

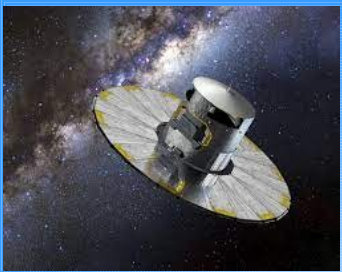
# Characterising the Milky Way through Gaia, IGAPS and WEAVE

Maria Monguió  
ICCUB-IEEC

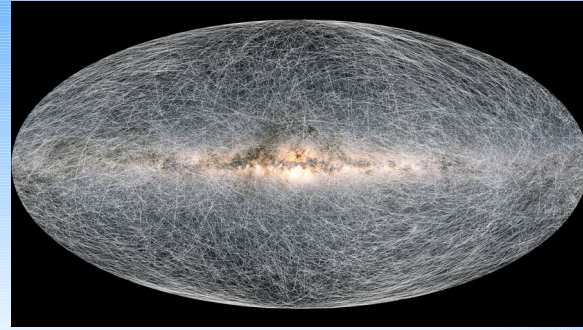
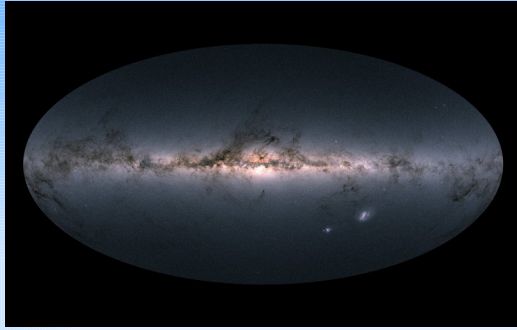
Barcelona, February 8, 2022







# Gaia



## Already available:

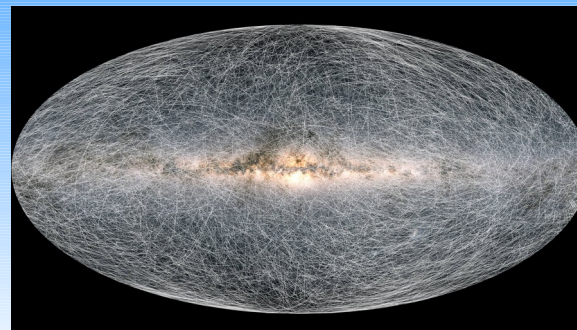
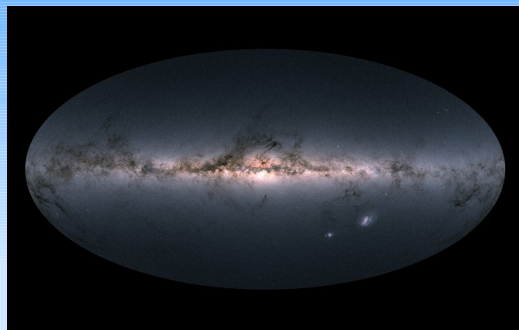
- G magnitude ( $1.8 \times 10^9$ )
- 5 $\mu$  astrometry ( $1.5 \times 10^9$ )
- $G_{BP}$  and  $G_{RP}$  ( $1.5 \times 10^9$ )

## Future releases:

- Spectra in the Ca triplet
- BP/RP spectra
- Radial Velocities
- Epoch and transit data
- Astrophysical parameters
- Source classification (exoplanets, QSO, galaxies, SSO)



# Gaia



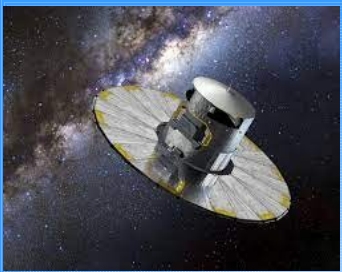
## Already available:

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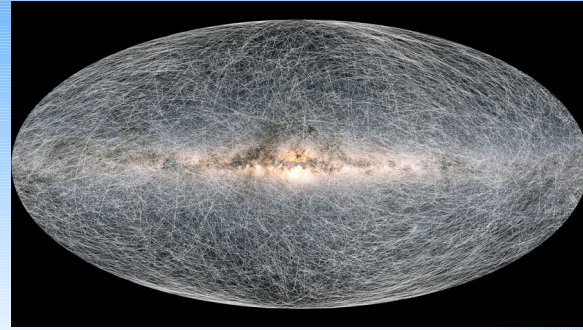
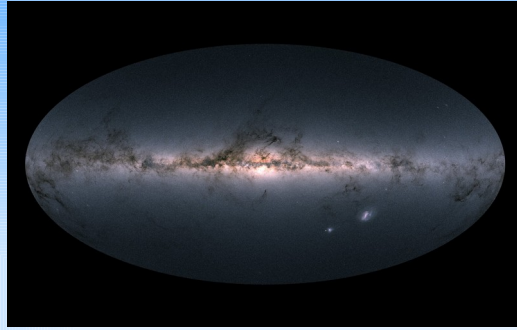
## Future releases:

- Spectra in the Ca triplet
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- Source classification (exoplanets, QSO, galaxies, SSO)

**Gaia DR3:  
June 13, 2022**

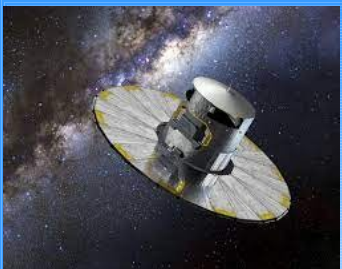


# Gaia

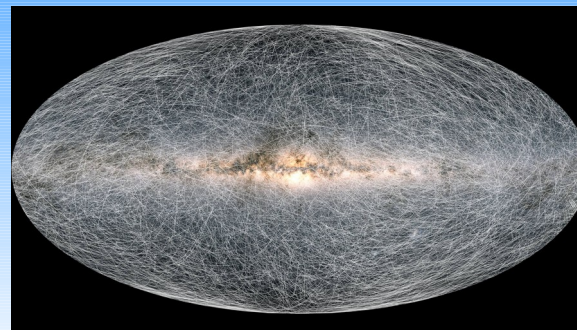
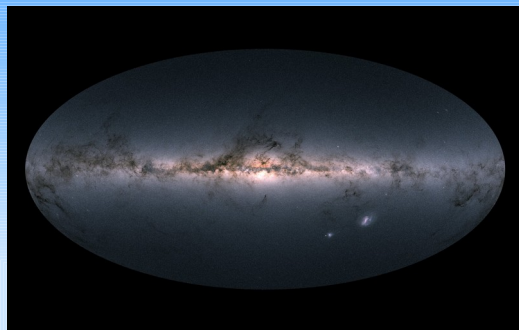


## Data release 3:

- G magnitude ( $1.8 \times 10^9$ )
- 5p astrometry ( $1.5 \times 10^9$ )
- $G_{BP}$  and  $G_{RP}$  ( $1.5 \times 10^9$ )
- Object classification (500M)
- BP/RP spectra (100M,  $G < 17.6$ )
- RVS spectra (1M)
- Radial velocities (33M,  $Grvs < 14$ )
- Variable stars (13M)
- SSO
- Non single stars
- QSO

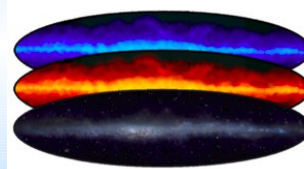


# Gaia



## Missing:

- Photometry in other bands
- Radial velocities for faint/blue objects
- Spectra in wider
- Abundances



