MATISSE

Overview of stellar physics programs for 2019-2020

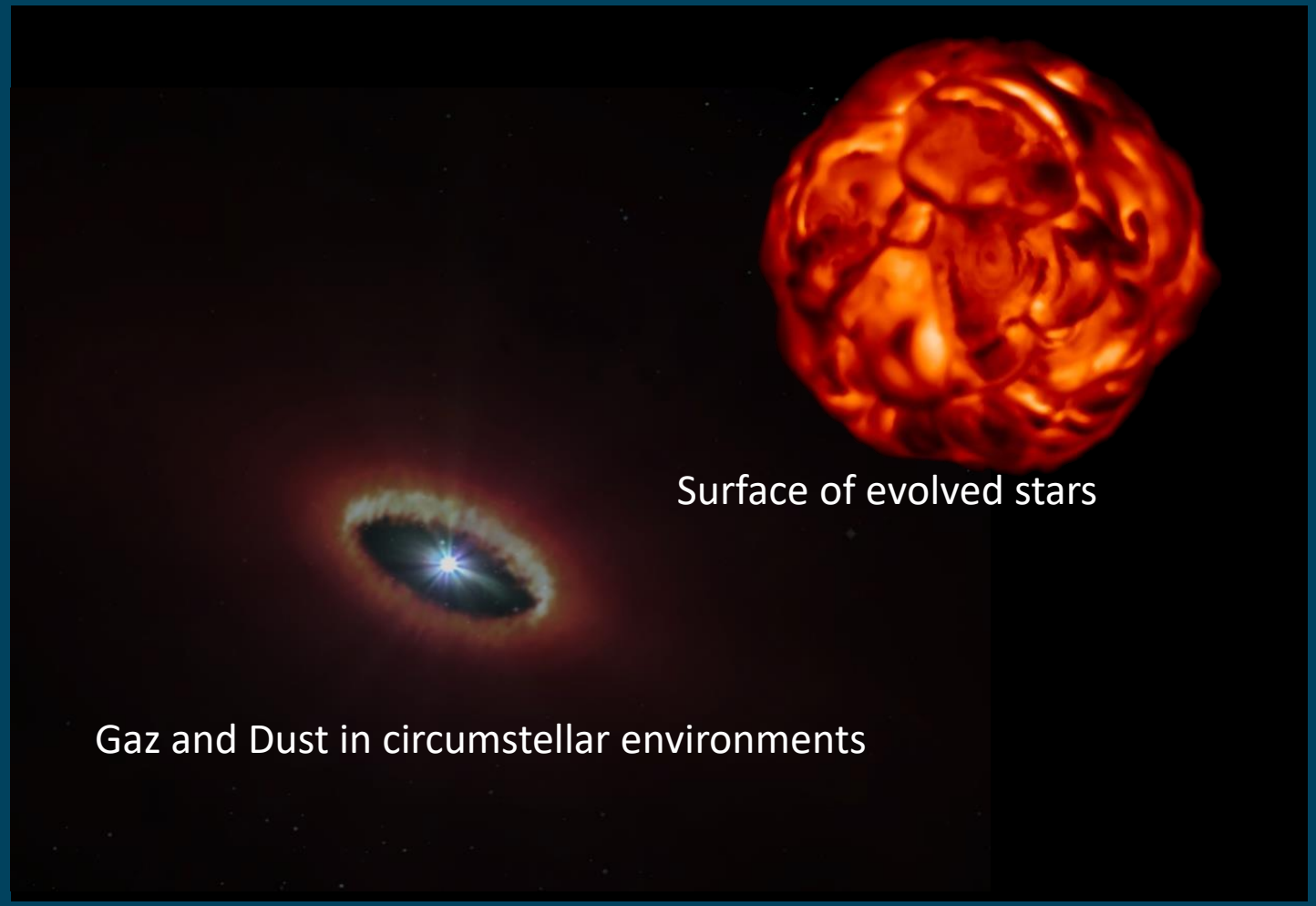
Overview of stellar physics programs for 2019-2020

Overview on :

- MATISSE GTO Programs
- MATISSE commissioning data
- GRA4MAT commissioning data
- ~~Open time programs~~

About the following types :

- Red Supergiants
- AGBs
- Cepheids
- B[e] stars
- Be stars
- LBV (η Car)



Overview of stellar physics programs for 2019-2020

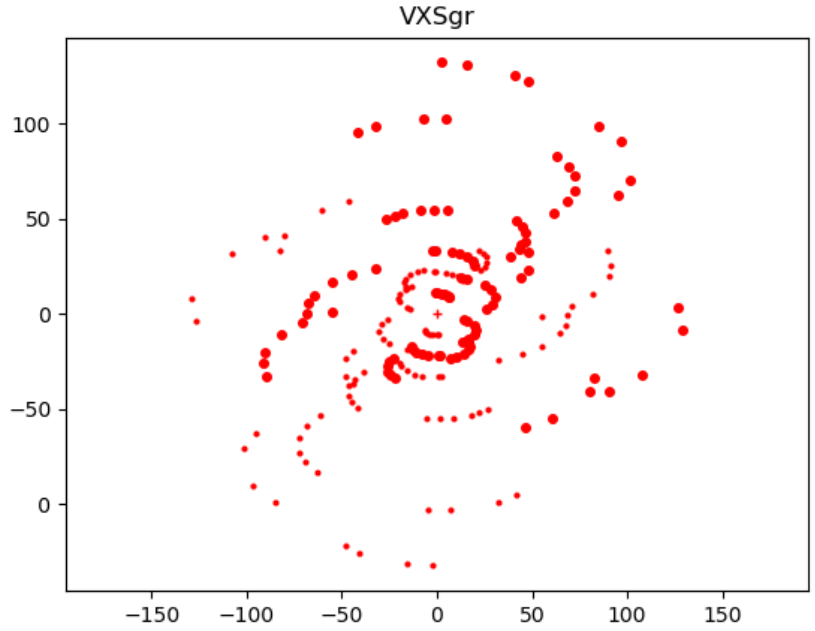
MATISSE GTO programs in P103 (March-September 2019):

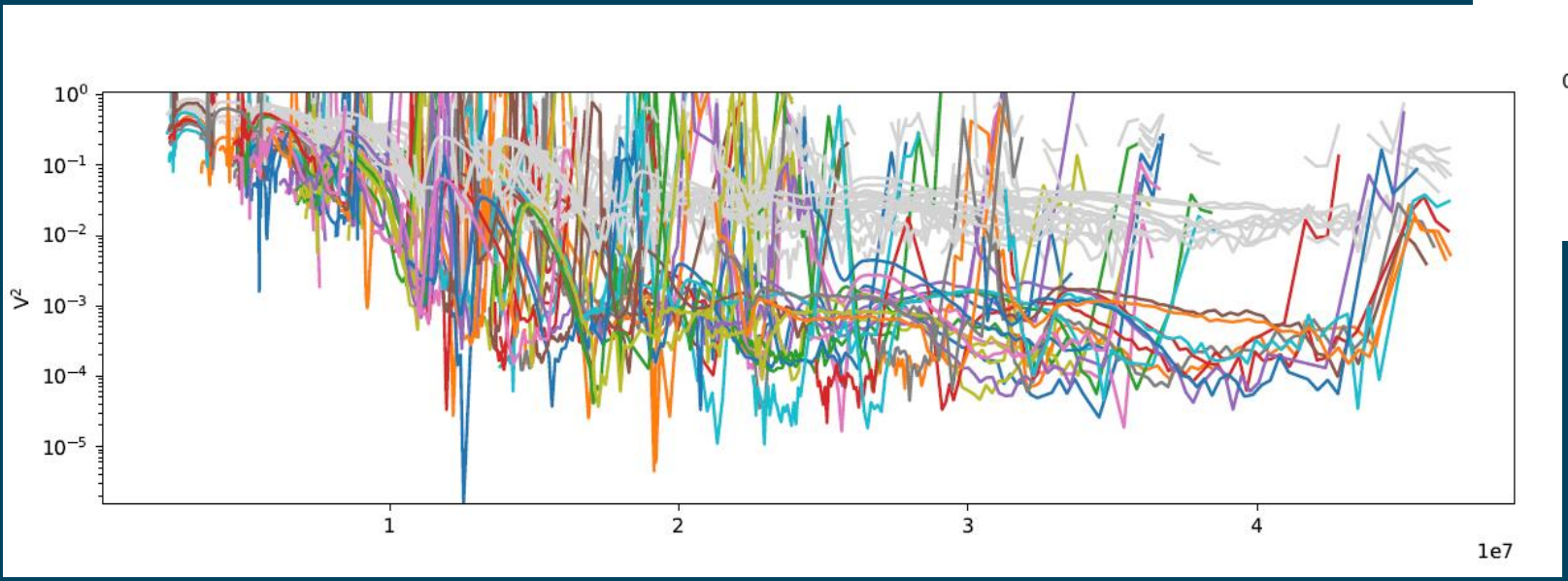
- Supergiant Vx Sgr (Chiavassa)
- η Car (Weigelt)
- B[e] star HD87643 (Millour)
- 3 Cepheids (Hocde)
- 3 Carbon AGBs (Hron)

Overview of stellar physics programs for 2019-2020

GTO P103: Supergiant Vx Sgr (Chiavassa)

Observations during 5 nights
with SMALL, MEDIUM, and LARGE configs
17 Good measurements in LM-LOW and N-LOW
Data Reduced
Image reconstruction should be the next step

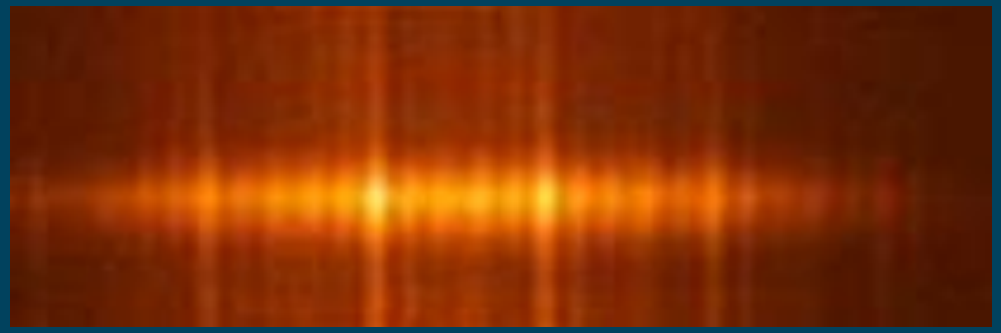


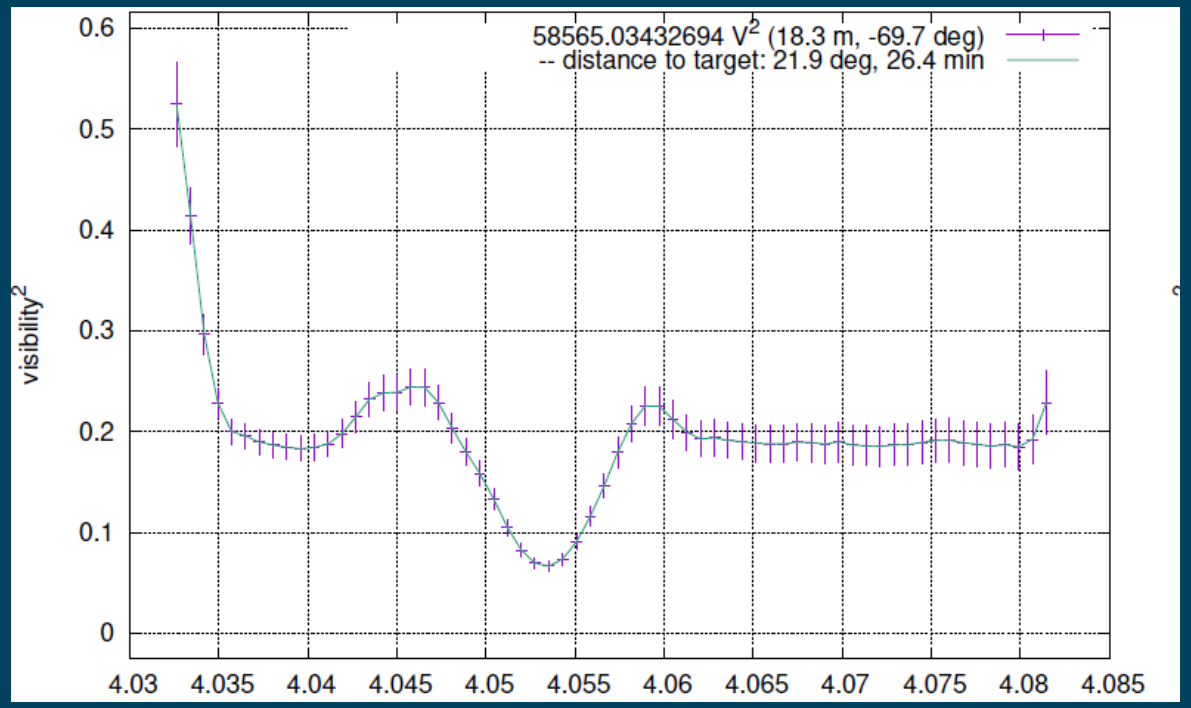


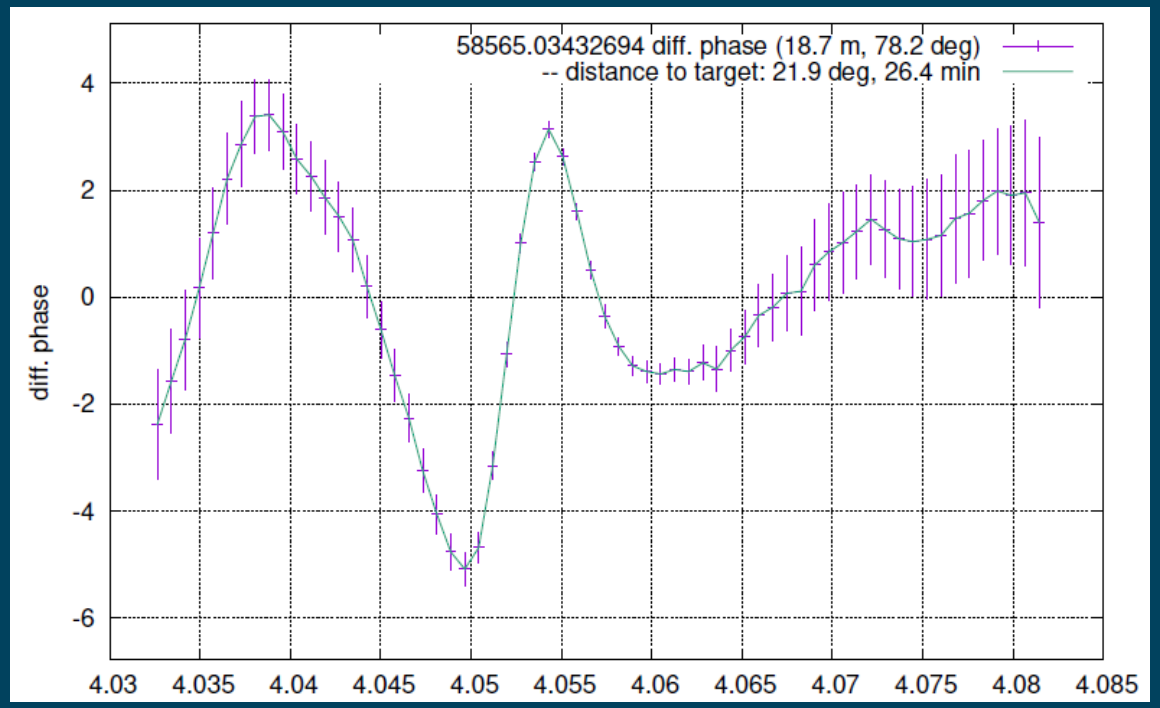
Overview of stellar physics programs for 2019-2020

