1001 Magellanic Fields with 4MOST

Maria-Rosa Cioni

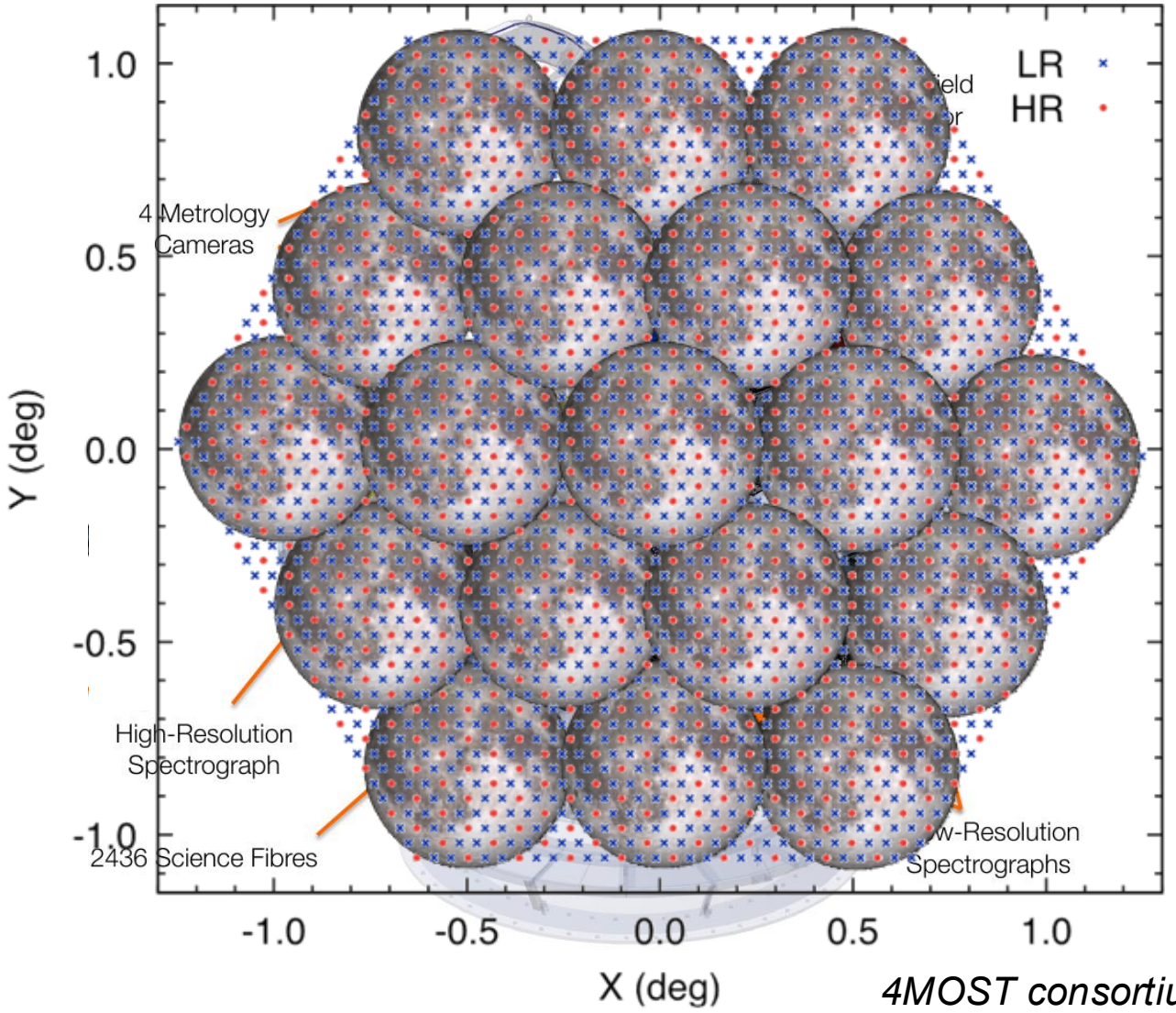
for Lara Cullinane and the 1001MC team

Leibniz-Institut für Astrophysik Potsdam

4MOST

Leibniz-Institut für Astrophysik Potsdam (AIP)