## IGAPS

The INT Galactic plane surveys

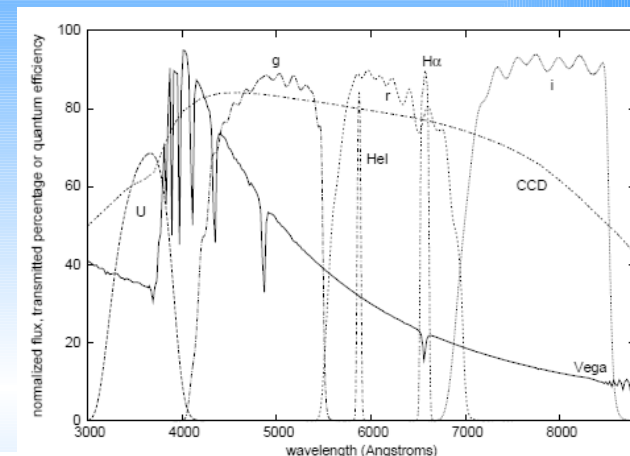


# IGAPS

## INT Galactic Plane Sureys

Monguió et al. 2020

- IPHAS+UVEX :  $i, H\alpha, r(x2), g, U_{RGO}$
- Northern Galactic plane  $30 < |l| < 215, |b| < 5$
- Astrometry based on Gaia-DR2
- Photometric calibration based on PanStarrs (gri)

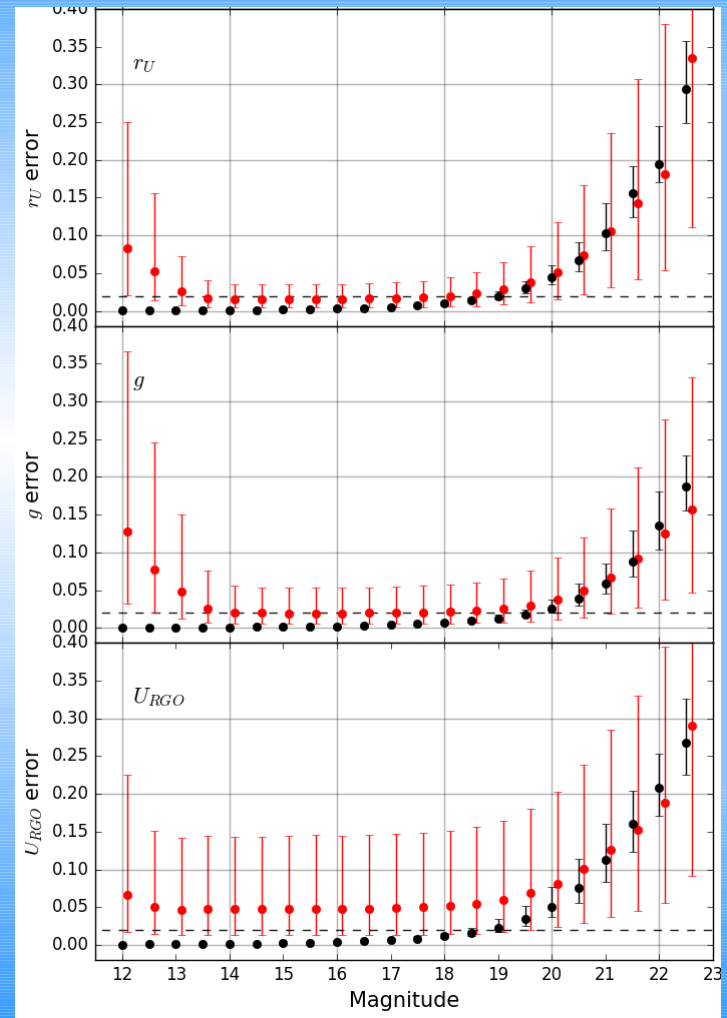
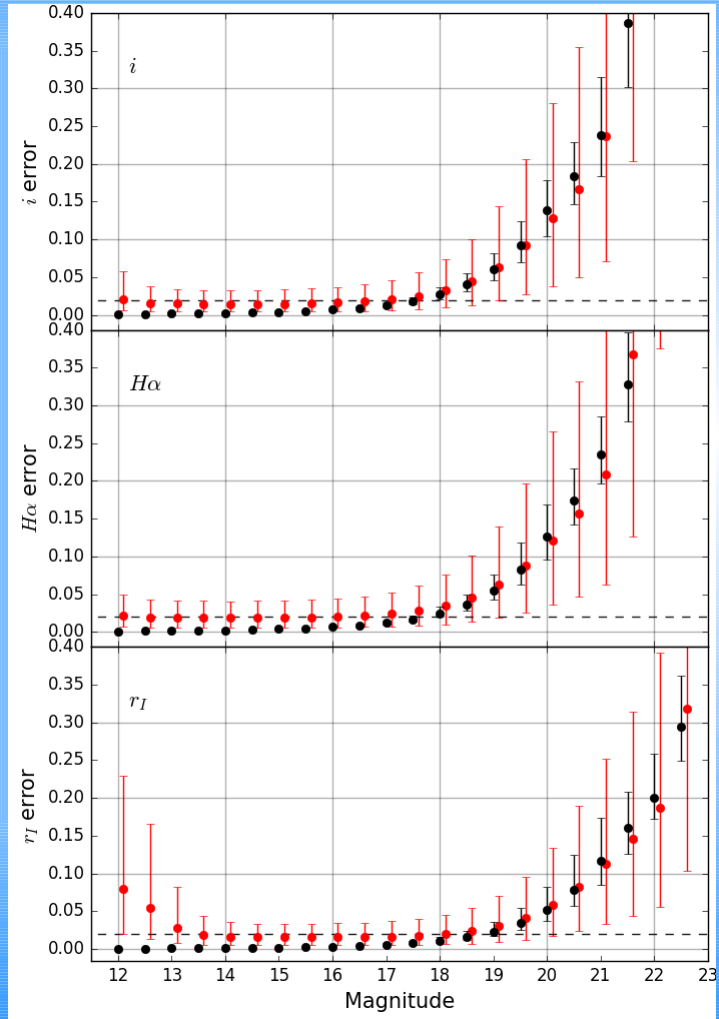


Property	Value	Comment
Telescope	2.5-m Isaac Newton Telescope (INT)	
Instrument	Wide Field Camera (WFC)	
Detectors	Four 2048×4100 pixel CCDs	
Pixel Scale	0.33 arcsec pixel <sup>-1</sup>	
Filters	$i, H\alpha, r, g, U_{RGO}$	2 $r$ epochs available $m_{AB}$ provided as alternative
Magnitude System	Vega	
Exposure times (seconds)	$i:10, H\alpha:120, r:30, g:30, U_{RGO}:120$	
Saturation magnitude	12( $i$ ), 12.5( $H\alpha$ ), 13( $r$ ), 14( $g$ ) 14.5( $U_{RGO}$ )	
Limiting magnitude	→ 20.4( $i$ ), 20.5( $H\alpha$ ), 21.5( $r$ ), 22.4( $g$ ), 21.5( $U_{RGO}$ )	median $5\sigma$ detection over the noise.
median PSF FWHM (arcsec)	1.0( $i$ ), 1.2( $H\alpha$ ), 1.1( $r$ ), 1.3( $g$ ), 1.5( $U_{RGO}$ )	
Survey area	~ 1860 square degrees	