GTO P103: η Car (Weigelt)

Observations during 4 nights (March and May)
with SMALL, MEDIUM and UT
LM-HIGH centered on Brα and LM-LOW and N-LOW



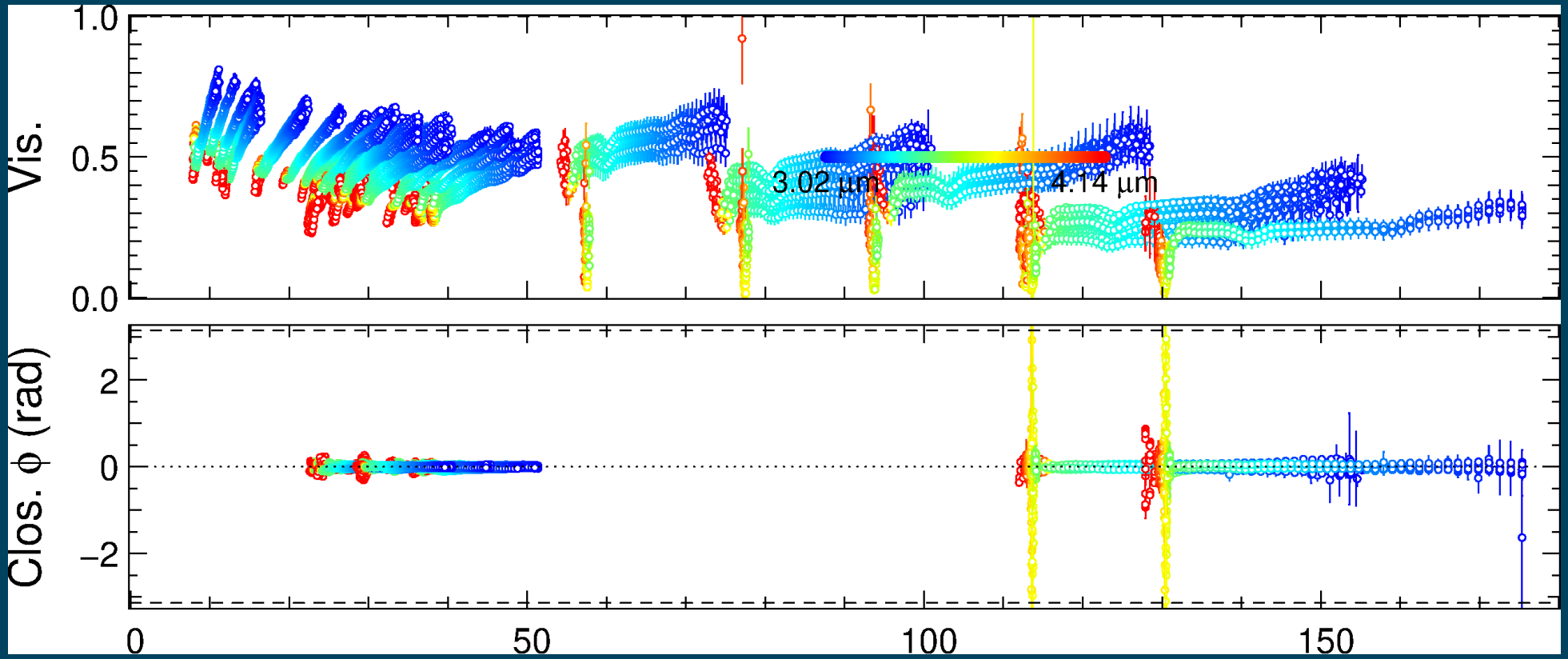




Overview of stellar physics programs for 2019-2020

GTO P103: η Car (Weigelt)

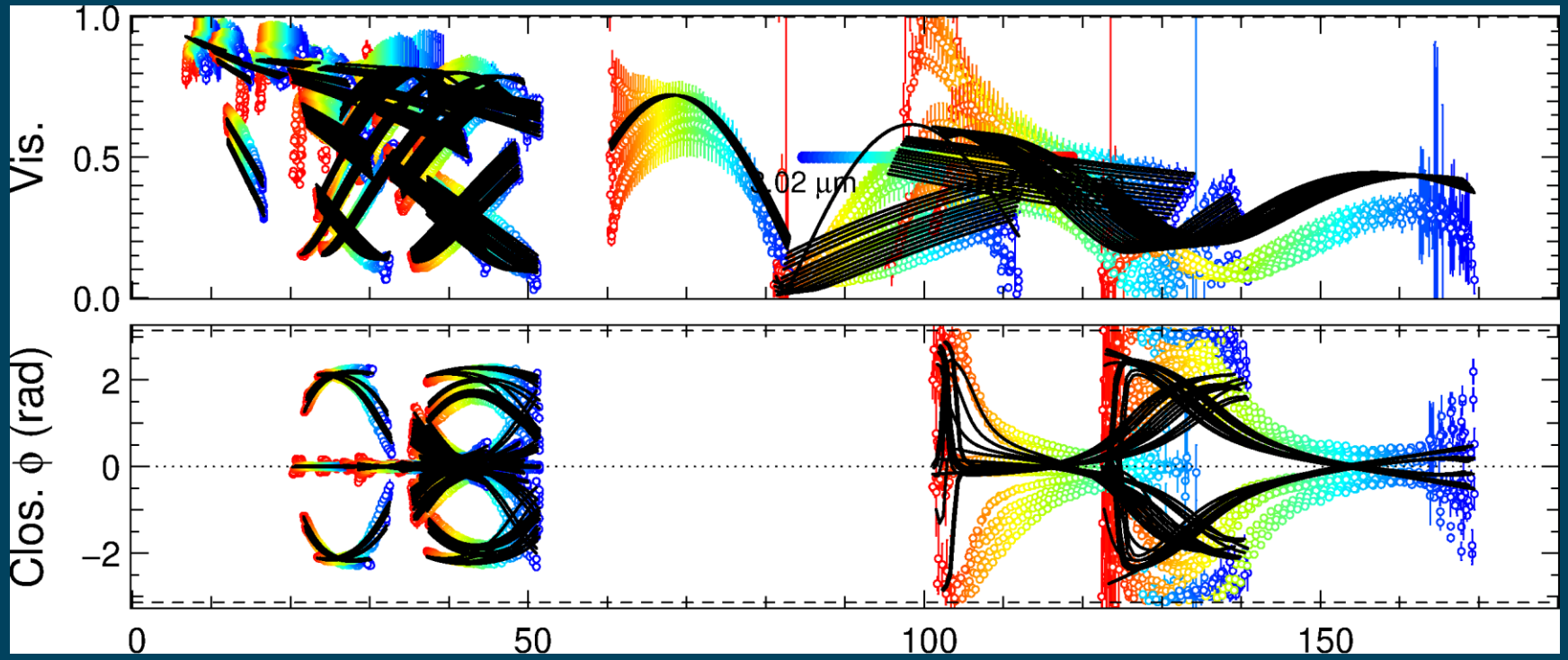
Observations during 4 nights (March and May)
with SMALL, MEDIUM and UT
LM-HIGH centered on Brα and LM-LOW and N-LOW



Overview of stellar physics programs for 2019-2020

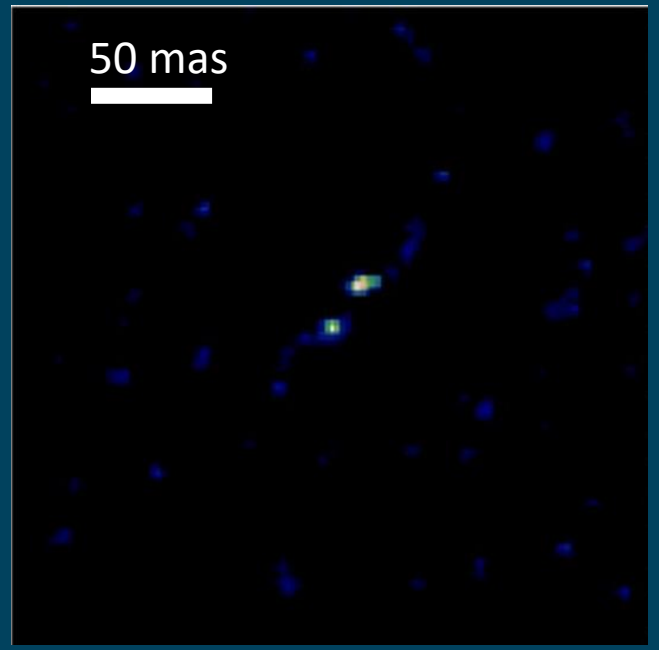
GTO P103: B[e] HD87643 (Millour)

Observations during 3 nights (March and May)
with SMALL, MEDIUM configs
LM-LOW and N-LOW