- Installed on the 4m VISTA telescope on Paranal (replacing VIRCAM)
- 4.2 deg^2 field of view
- 3 optical spectrographs:
  - 1x R~20000 (HR)
  - 2x R~6000 (LR)
- 2436 science fibres, 812 per spectrograph



4MOST consortium

Survey overview

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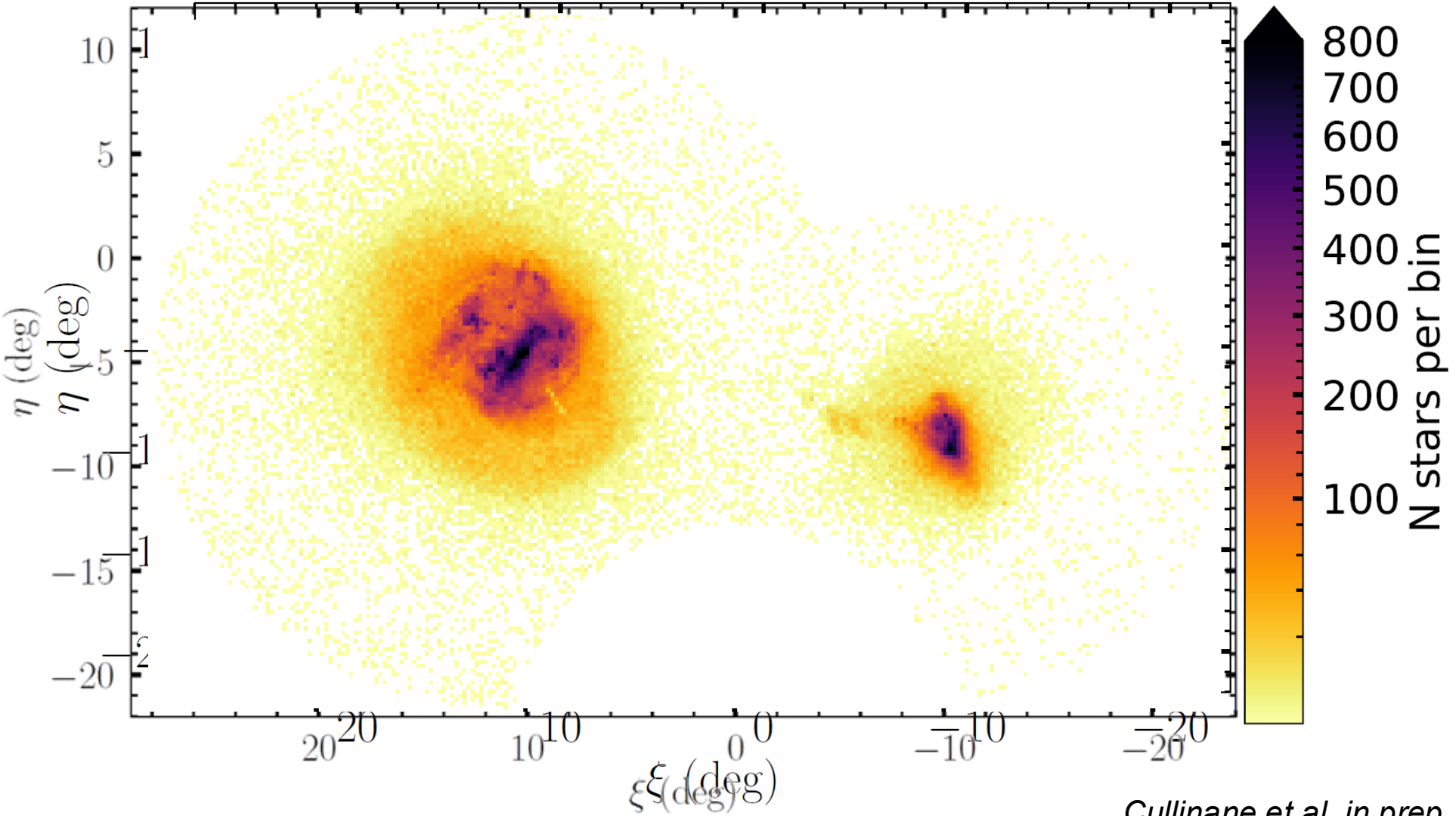
- ~10^6 targets
  - ~10^5 background galaxies
  - 2x10^5 HR
  - 7x10^5 LR
- ~1000 deg^2: R_{LMC}<15.6° and R_{SMC}<11.3°



Cullinane et al. in prep.