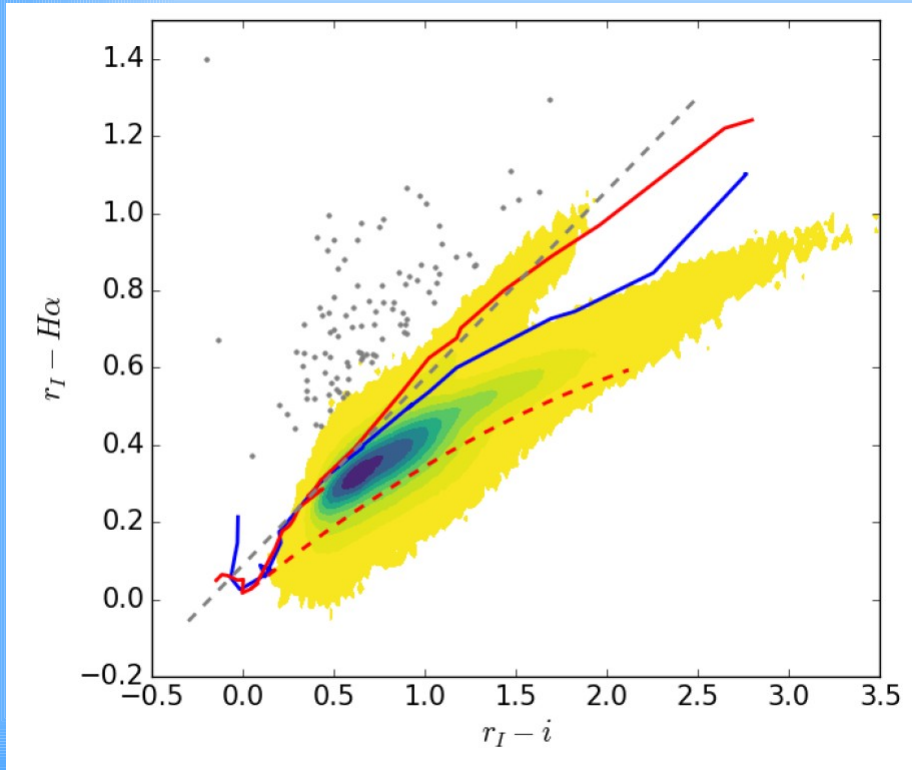


# IGAPS

Monguió et al. 2020



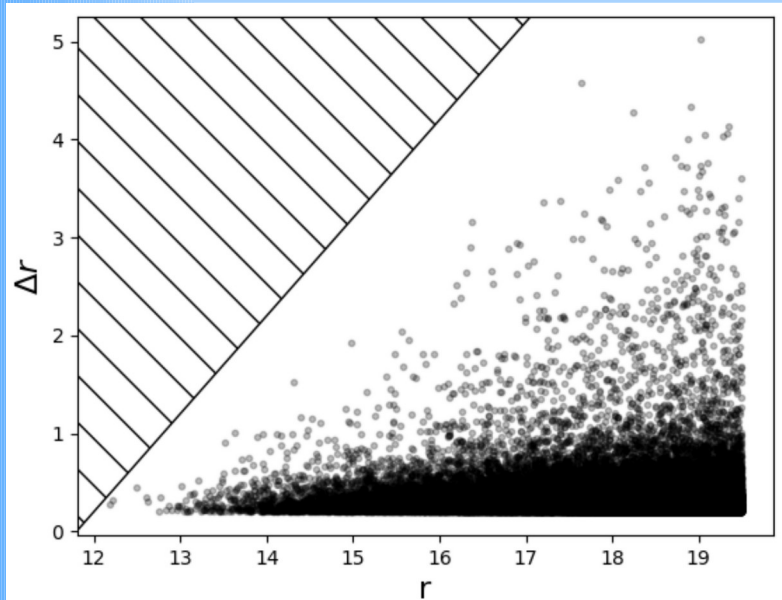
# IGAPS: Selecting emission line stars



## Emission flag:

- Only for  $r < 19.5$
- 8292 ELS at  $5\sigma$
- 12568 ELS at  $3 < \sigma < 5$

# IGAPS: Variability



## Variable flag:

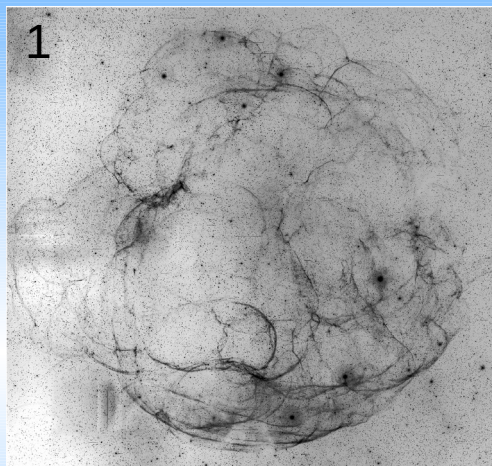
- $\Delta r > 0.2$  &  $5\sigma$
- 53525 variable sources
  - 125 Miras
  - 63 eclipsing binaries
  - 35 young variables
  - 17 pulsating variables

# IGAPS IMAGES

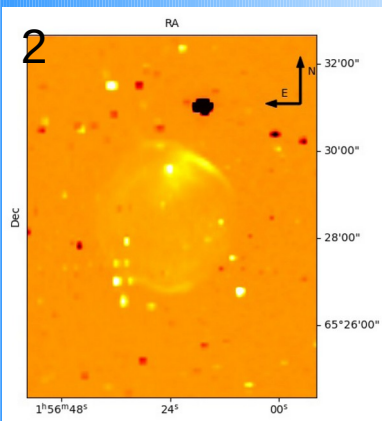
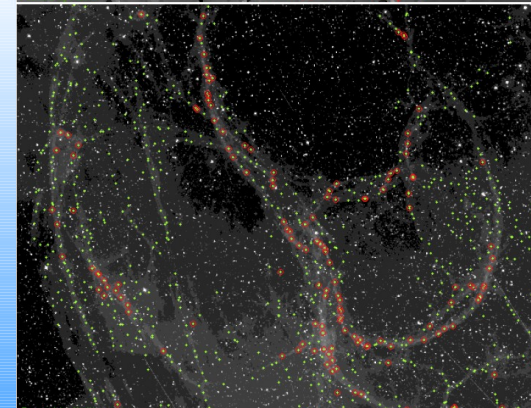
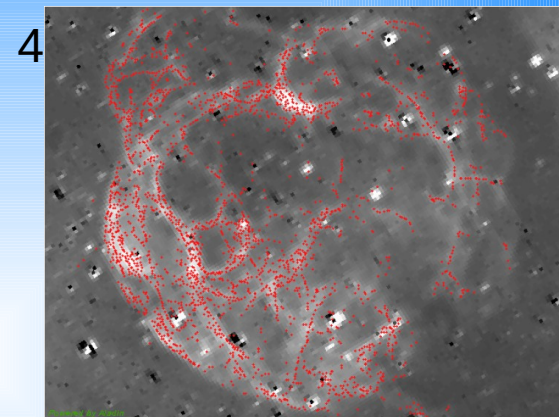
Greimel et al. 2021

[igapsimages.org](http://igapsimages.org)

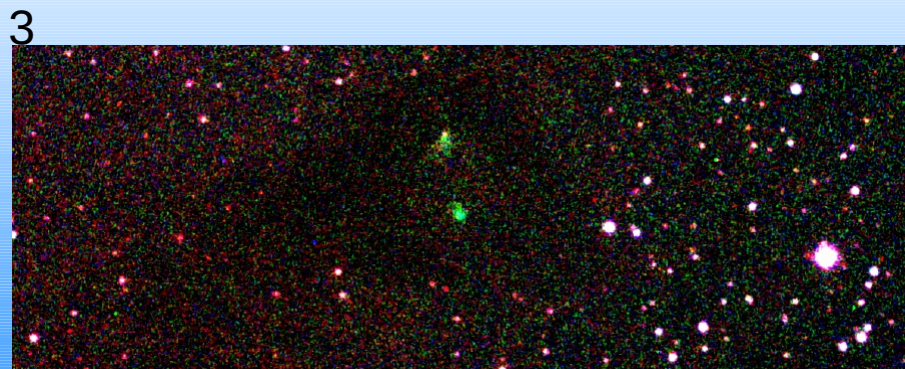
1. To make nice images
2. To detect planetary nebulae
3. To select nebular targets and skies for spectroscopic surveys (WEAVE)



5 x 3.5 sq.deg.