VLTI/AMBER 2008

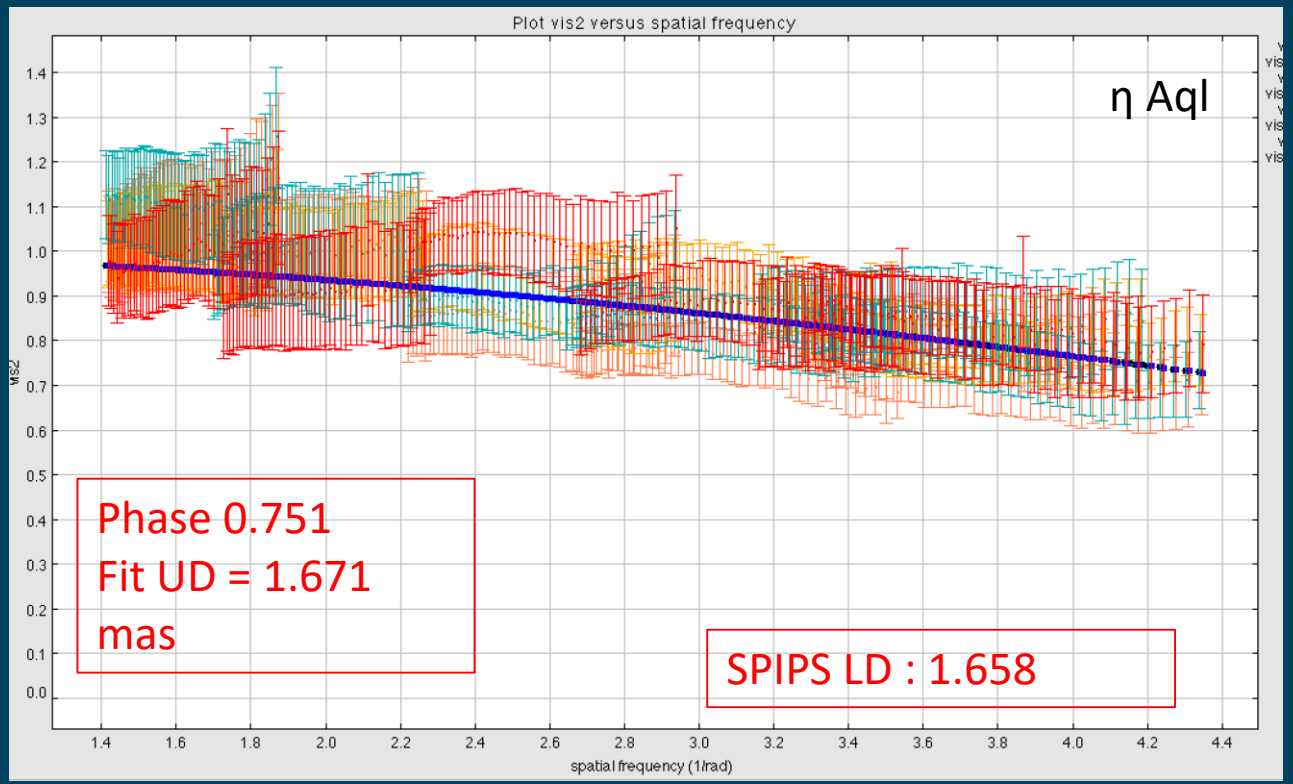
VLTI/MATISSE 2019

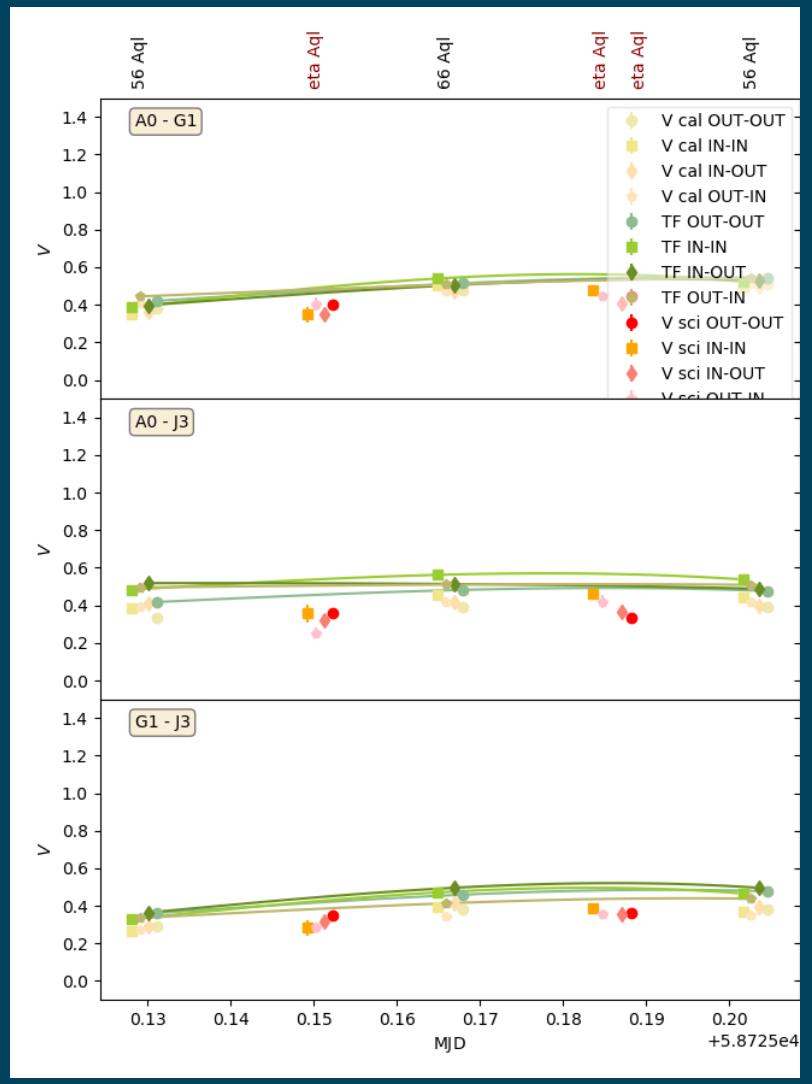


Overview of stellar physics programs for 2019-2020

GTO P103: 3 Cepheids : (Hocde)

Observations during 2 nights (August) with LARGE config
LM-LOW and N-LOW
3pts η Aql + 1pt S Sge + 1pt TT Aql + 1pt Y Sgr
Relatively bad seeing (between 1 and 2")





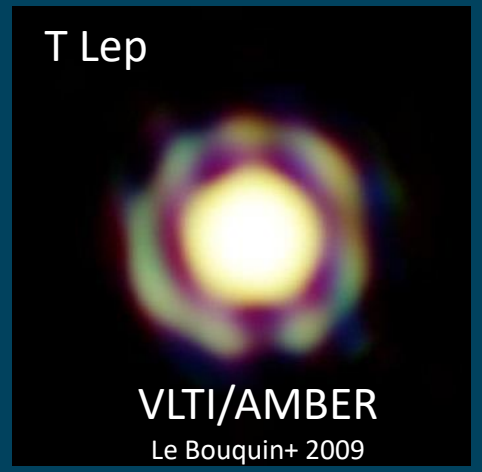
Overview of stellar physics programs for 2019-2020

MATISSE GTO programs observed in P104 (Now):

- 3 Carbon stars (Hron)
- 7 B[e] stars (Meilland)
- η Car (Weigelt)
- 2 Cepheids (Hocde)

Observations in February (9n on AT) and March (4 half-nights on UT)

- AGB T Lep (Millour) — Observed in December



Overview of stellar physics programs for 2019-2020

MATISSE GTO programs in P105 (April-September 2020)

- 6 Carbon stars (Hron) => rejected
- 2 B[e] stars (Meilland) in August (3x0.3n on AT)
- η Car (Weigelt) => Accepted (3runs ≈ 2n in Service)
- 2 Cepheids (Hocde) => rejected or not submitted?
- VX Sgr (Chiavassa) => rejected or not submited?

Overview of stellar physics programs for 2019-2020

Data from the MATISSE commissioning

- R Scl (AGB) : Millour
- FS CMa (B[e]/Herbig) : Weigelt
- 7 Be stars : Meilland
- HD62623 (B[e]) : Meilland
- Mira (AGB) : Cruzalebes
- WR104 : Matter
- Betelgeuse : Petrov
- Antares : ???

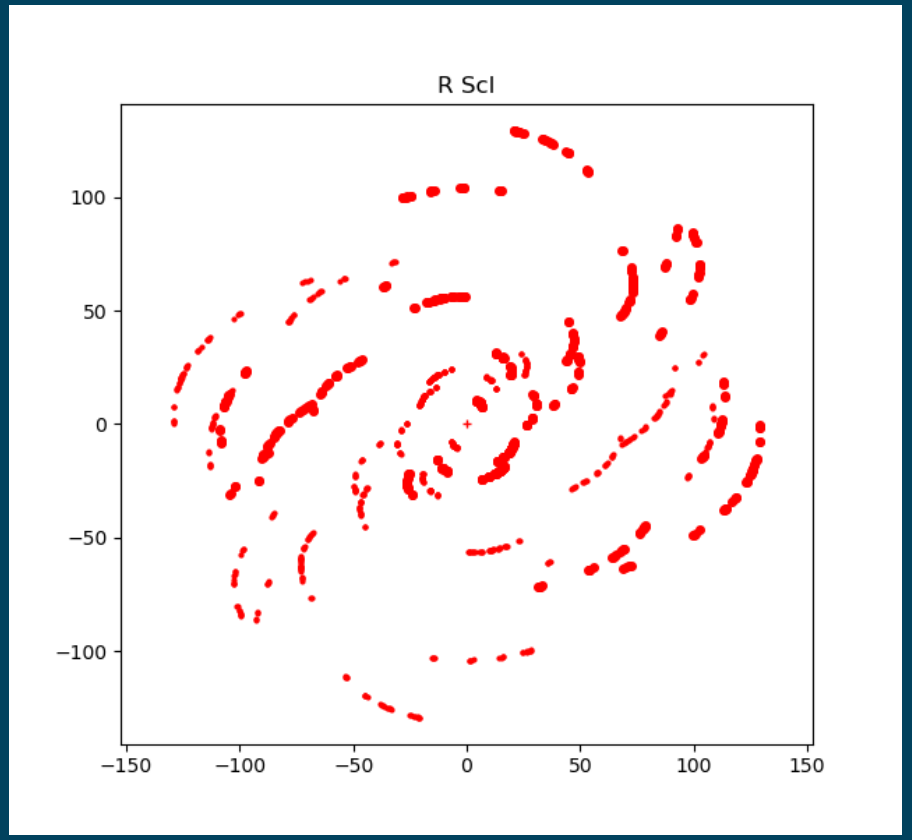
Overview of stellar physics programs for 2019-2020

Data from the MATISSE commissioning : R Scl (Millour)

Observations during the Imaging Commissioning
10 nights In December 2018

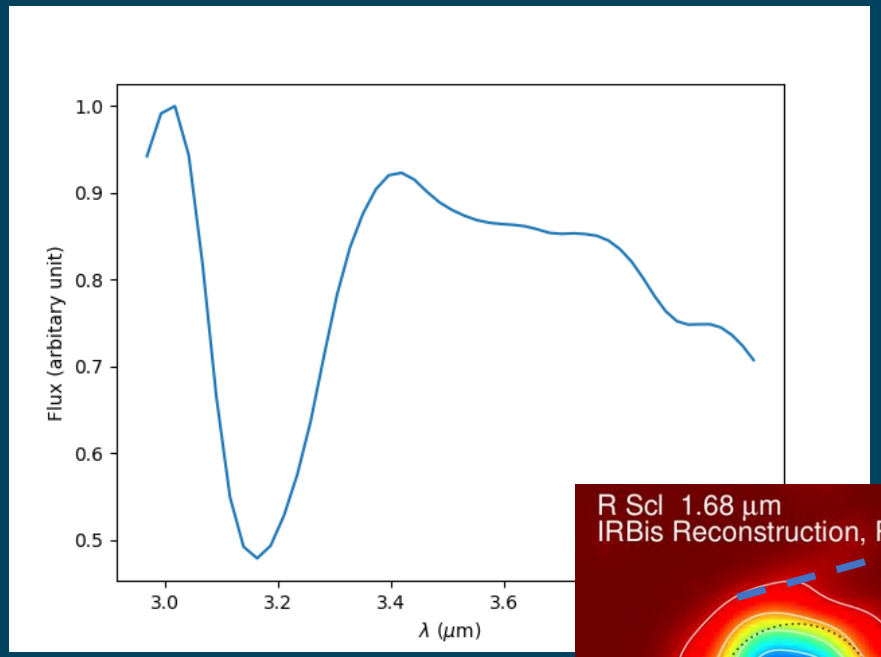
With All configs (including Intermediate ones)

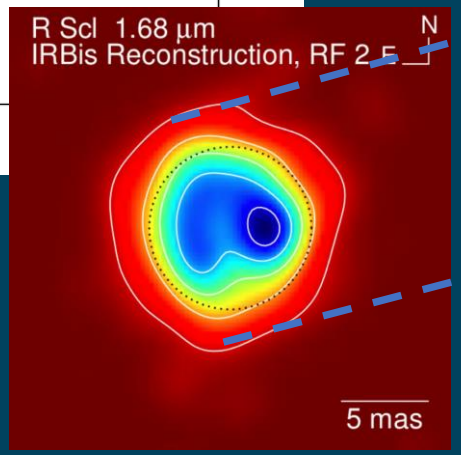
In LOW-L and LOW-N



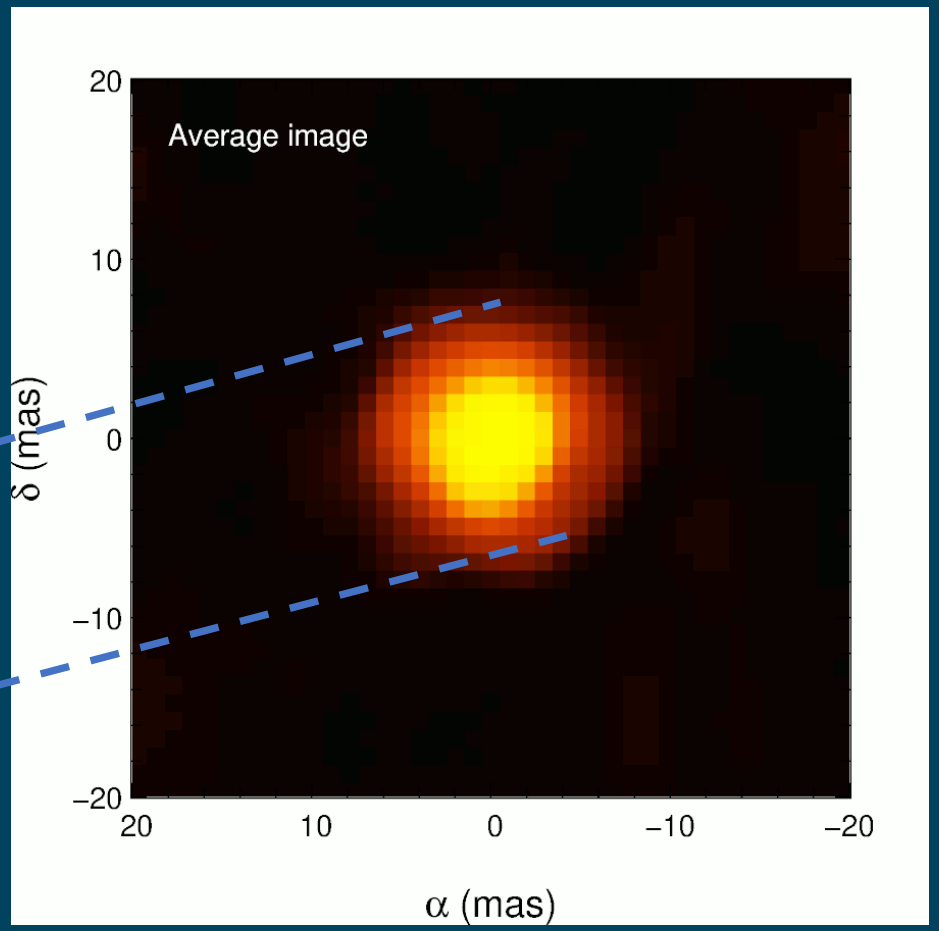
Overview of stellar physics programs for 2019-2020