Survey overview

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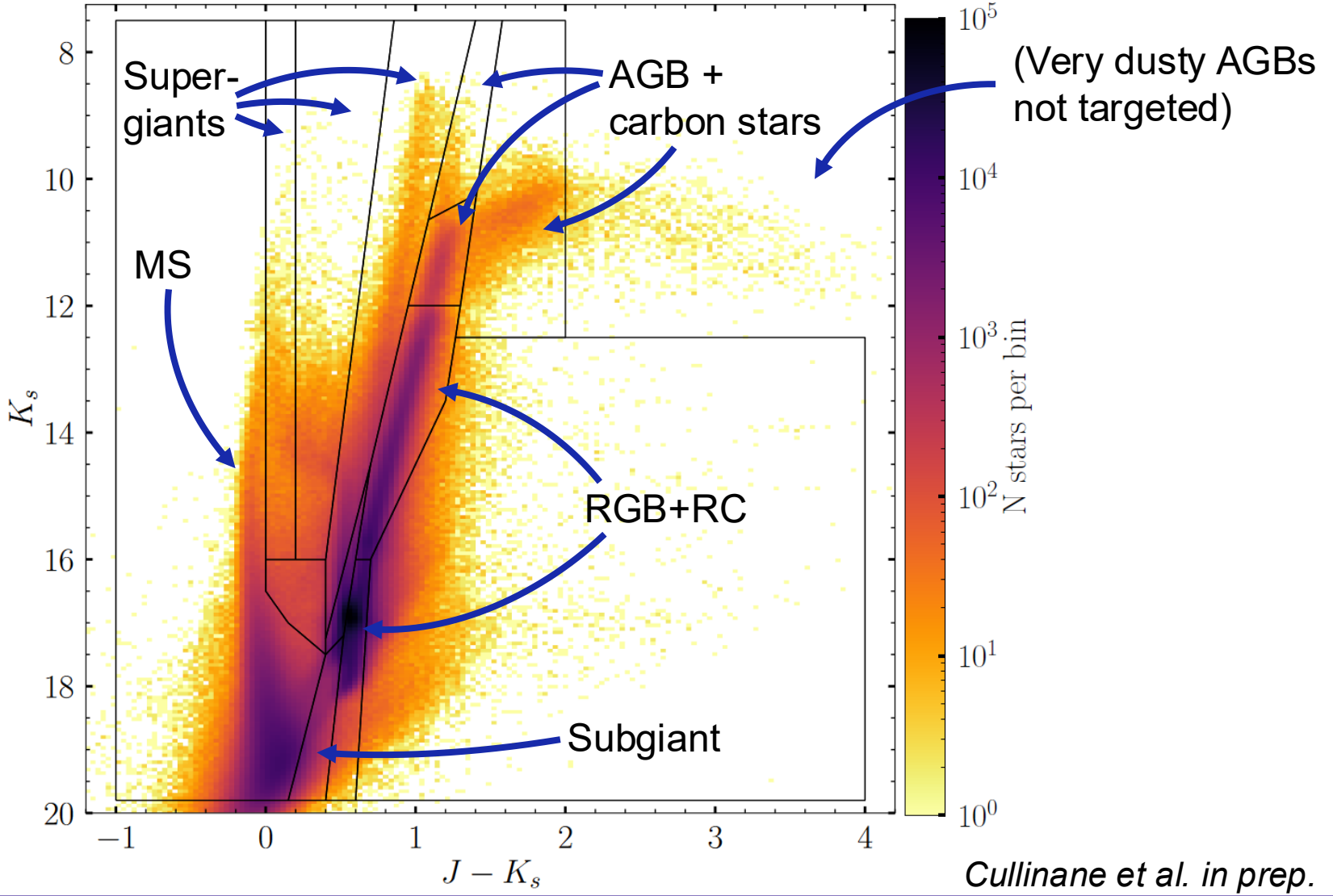
- Includes stellar populations of all ages



Cullinane et al. in prep.