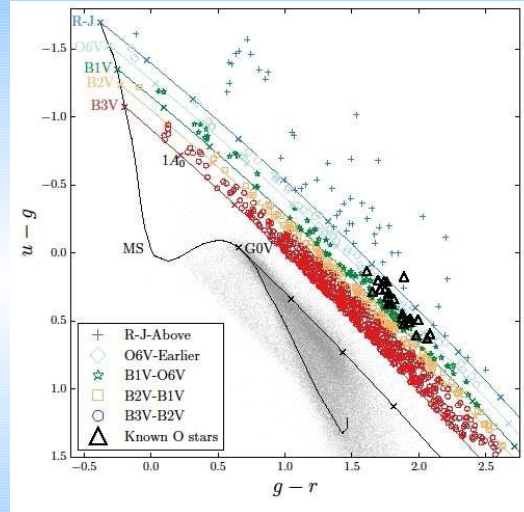
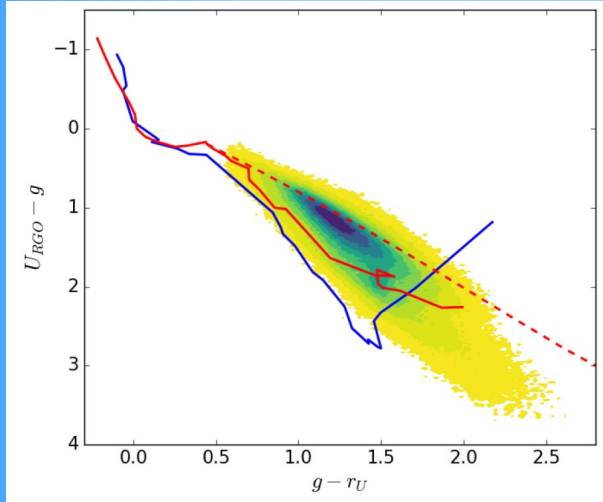
IPHASXJ015624.9+652830



Dobashi 3782

YSO IRAS  
01166+6635

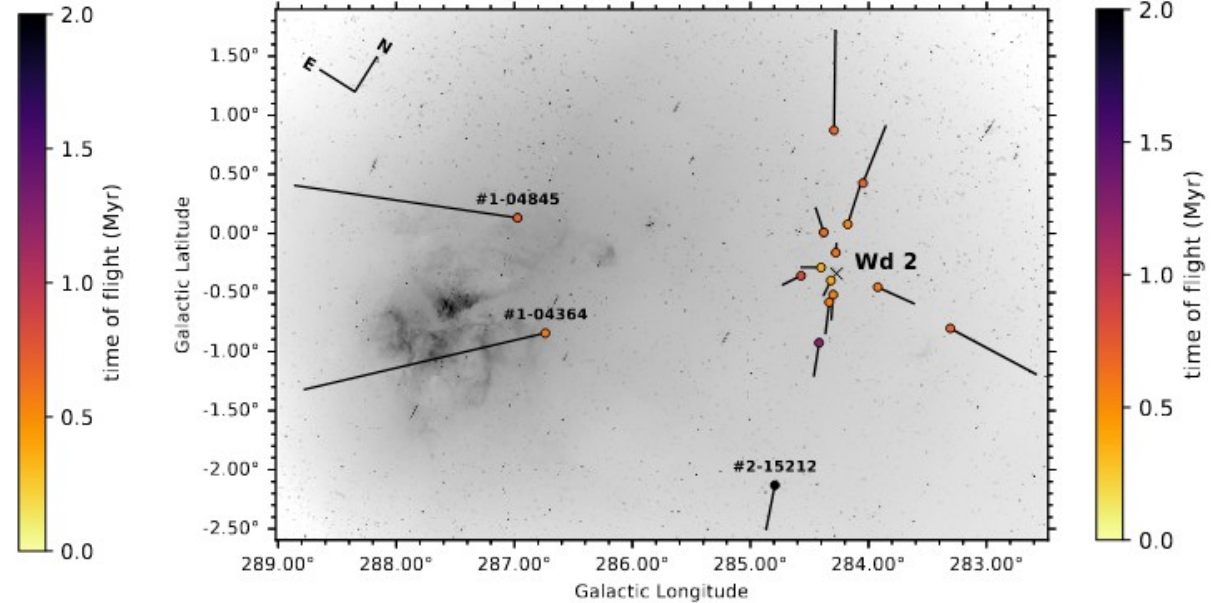
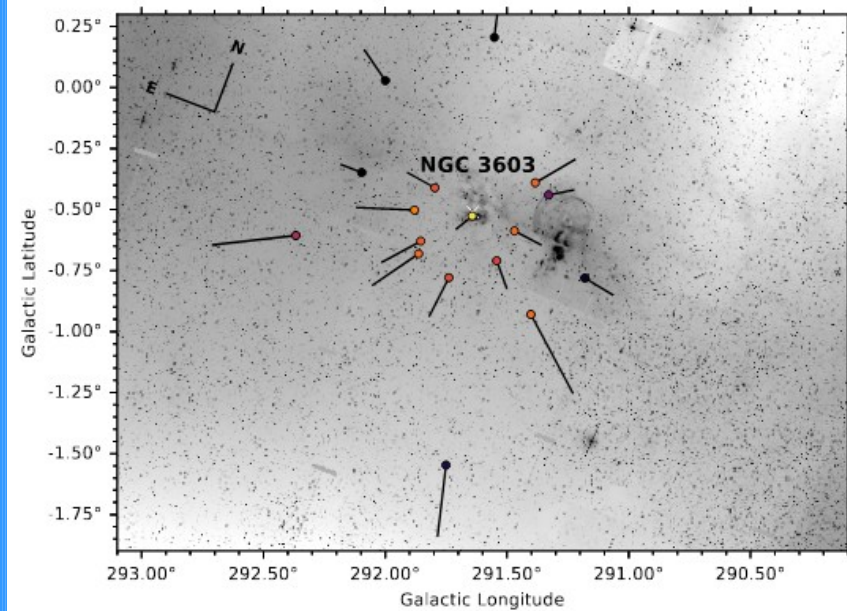
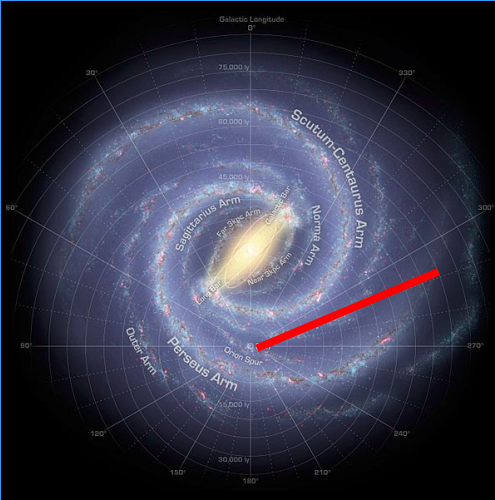
# IGAPS: Selection of OB stars