Data from the GRA4MAT commissioning





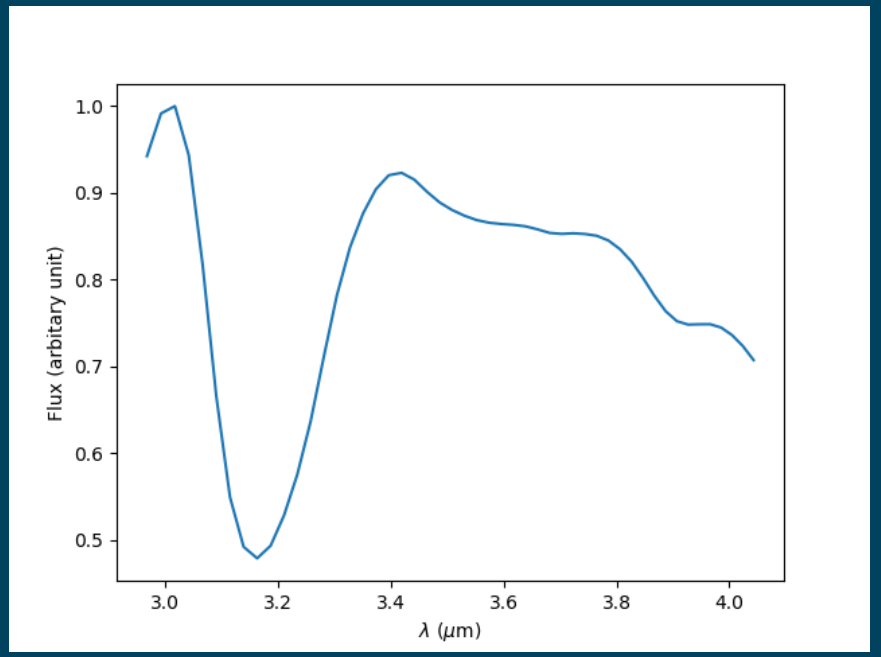
PIONIER H-band

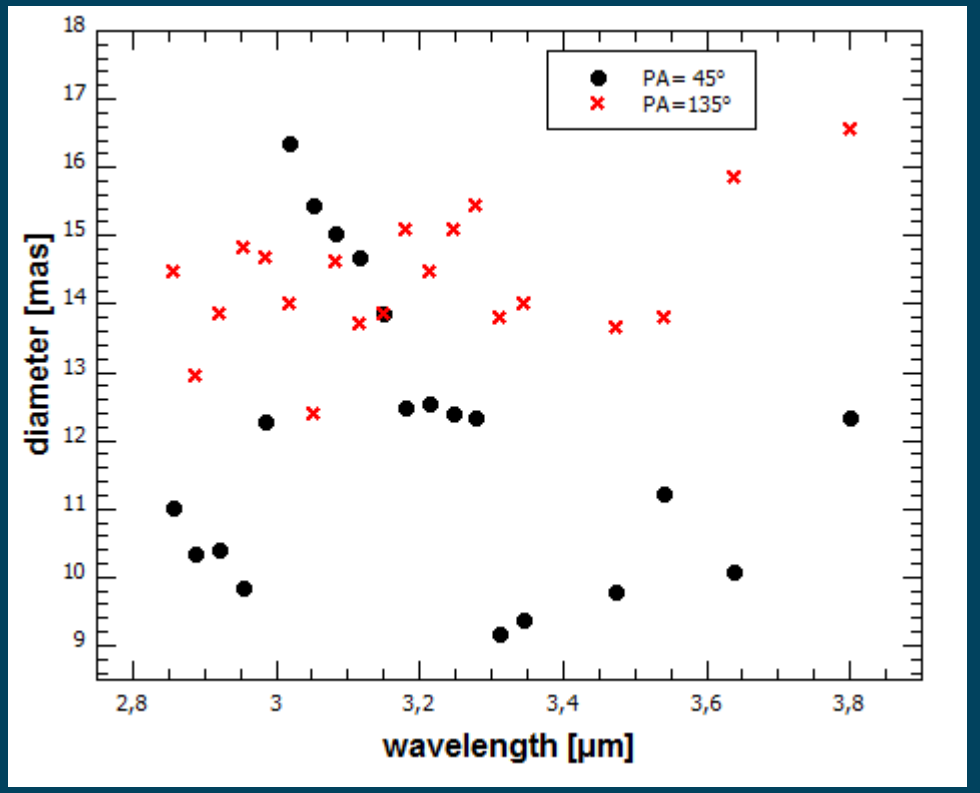


MATISSE L-band spectrally-resolved images

Overview of stellar physics programs for 2019-2020

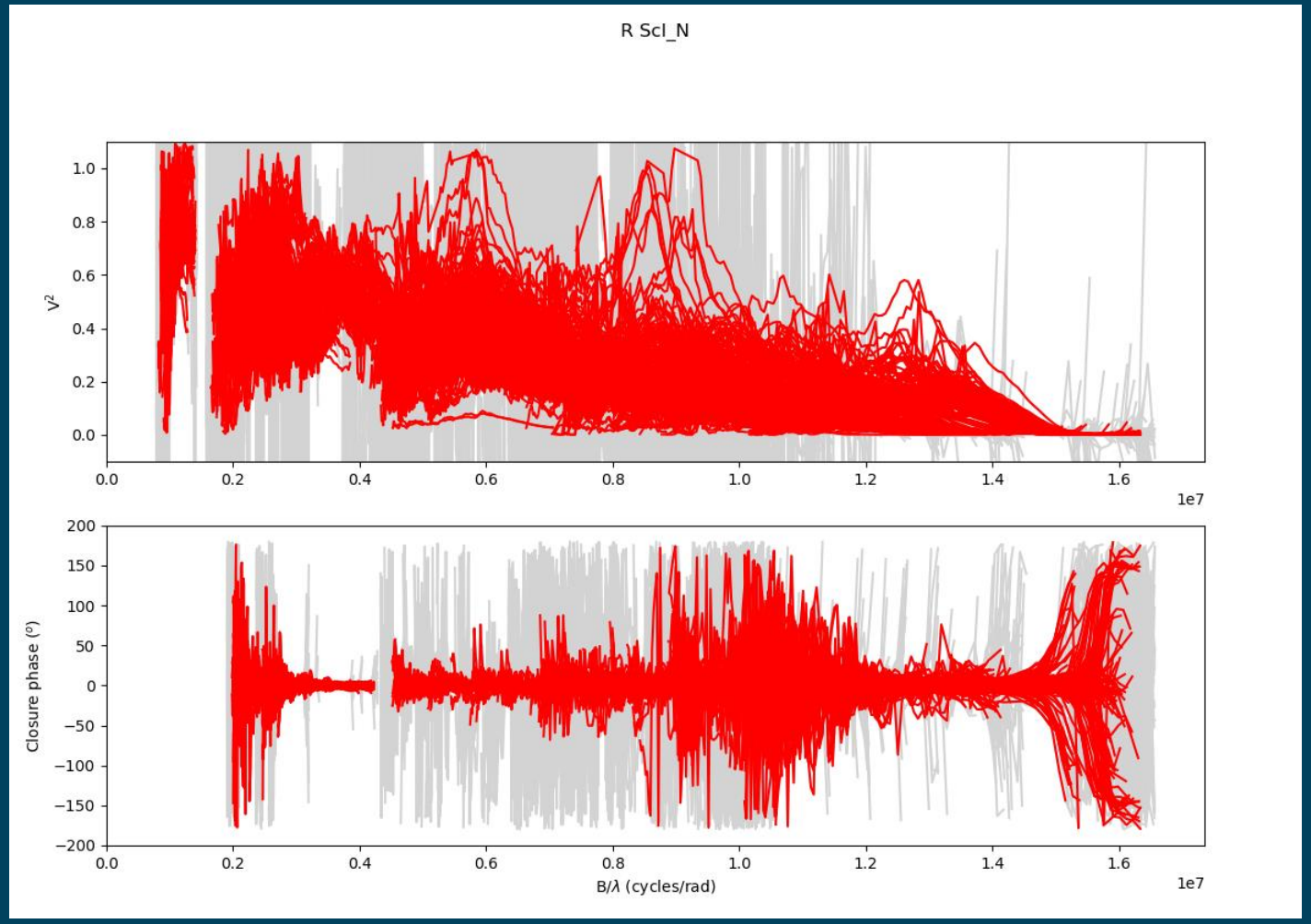
Data from the GRA4MAT commissioning





Overview of stellar physics programs for 2019-2020

Data from the MATISSE commissioning : R Scl (Millour)



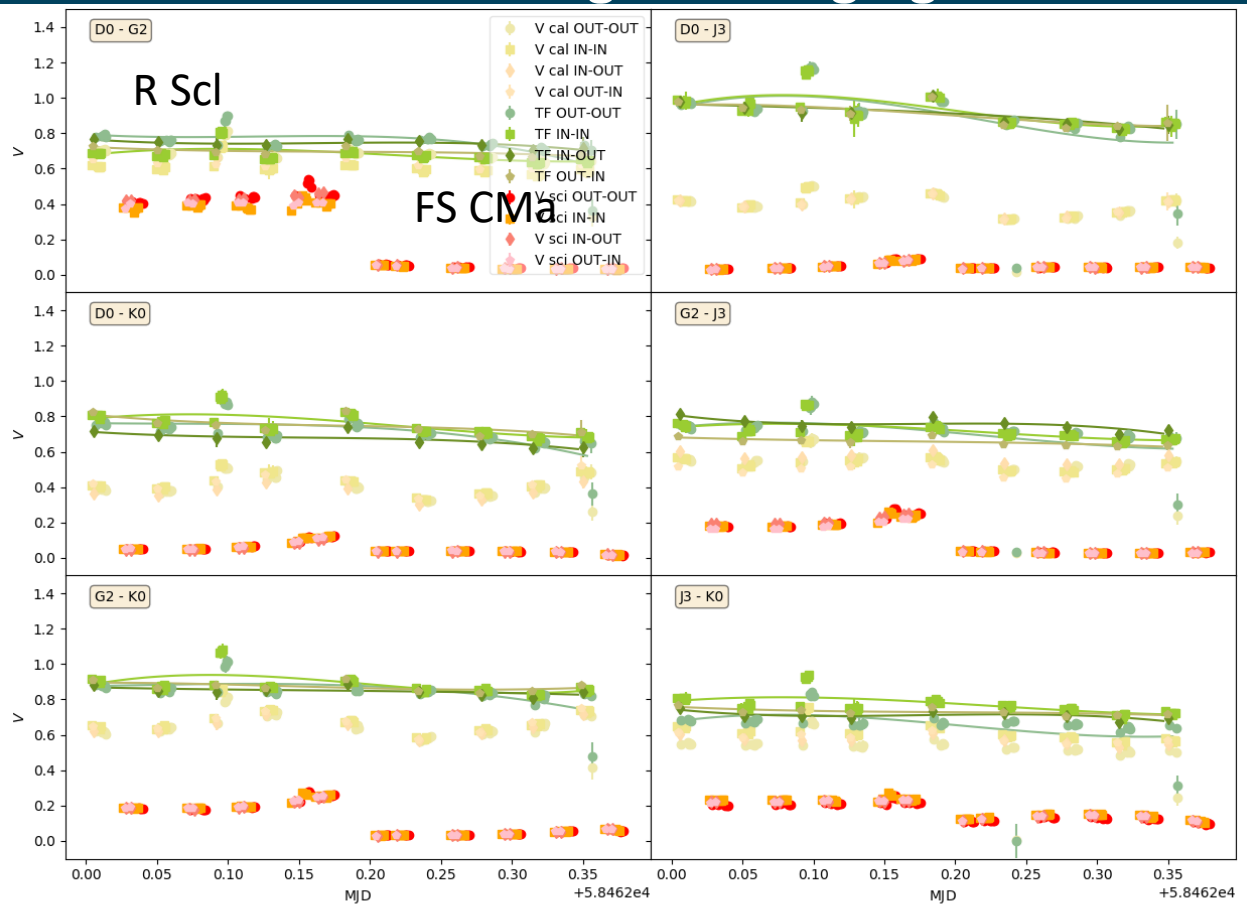
Better N band data
thanks to binning with
new version of the pipeline

Image reconstruction on N band
on going

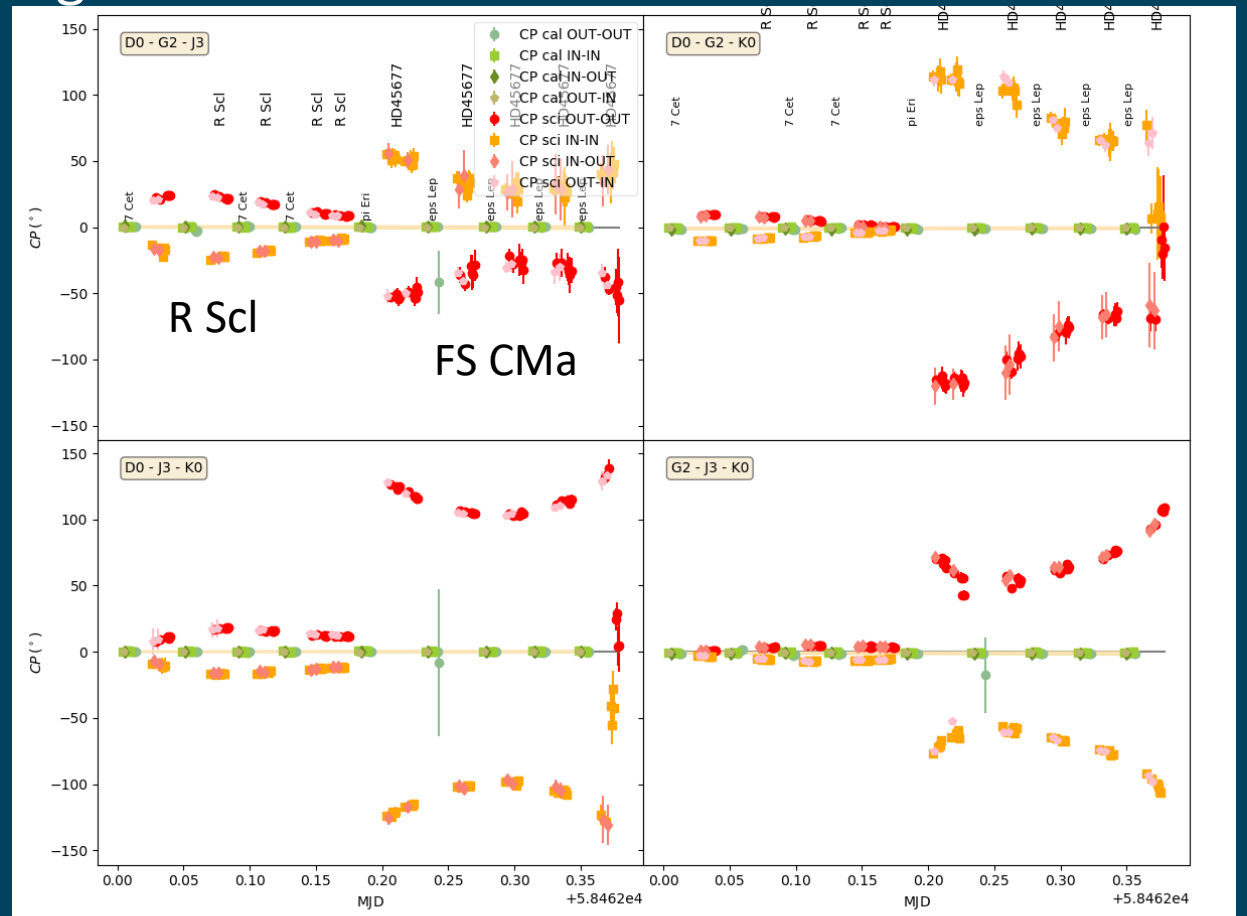
Overview of stellar physics programs for 2019-2020