Why bother when SDSS-V exists?

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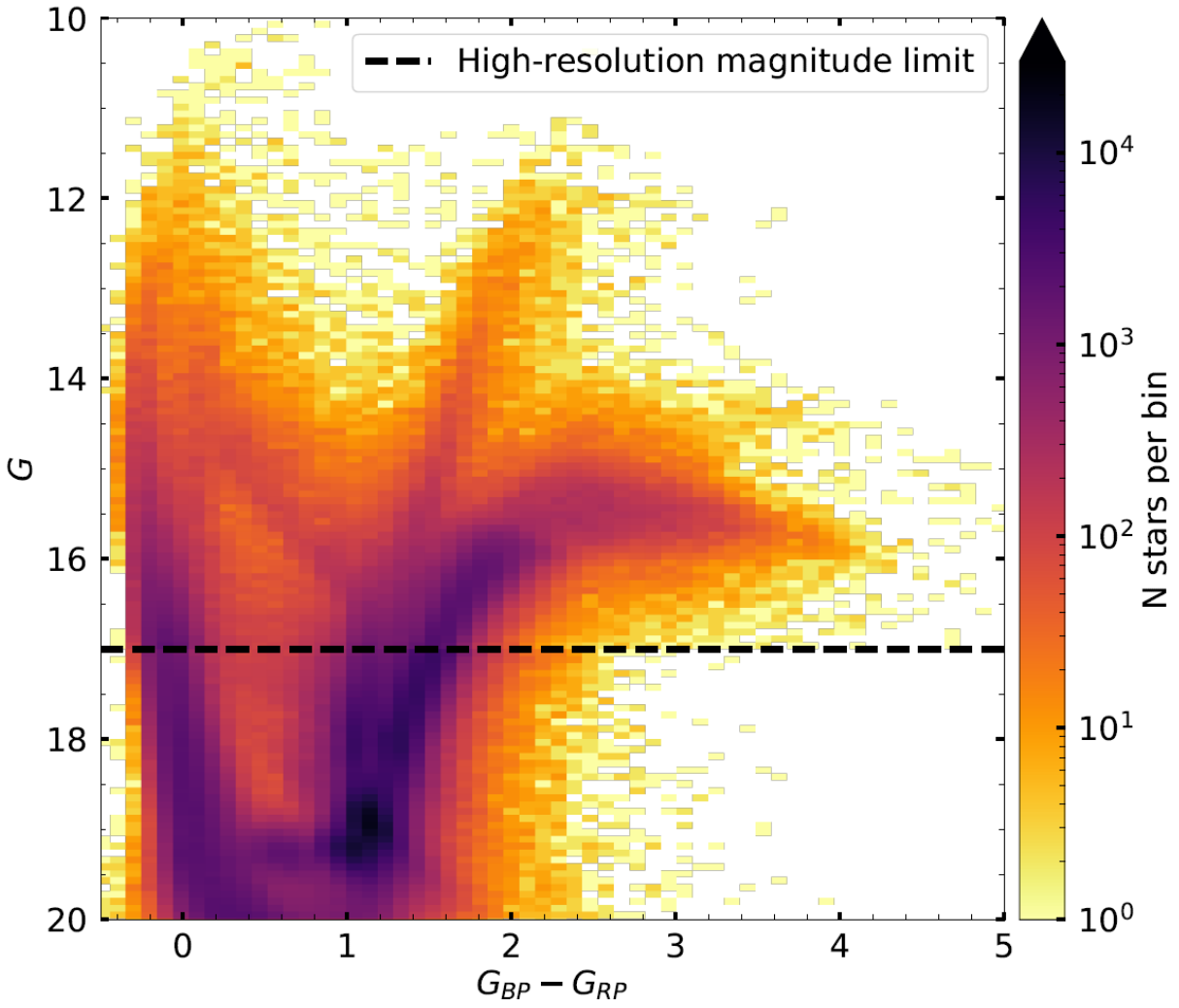
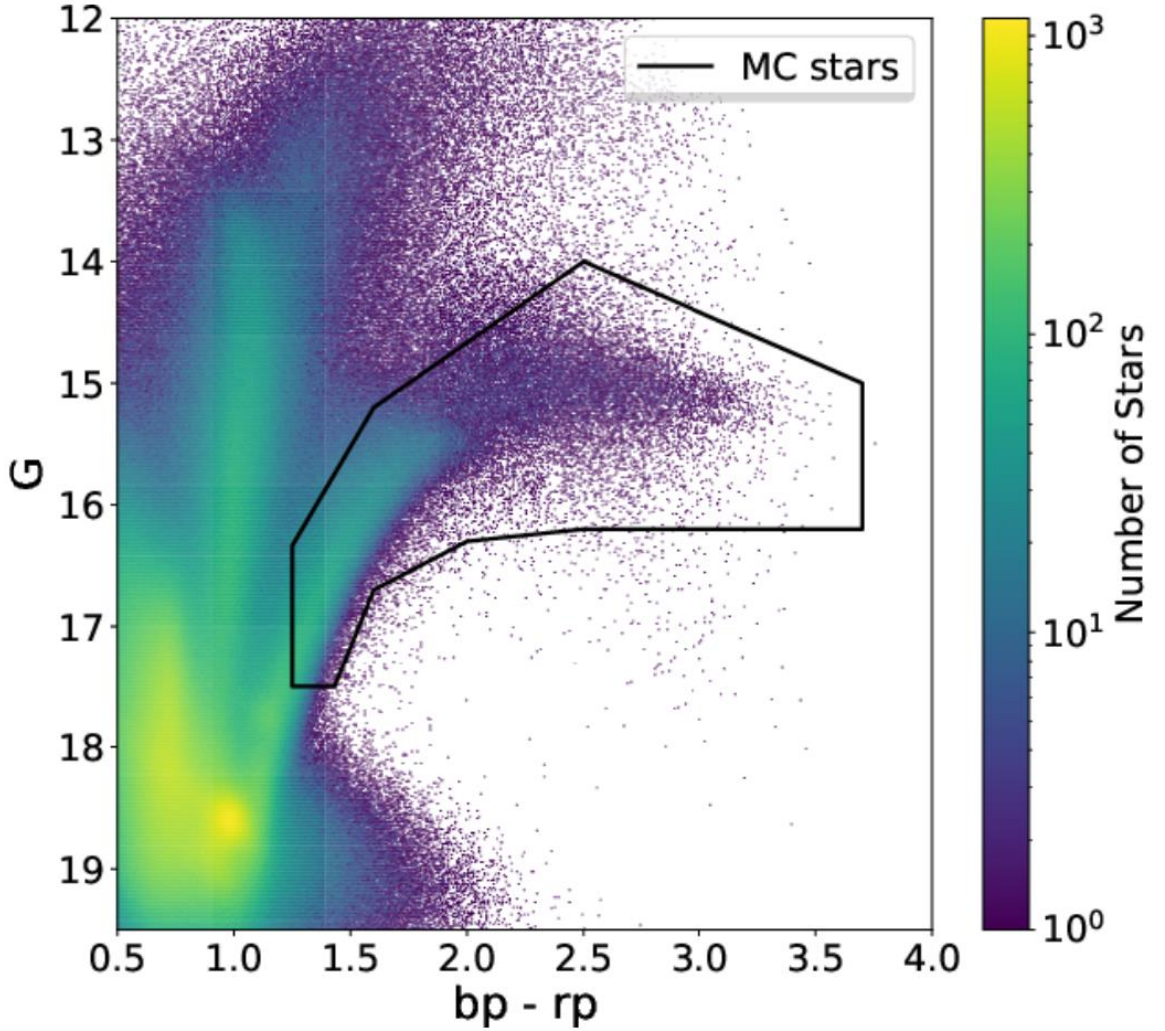


Cullinane et al. in prep.