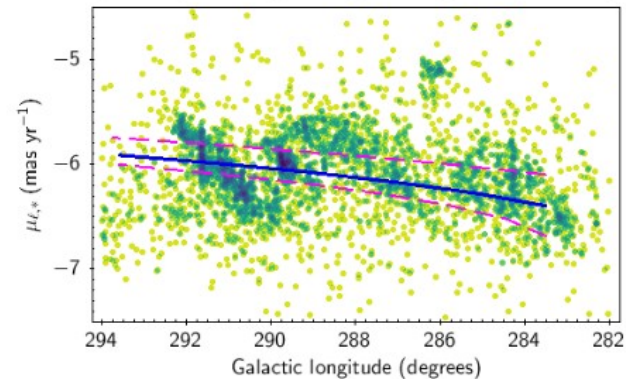
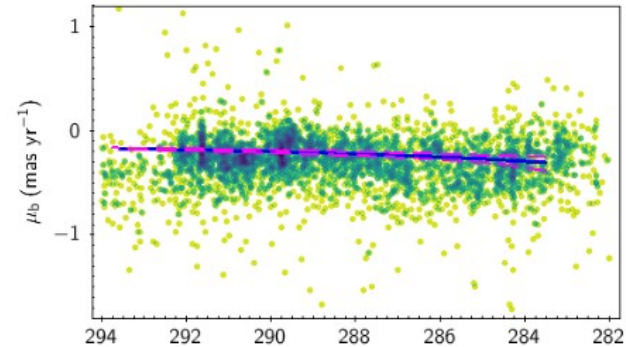
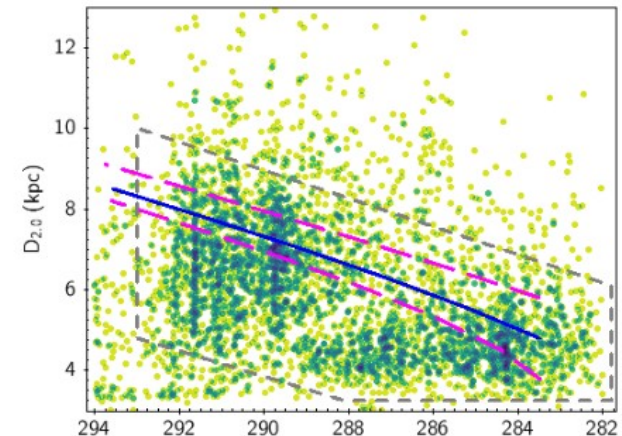
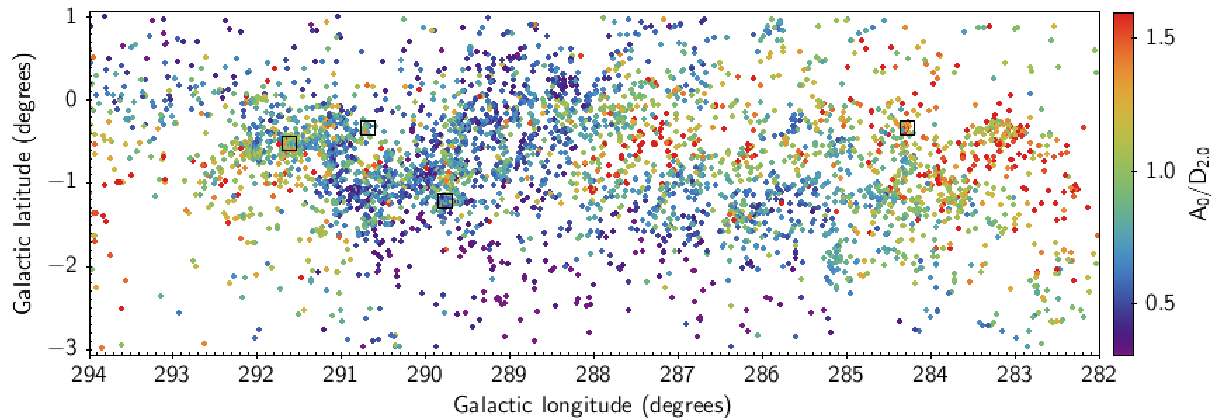
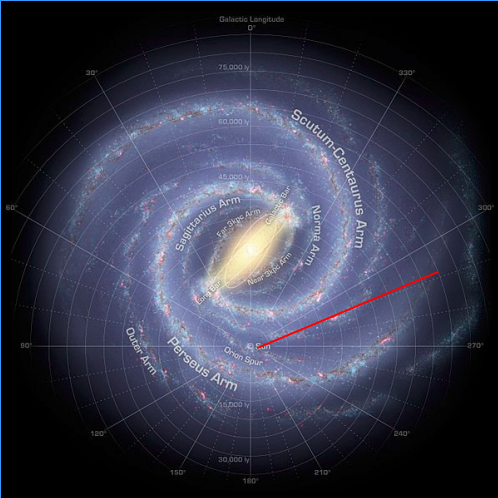
- Selection of O-B3 stars
- Mohr-Smith 2017
- Adding 2MASS, we obtain (Teff,dist), A0, Rv

# Kinematics of O stars around young clusters

Drew et al 2018,19,21

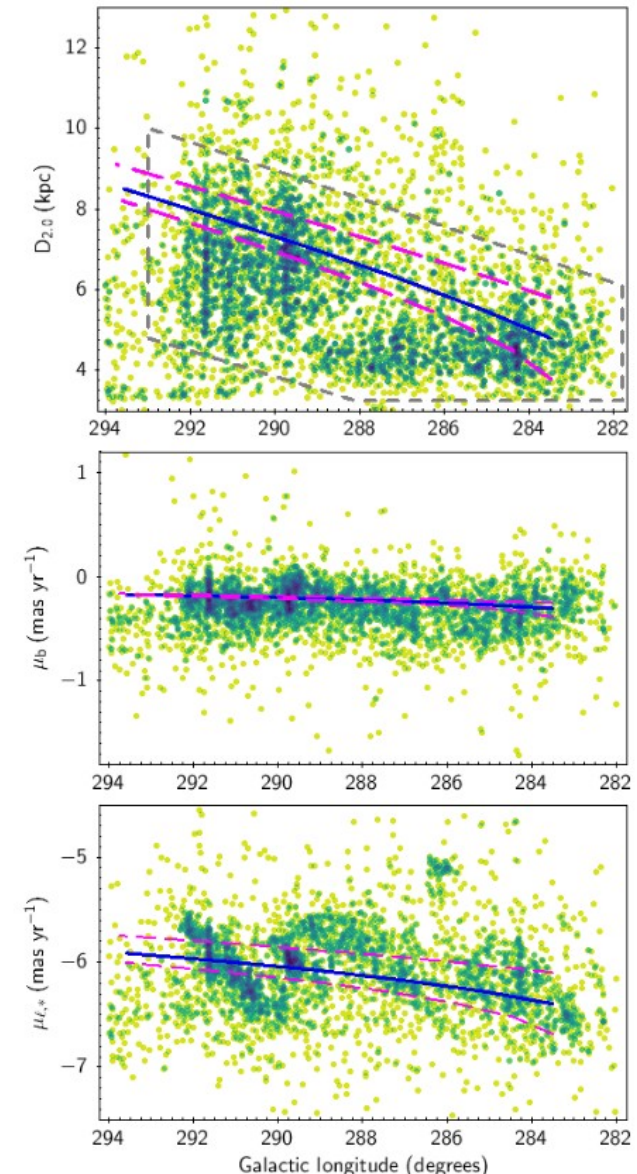
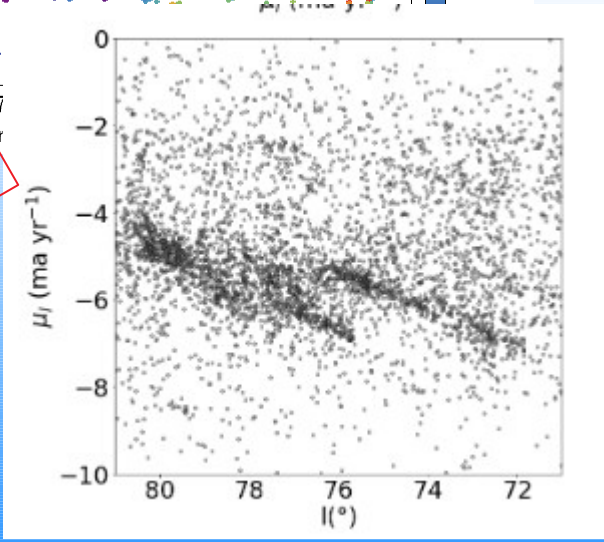
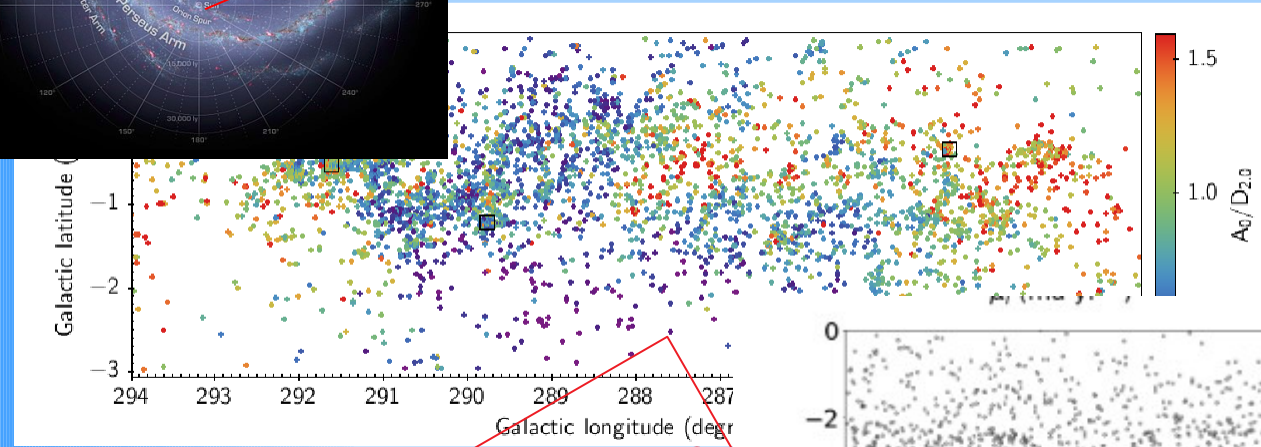
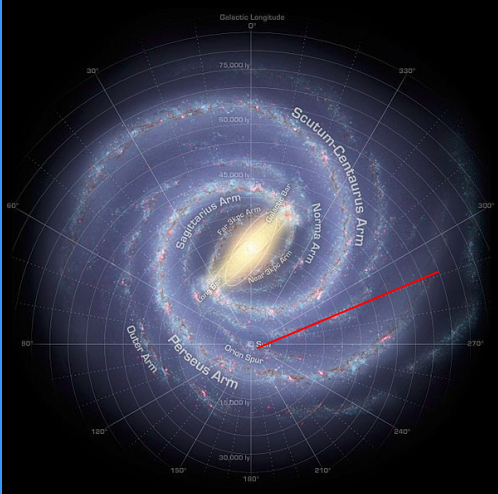