Data from the MATISSE commissioning : B[e] FS CMa (Weigelt)

Observations during the Imaging Commissioning in December 2018



L-Band Transfer function in visibility

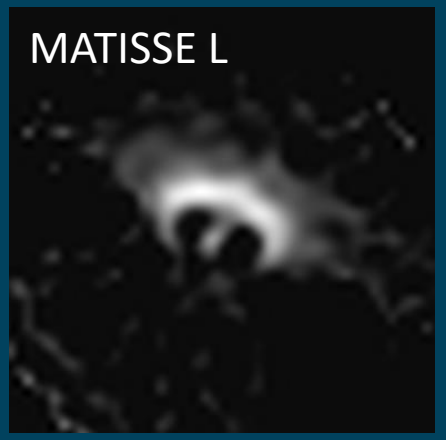


L-Band Transfer function in Closure Phase

Overview of stellar physics programs for 2019-2020

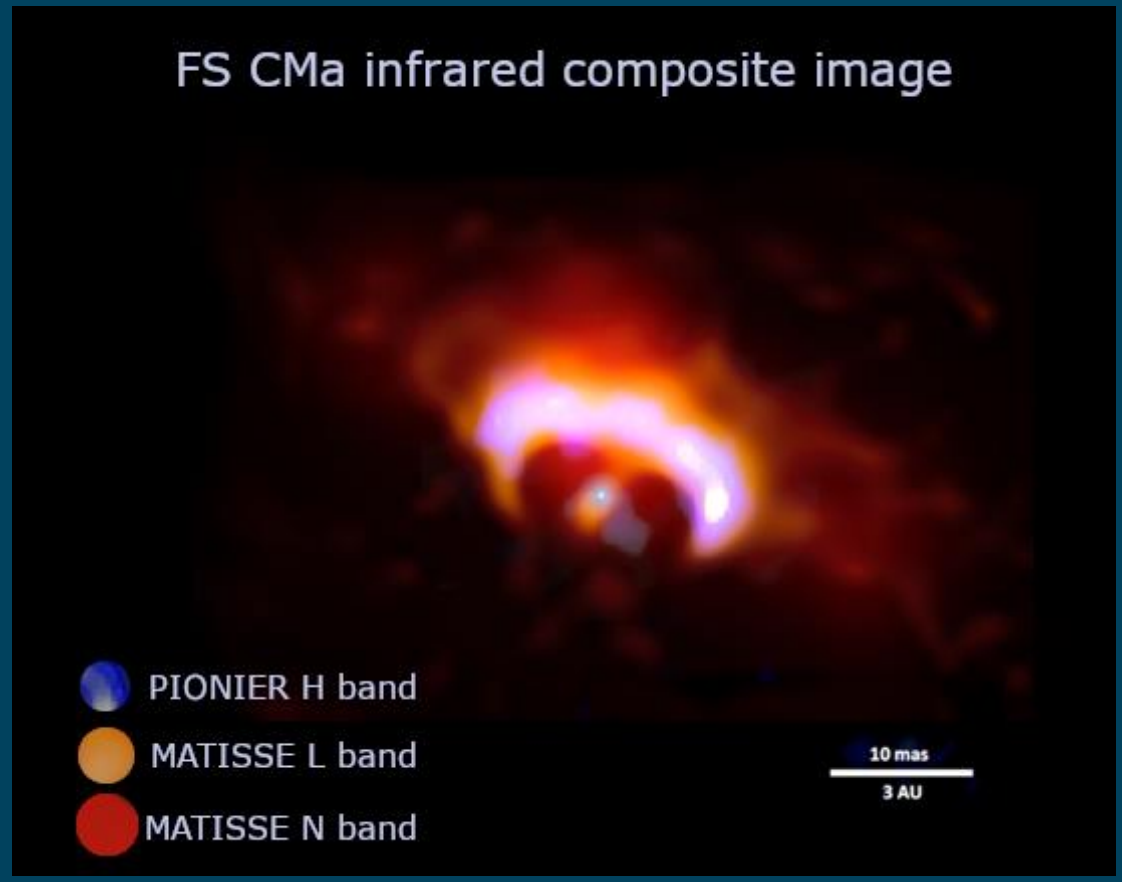
Data from the MATISSE commissioning : B[e] FS CMa (Weigelt)

Observations during the Imaging Commissioning in December 2018



N band image quality limited by SNR on CP

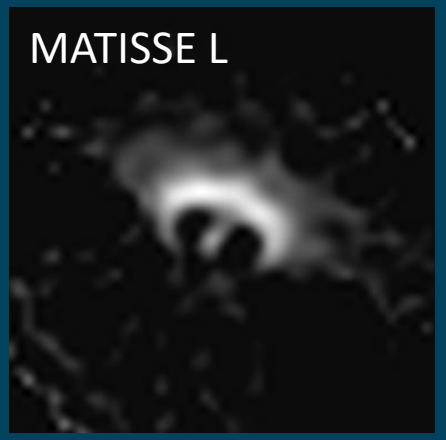
Spectral binning should help!

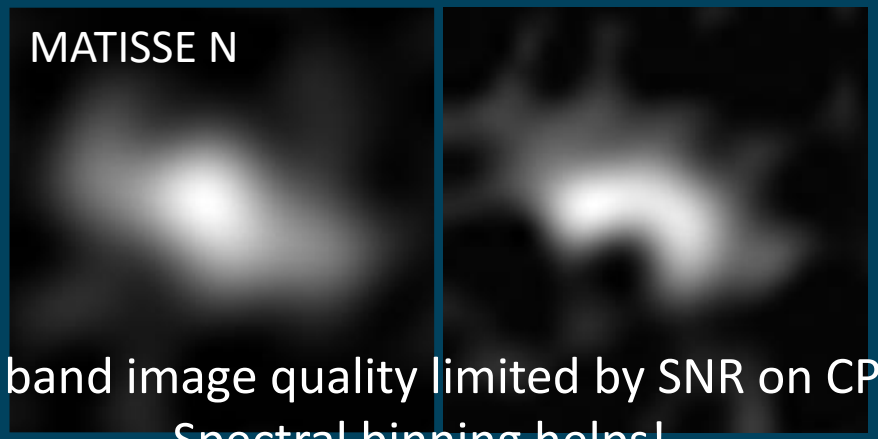


Overview of stellar physics programs for 2019-2020

Data from the MATISSE commissioning : B[e] FS CMa (Weigelt)

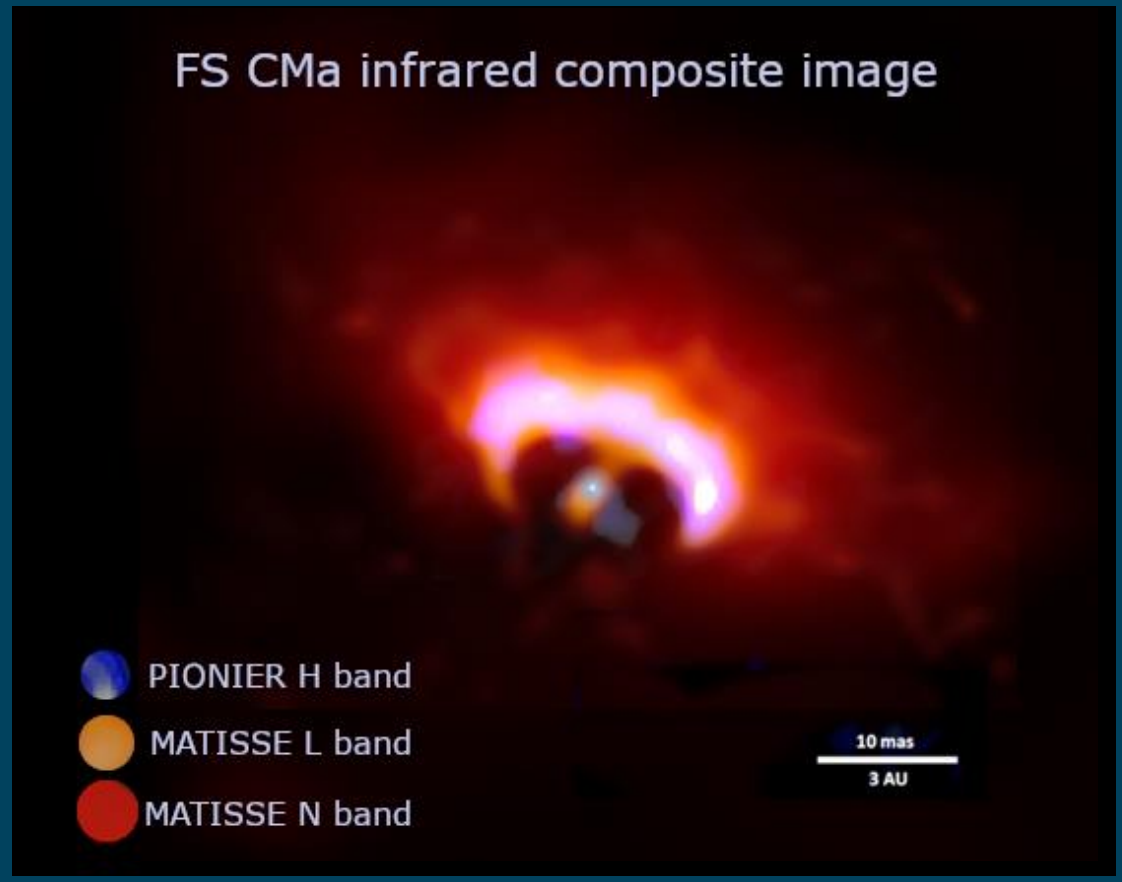
Observations during the Imaging Commissioning in December 2018





N band image quality limited by SNR on CP

Spectral binning helps!

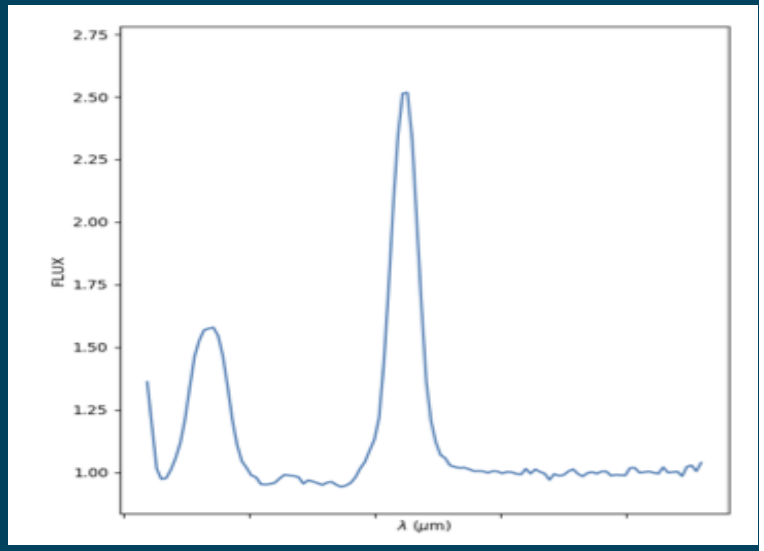


Overview of stellar physics programs for 2019-2020

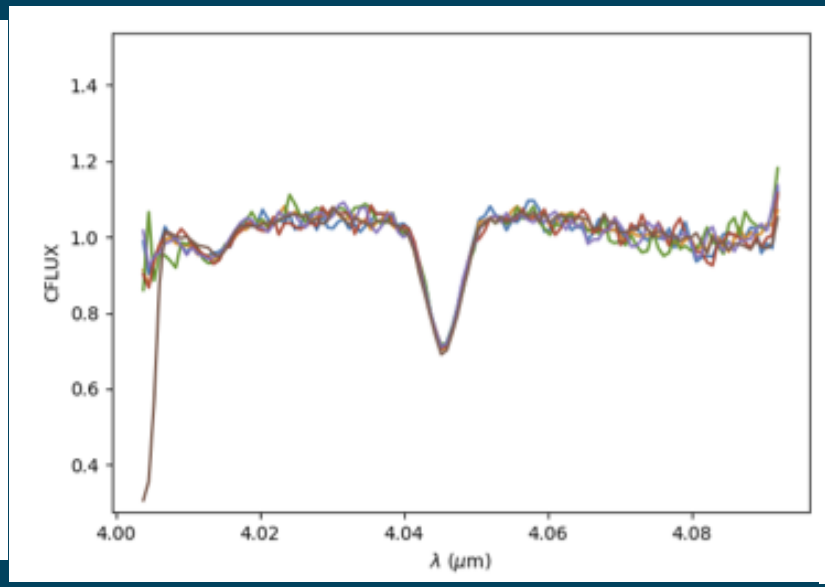
Data from the MATISSE commissioning : 7 Be stars (Meilland)

α Ara, Achernar, η Cen, δ Cen, δ Sco, 48 Lib, HD112091

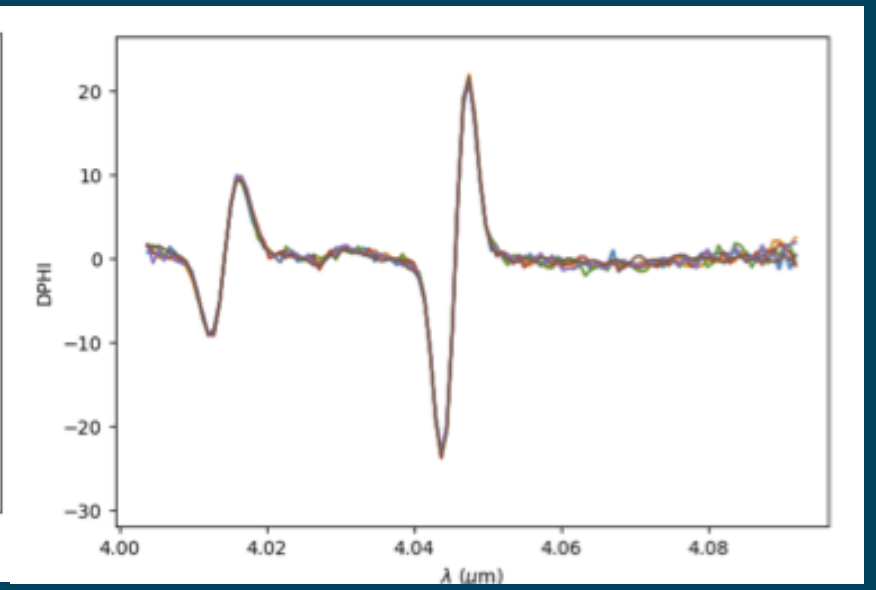
mainly in MED or HIGH centered on Brα



Brα Line Profile (+ Hu 9)



