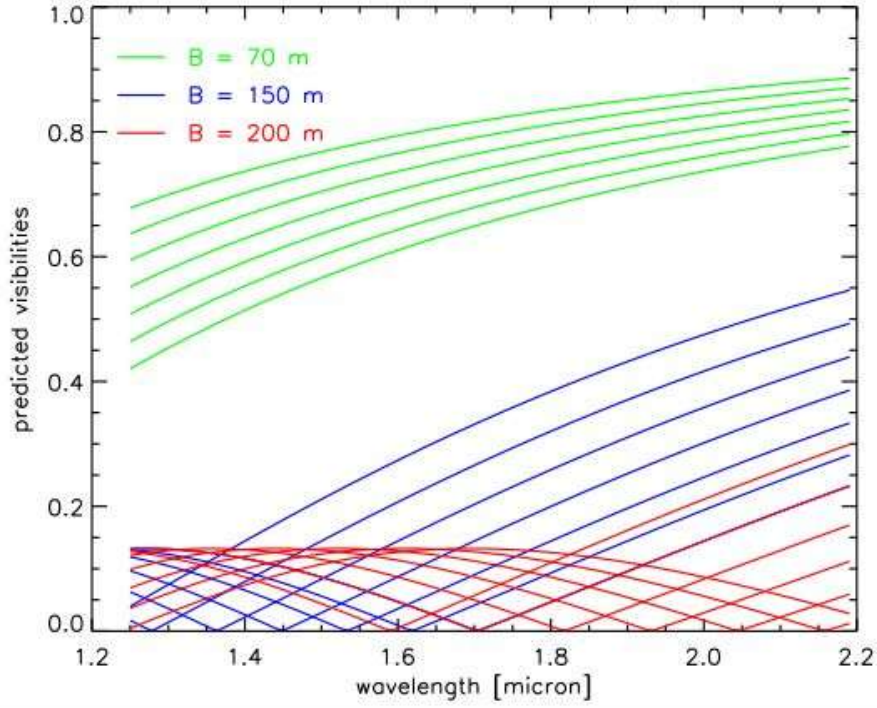

# stars
J mag
# stars
H mag
# stars
K mag

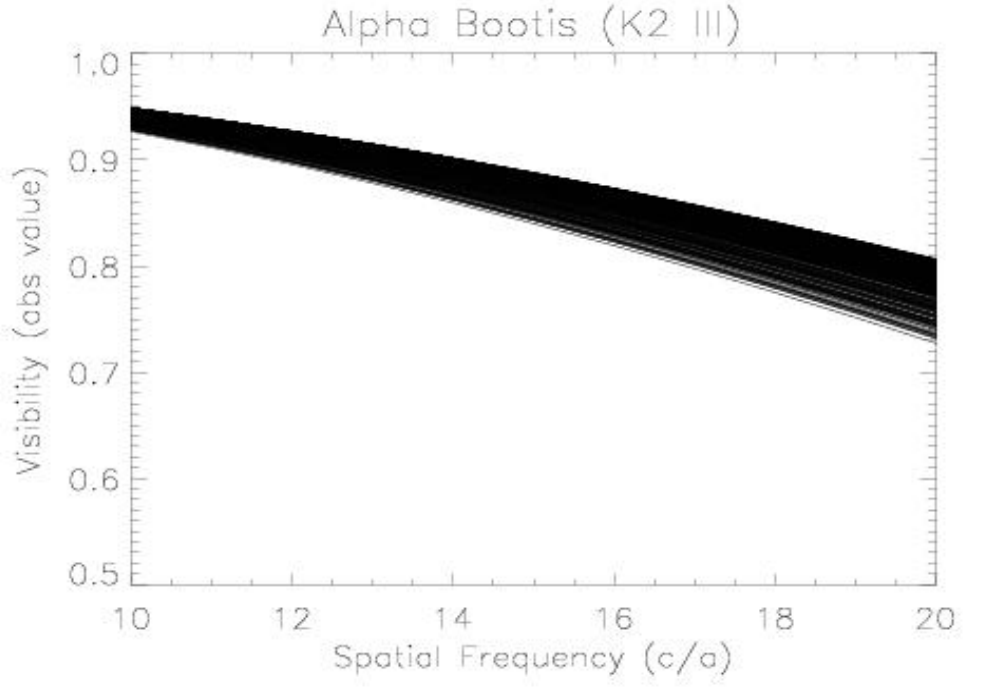

Declination [deg]
Right Ascension [hours]

*Instrument setup:*

- AMBER low resolution (JHK)
- Baselines:
  D0-G1-J6 (71.6-148.8-192.3 m)
- required accuracy: few percent



*Science targets and calibrators:* hot and unresolved calibrators

| science | calib | dist(°) | diam(mas) | vis | Kmag | spec.type |
|---|---|---|---|---|---|---|
| HD25470 | HD33262 | 11. 1 | 0.95 | 0.82 | 3.37 | F7V |
| HD6311 | HD15008 | 8.3 | 0.52 | 0.94 | 3.96 | A3V |
| HD62082 | HD62412 | 4.0 | 0.96 | 0.82 | 3.54 | K1III |
| HD74167 | HD75063 | 1.3 | 0.61 | 0.93 | 3.63 | A1III |

*Total observing time:*

- 45 x 1-2 hour = 45-90 hours → large programme

*Observing period:*

- two observing periods necessary (P80-P81)