# Kinematics of O stars



Drew et al 2021

# Kinematics of O stars

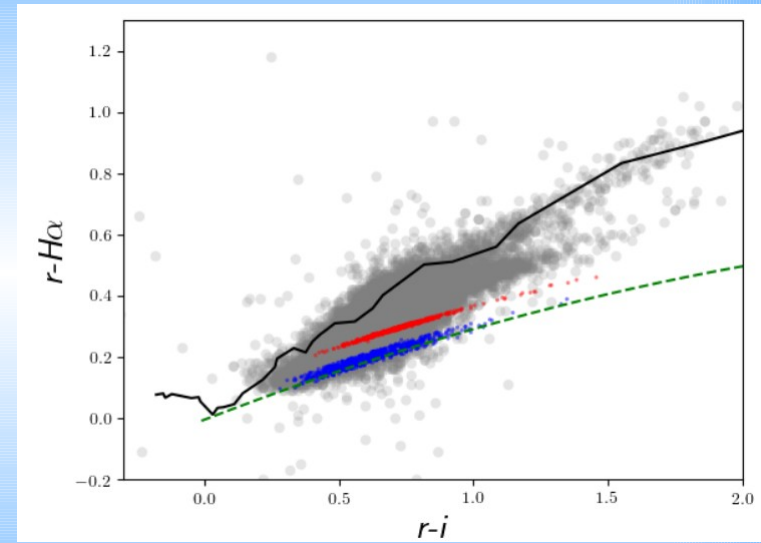
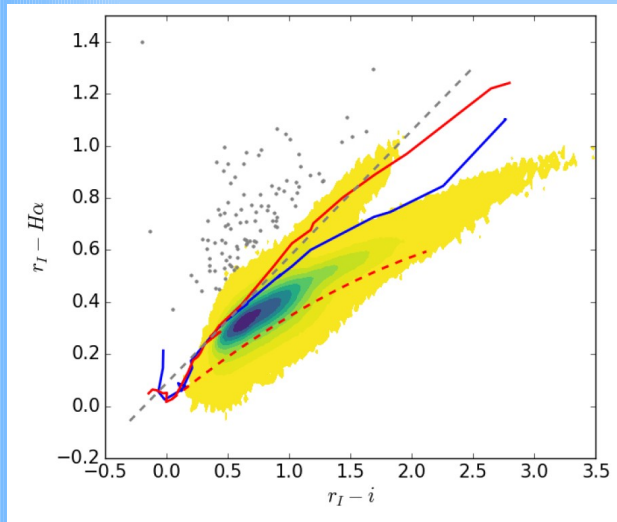