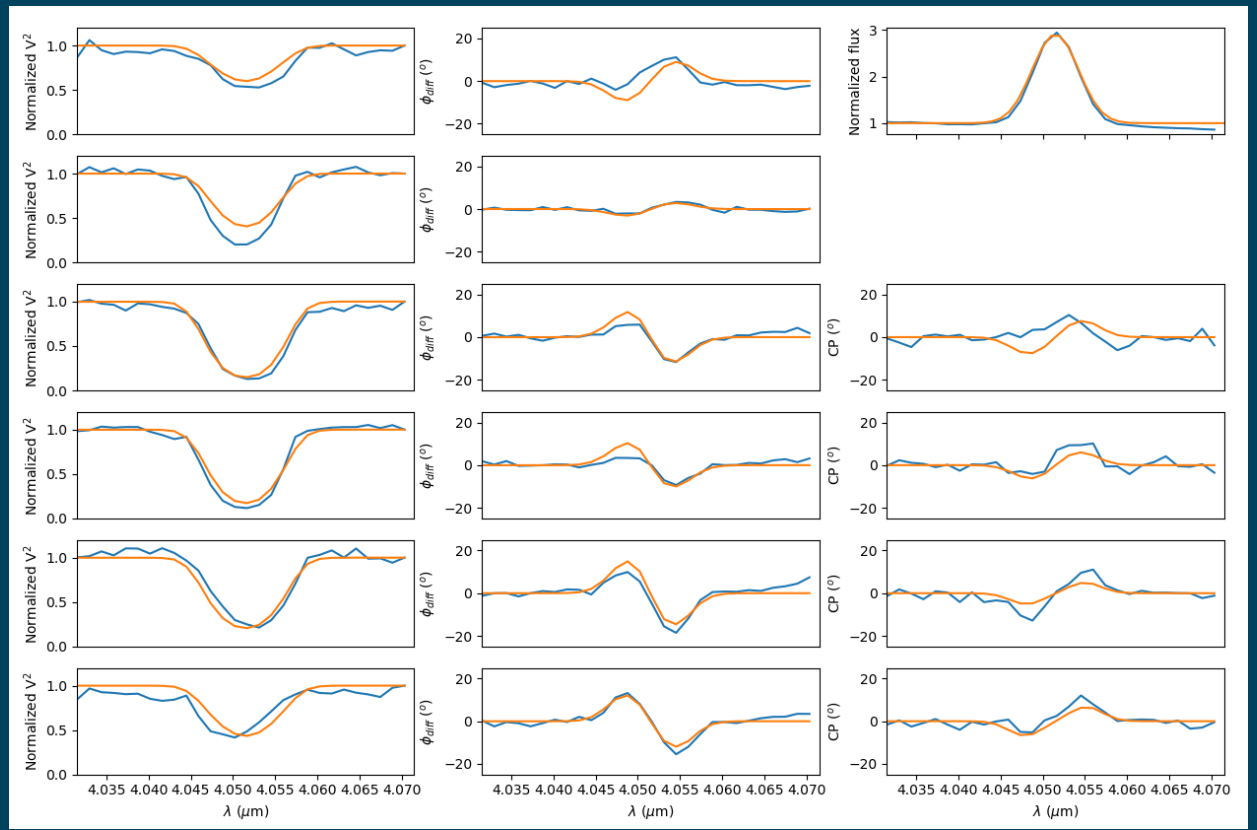
Visibility

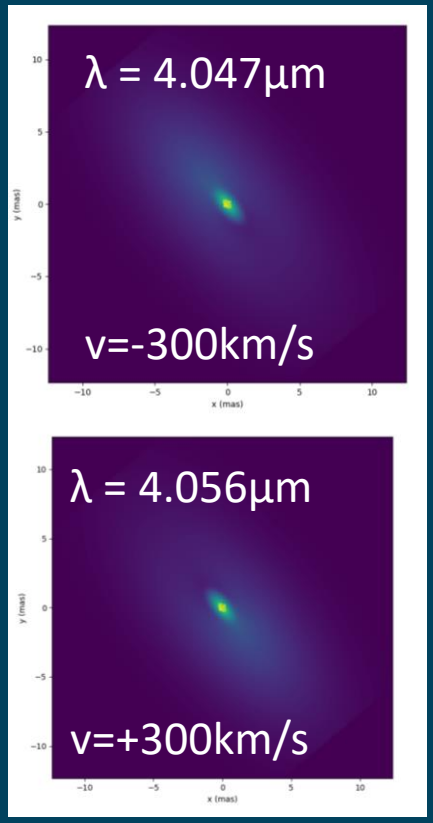


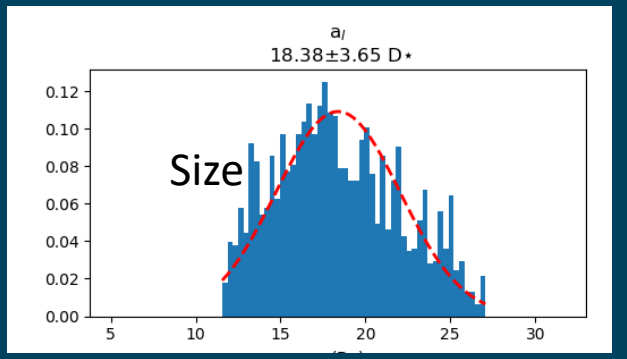
Differential Phase

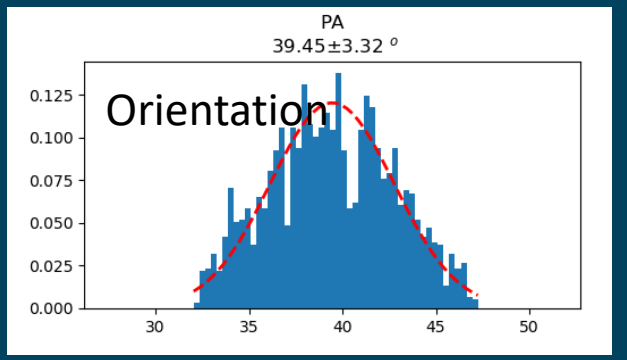
Overview of stellar physics programs for 2019-2020

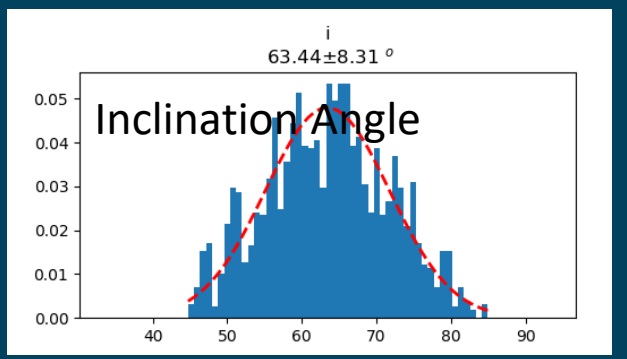
Data from the MATISSE commissioning : 7 Be stars (Meilland)











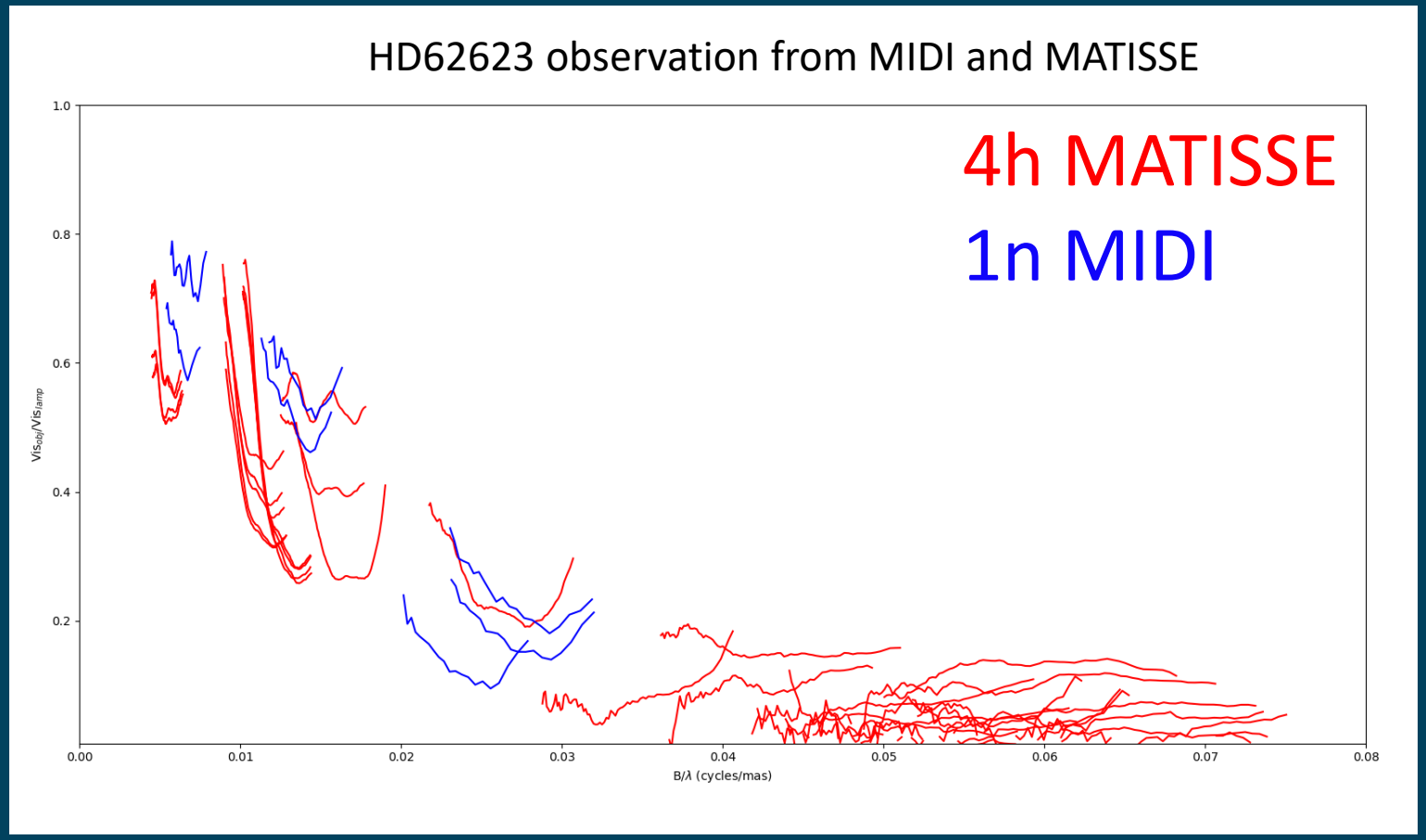
MCMC–fit on disk geometry and kinematics from Brα using a toy-model

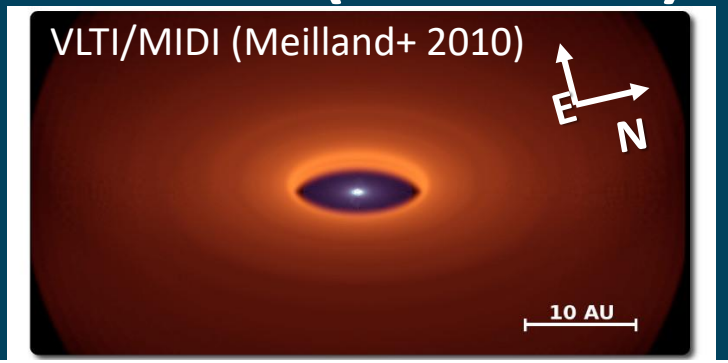
Radiative transfer will add information on the density and temperature distribution

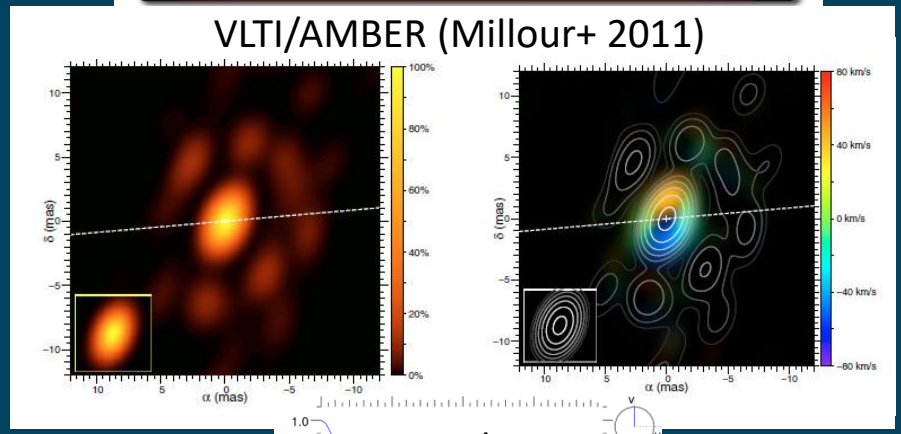
Overview of stellar physics programs for 2019-2020

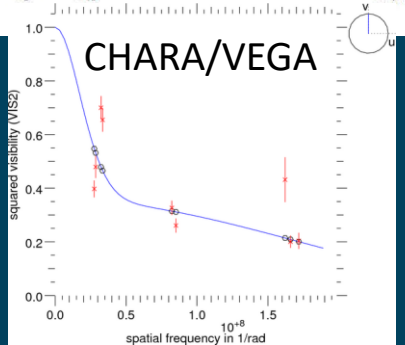
Data from the MATISSE commissioning : B[e] HD62623 (Meilland)

Observed as backup during December 2018 imaging run



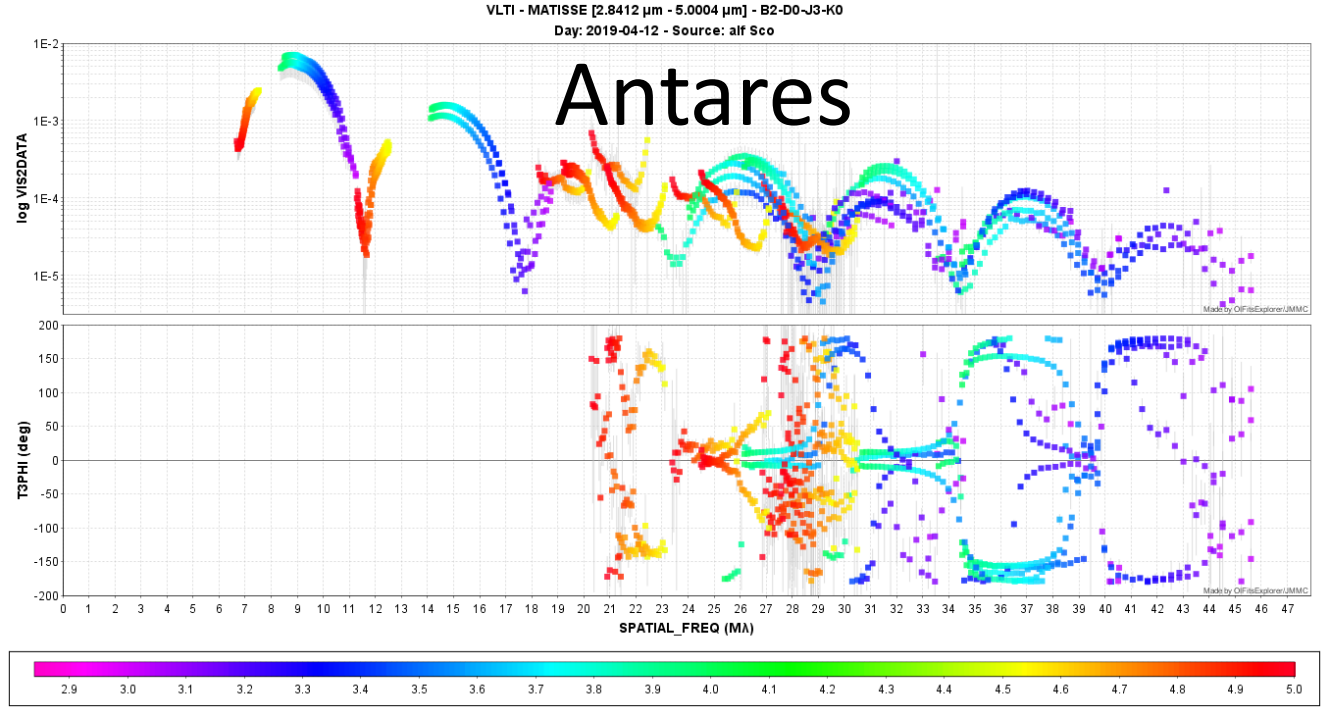




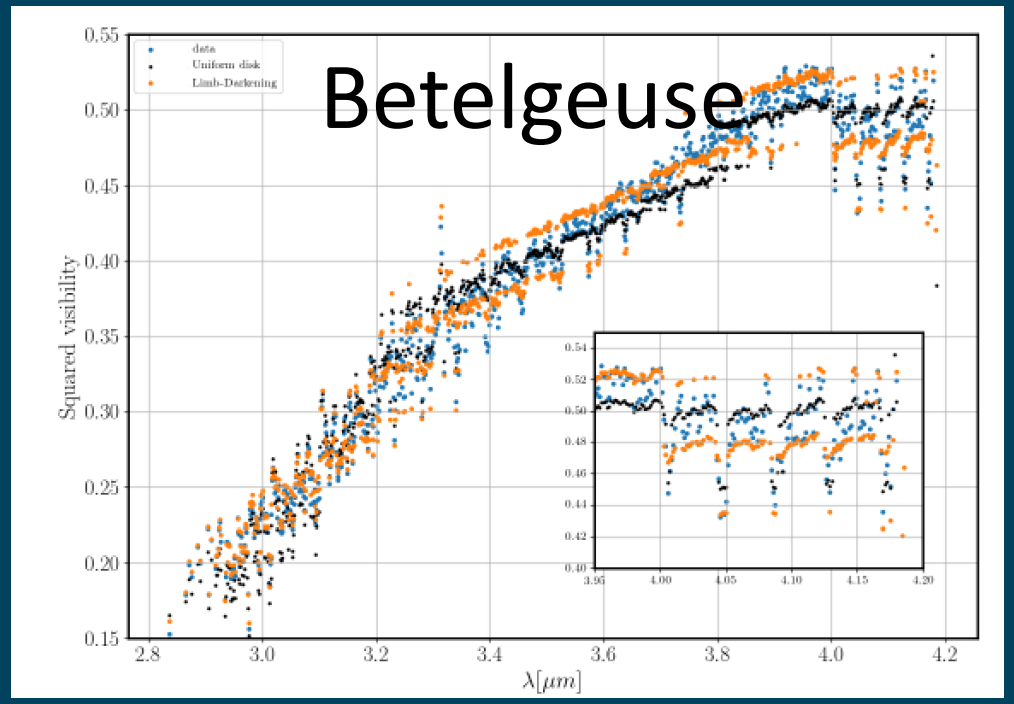


Overview of stellar physics programs for 2019-2020

Data from the MATISSE commissioning : Antares and Betelgeuse



On a few measurements in LOW-LM



Observed a lot in MED-LM and HIGH-N
During December 2018 imaging run

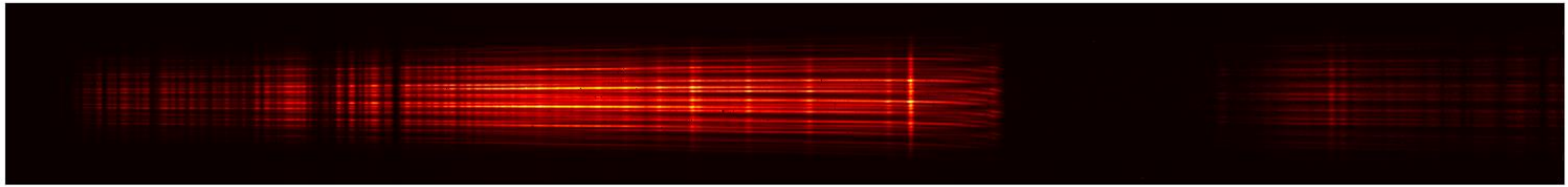
Overview of stellar physics programs for 2019-2020

Data from the GRA4MAT commissioning

- A few Be stars
- And B[e] stars
- Rigel radiatively driven wind
- η Car in VHIGH
- Not that many cold stars up to now

} Emission line stars

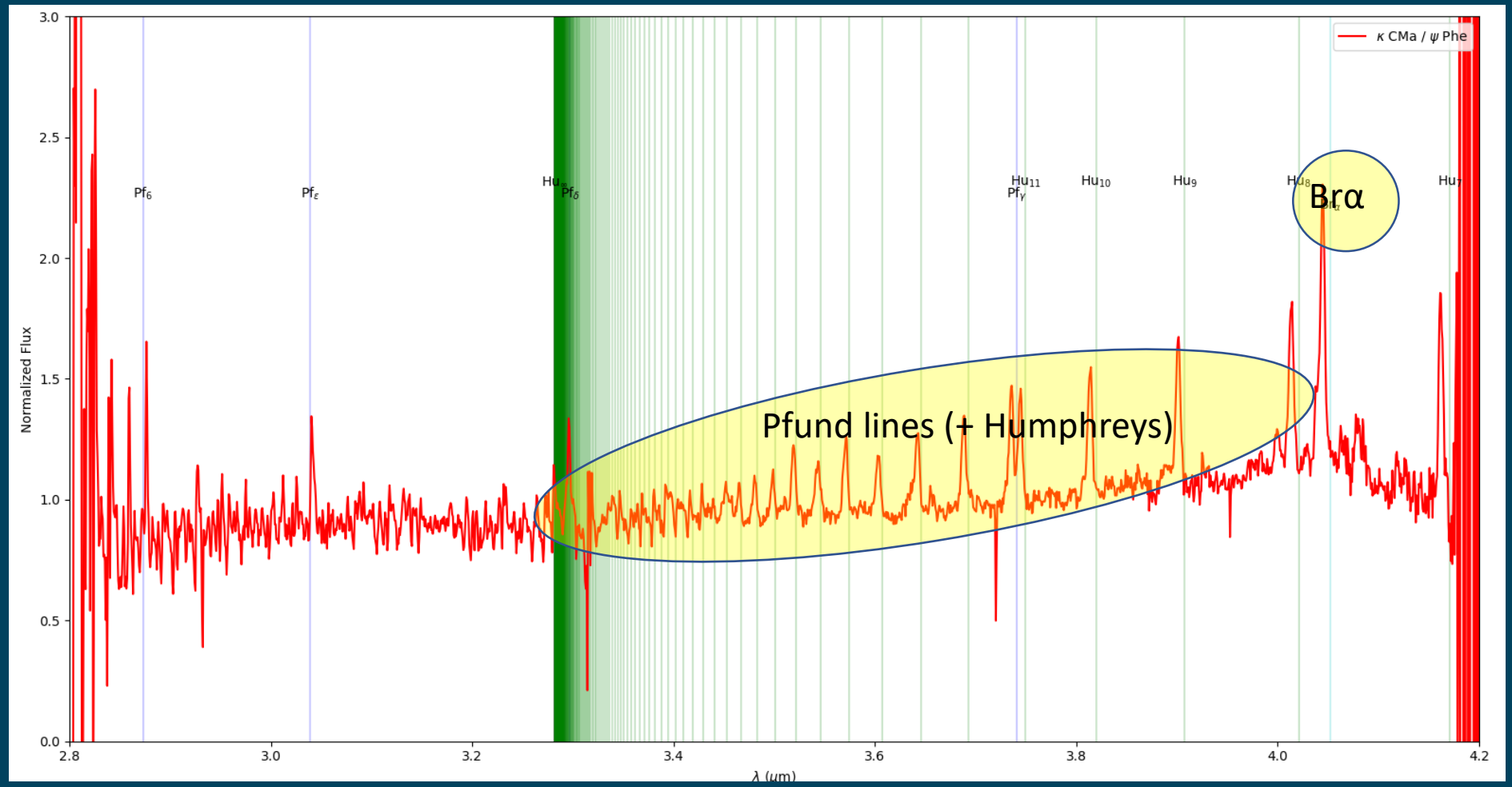
GRA4MAT



First GRA4MAT fringes obtained in May 2019 on the Be star δ Cen
Commisioning in September, October and December 2019

Overview of stellar physics programs for 2019-2020

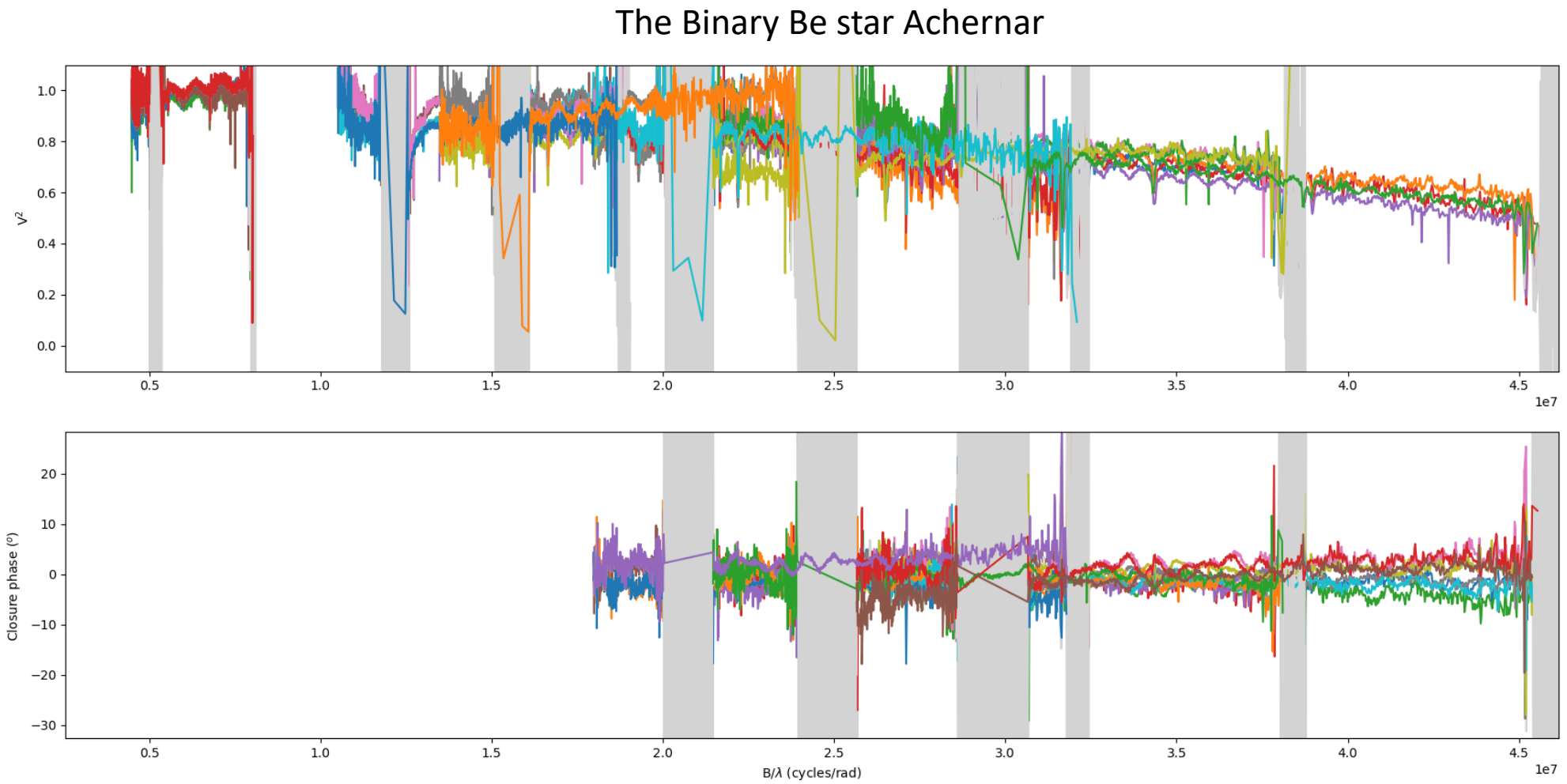
Data from the GRA4MAT commissioning : Be stars