RV needed to complete the picture

Quintana & Wright 2021



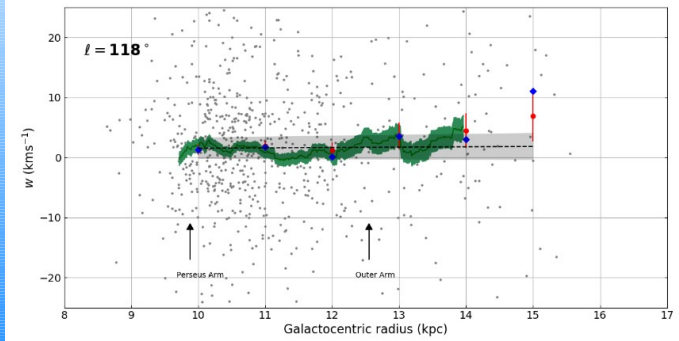
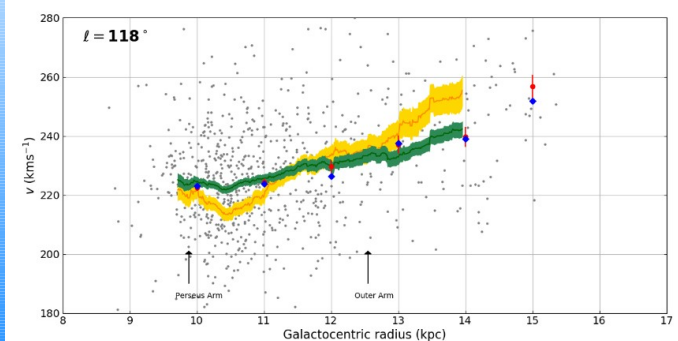
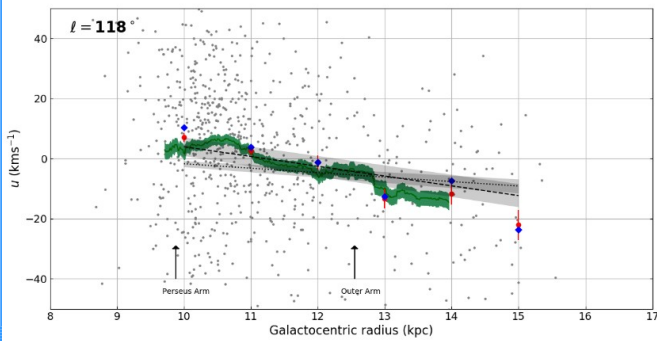
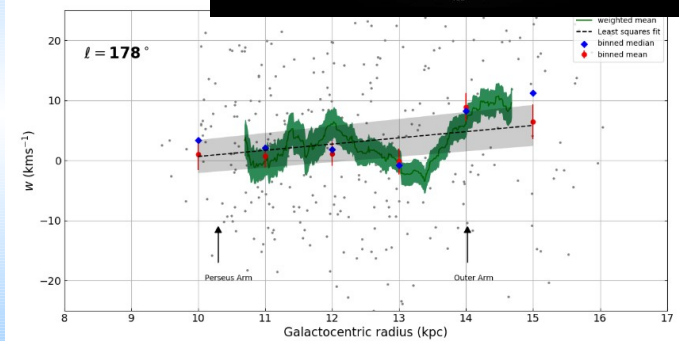
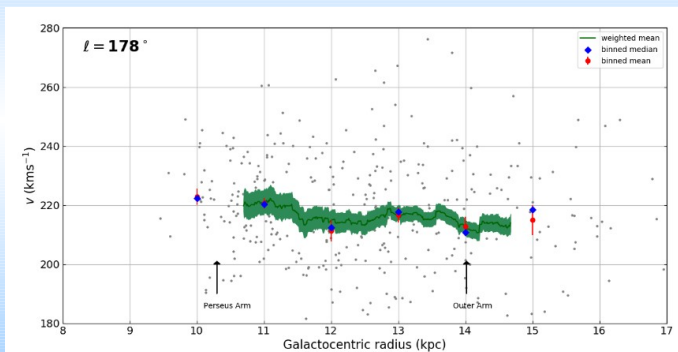
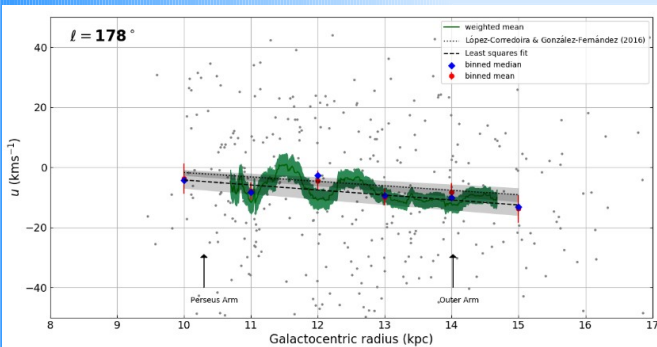
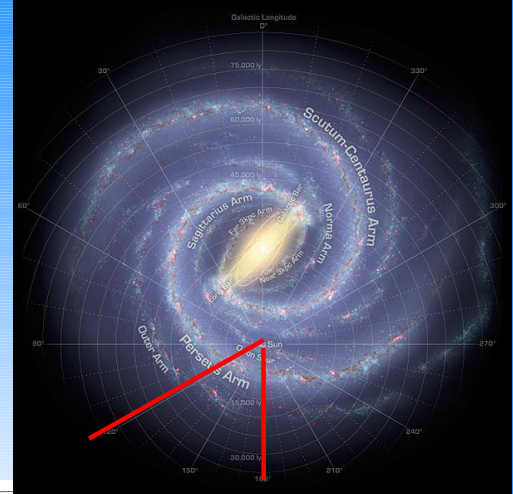
# Selection of BA stars



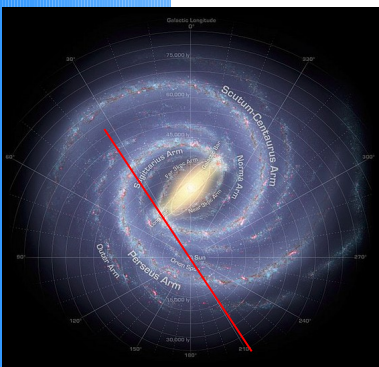
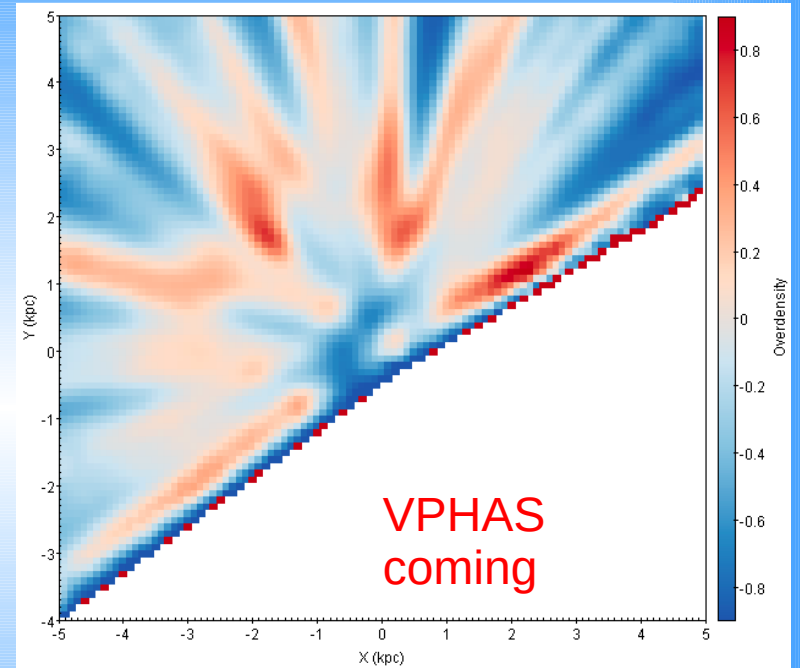
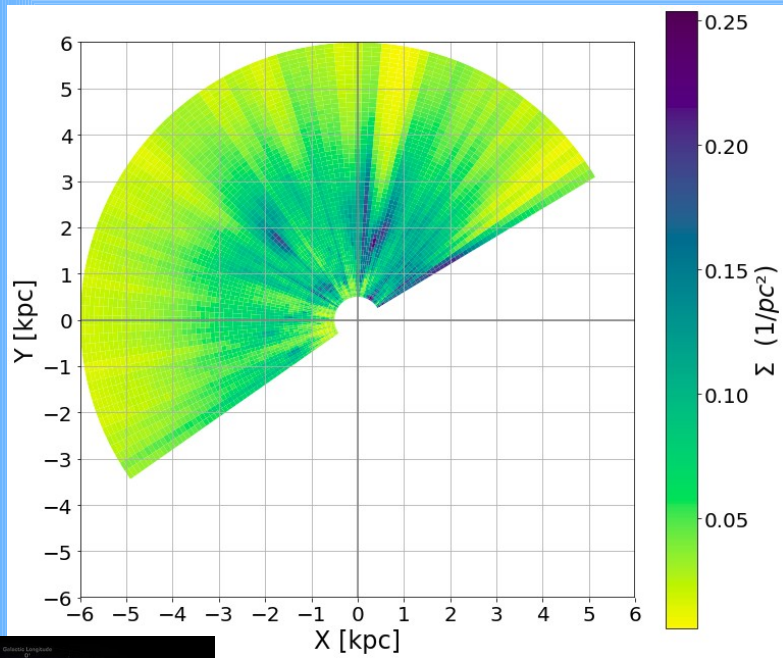
# Kinematics using A stars

Harris et al 2017,2018

- Uses Hectospec spectra at  $l=178$  and  $l=118$
- MCMC method to get  $T_{\text{eff}}$ ,  $\log g$ ,  $v_{\text{ini}}$ ,  $RV$
- +Gaia: 6D