GRA4MAT spectrum obtained on K CMa

Overview of stellar physics programs for 2019-2020

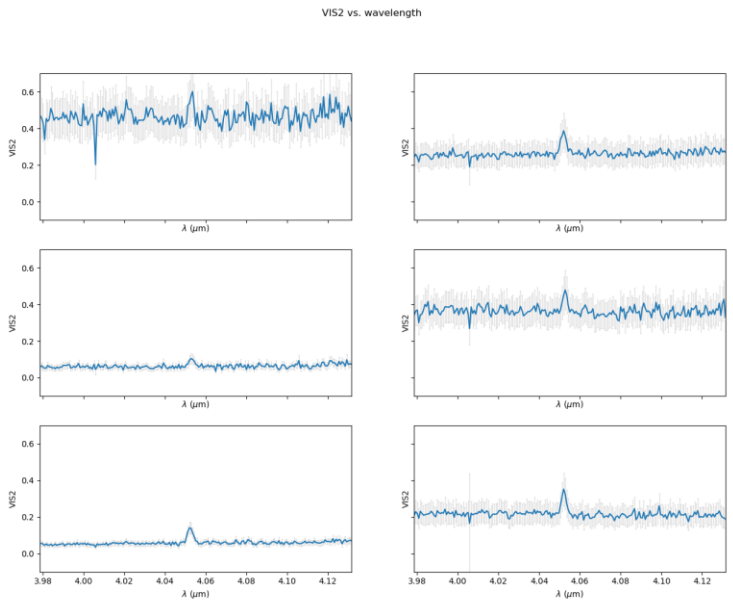
Data from the GRA4MAT commissioning : Be stars



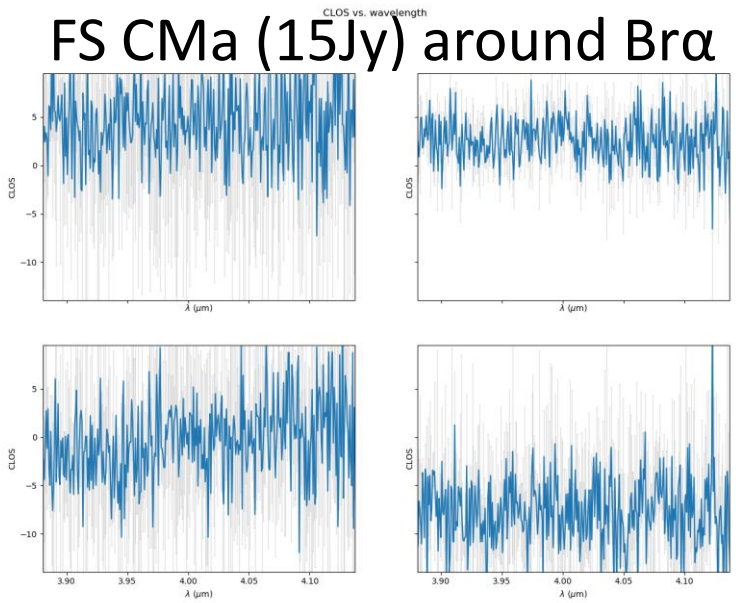
Overview of stellar physics programs for 2019-2020

Data from the GRA4MAT commissioning : B[e] stars

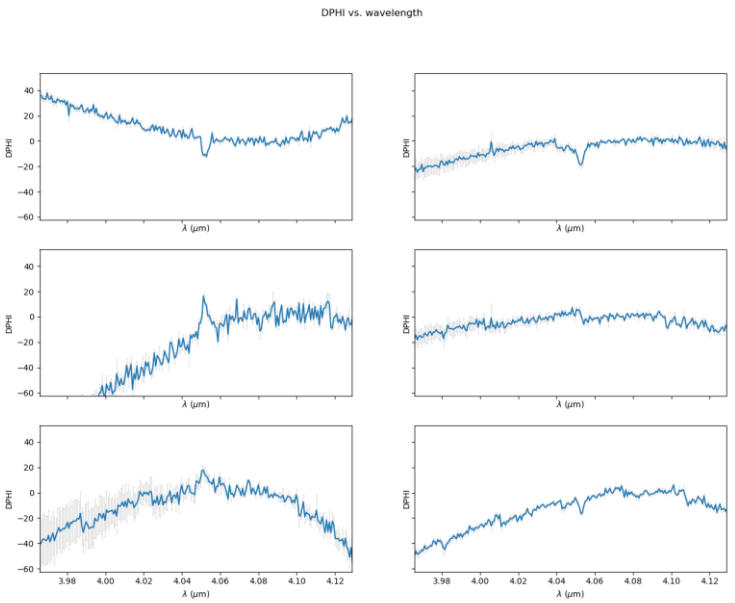
FS CMa (15Jy) around Brα



Visibility



Closure phase

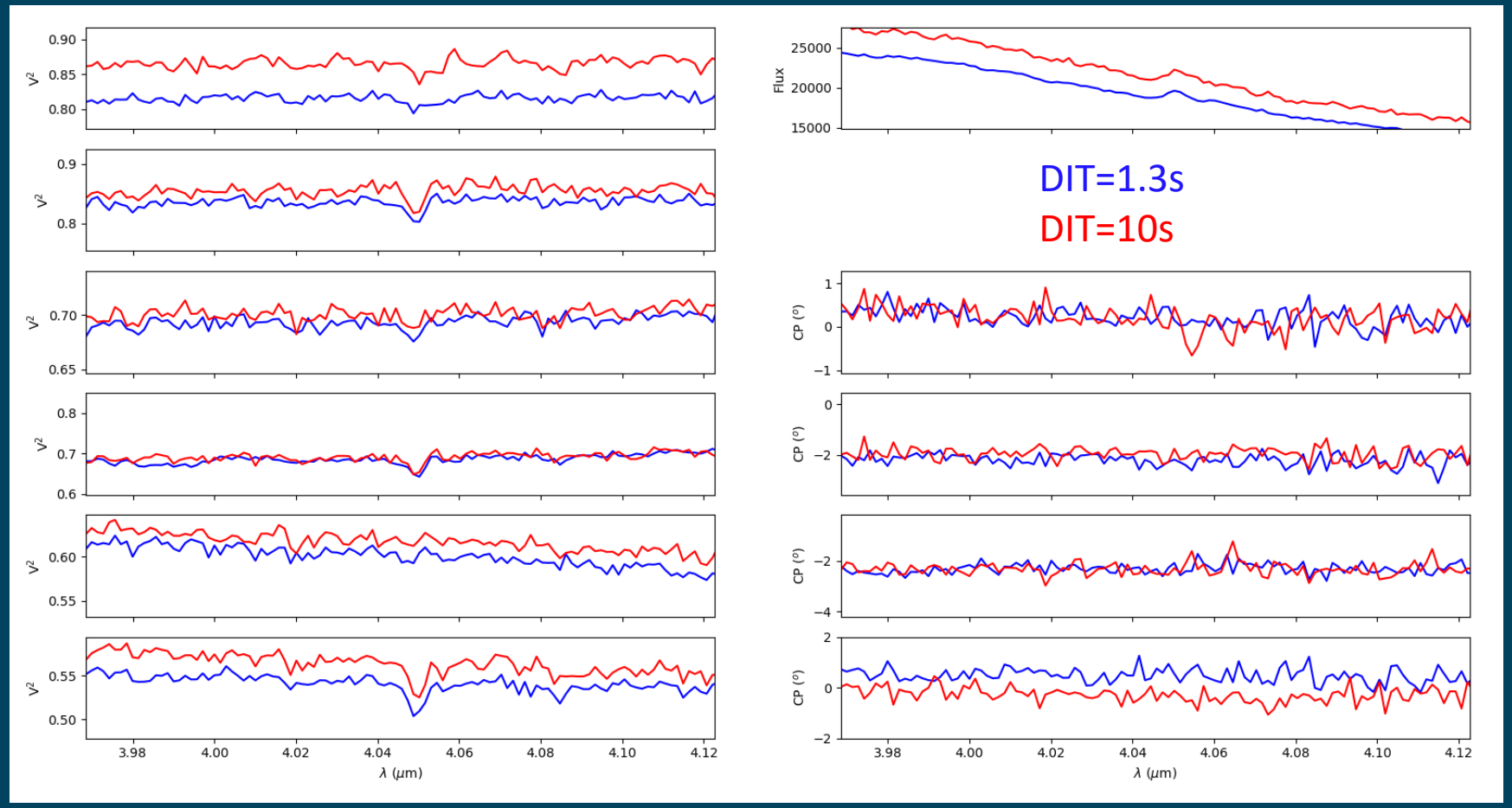


Differential phase

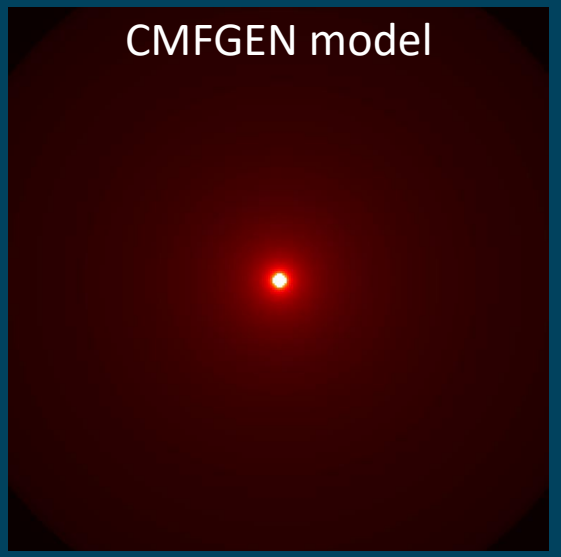
Similar data on HD 50138 and HD 62623

Overview of stellar physics programs for 2019-2020

Data from the GRA4MAT commissioning : Rigel wind



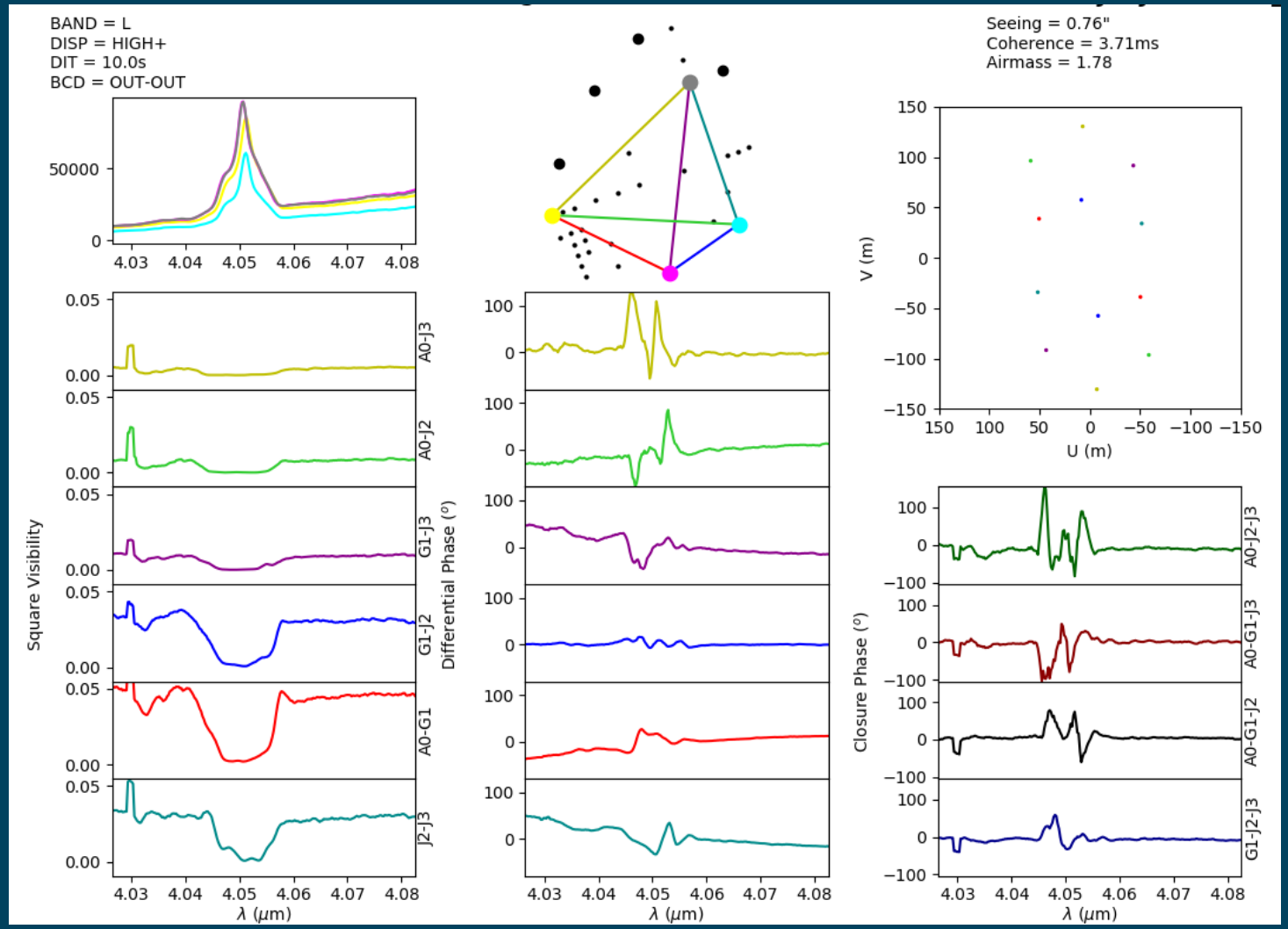
Wind of Rigel in the Brα line



Constraints on Mass-loss
+
Clumping or Asymmetry

Overview of stellar physics programs for 2019-2020

Data from the GRA4MAT commissioning : η Car in VHIGH



Overview of stellar physics programs for 2019-2020

GRA4MAT commisioning is still going on

GRA4MAT in VHIGH last night on η Car