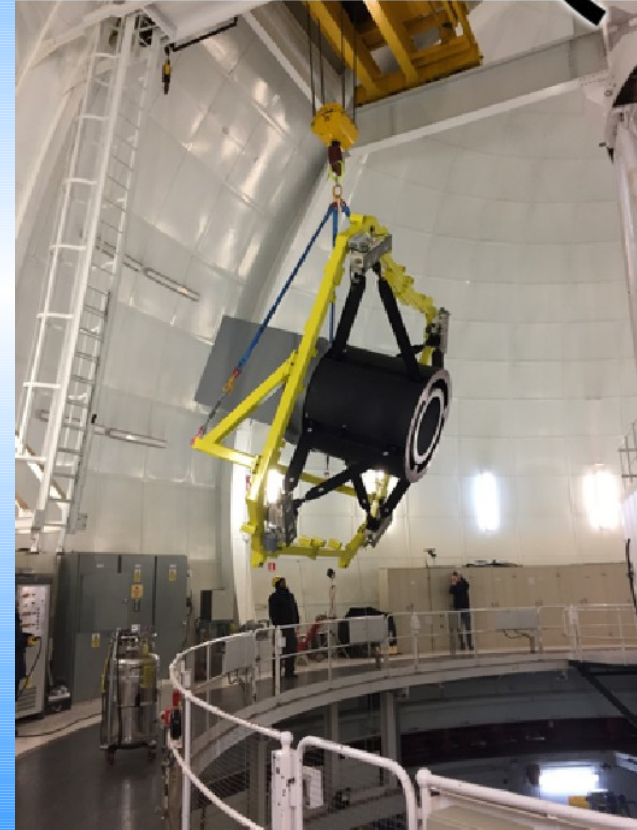
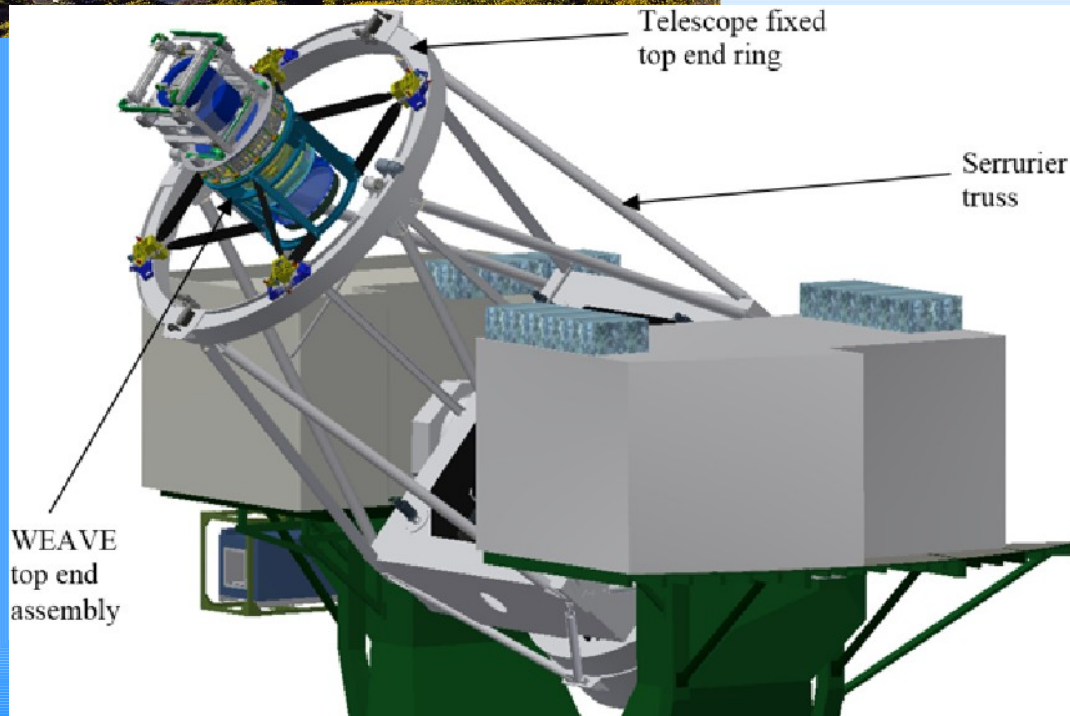
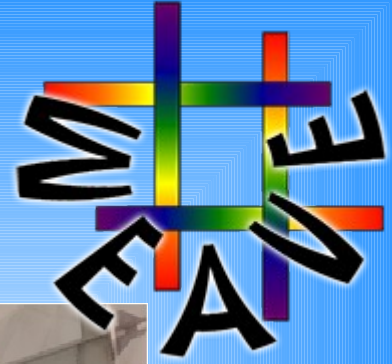


# Structure of the disc through BA stars



Work by Judith Ardèvol

# WEAVE



Telescope, diameter	WHT, 4.2m
Field of view	2° ø
Number of fibers	960 (plate A)/940 (plate B)
Fiber size	1.3"
Number of small IFUs, size	20 x 11"x12" (1.3" spaxels)
LIFU size	1.3'x1.5' (2.6" spaxels)
Low-resolution mode resolution	5750 (3000–7500)
Low-resolution mode wavelength coverage (Å)	3660–9590
High-resolution mode resolution	21000 (13000–25000)
High-resolution mode wavelength coverage (Å)	4040–4650, 4730–5450 5950–6850

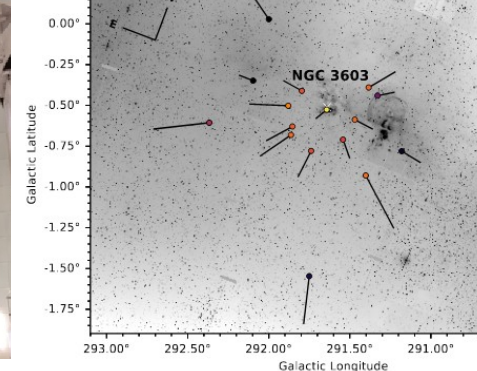
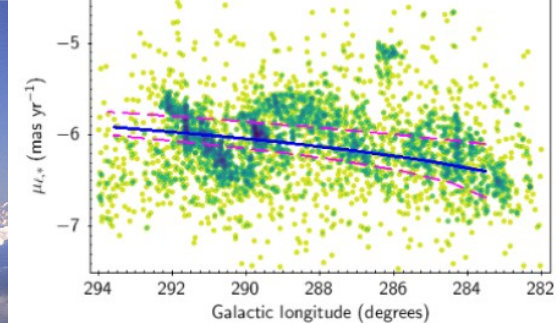
# First light expected mid-2022

- WEAVE is a consortium of: Spain, The Netherlands, UK, France, Italy
- 70% of 5 years of observing time to WEAVE surveys (226.4 nights/year) (+2?)
- 30% remaining time to ING
  - WEAVE or other WHT instruments

# WEAVE Surveys

- Galactic Archaeology (Vanessa Hill, OCA)
- Stellar Circumstellar & Interstellar Physics (Janet Drew, UCL)
- White Dwarfs (Boris Gaensicke, Warwick)
- WEAVE-LOFAR (Dan Smith, Hertfordshire)
- Stellar Populations Survey (Bianca Poggianti, INAF-Padova)
- Galaxy Clusters (José Alfonso López Aguerra, IAC)
- QSO (Mat Pieri, LAM)
- Apertif (Jesus Falcón Barroso, IAC)

*ICC members:*  
Friedrich Anders  
**Teresa Antoja**  
Lola Balaguer  
Juan Carbajo  
Cesca Figueras  
Jordi Miralda  
**Maria Monguió**  
Carme Jordi  
**Merce Romero**



Thanks!