Nidever et al. 2026

Survey science goals

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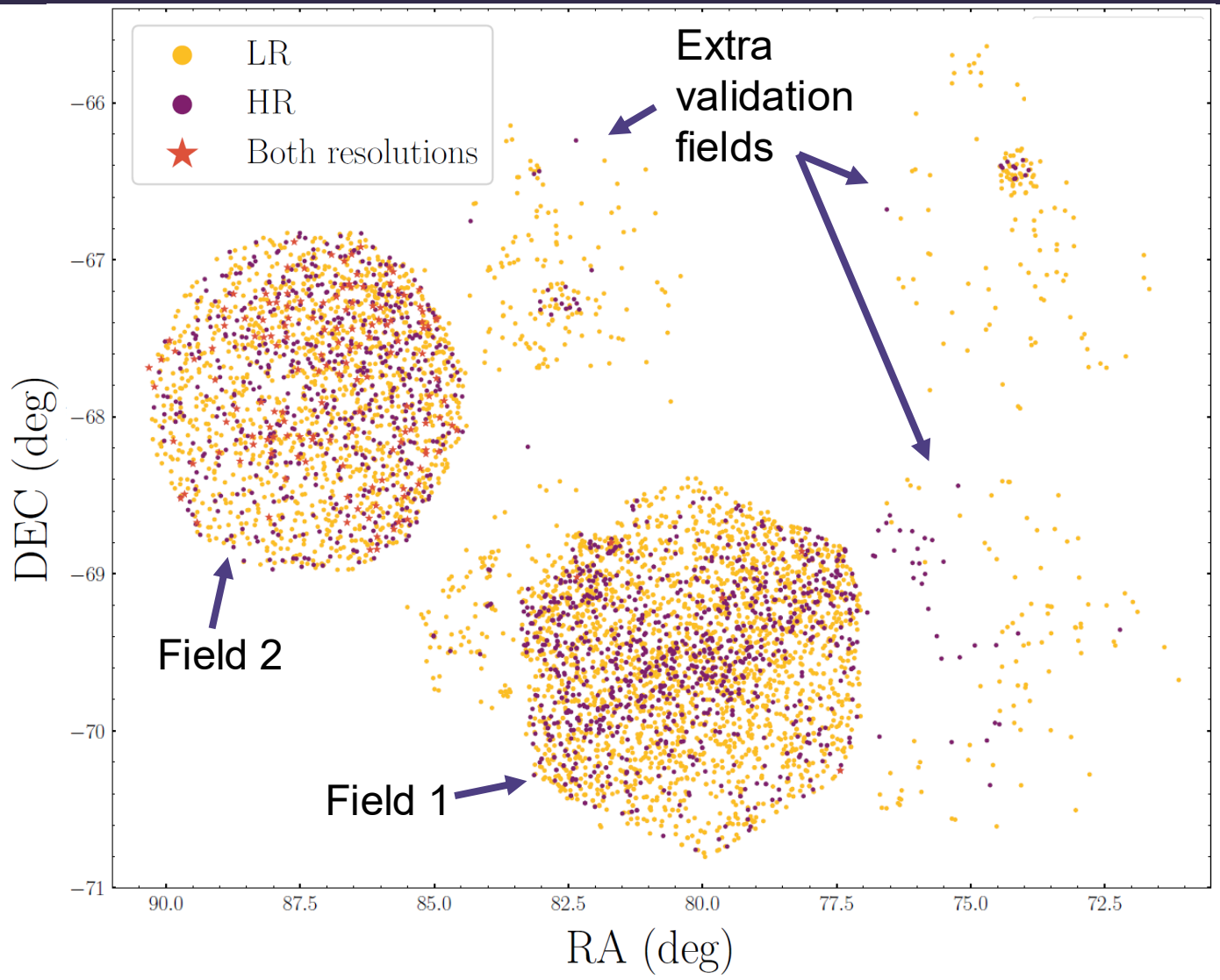
- Map the dust content of the MCs using background galaxies;
- Find and characterise kinematical and chemical patterns within the Magellanic system, and their spatial distribution across different stellar populations;
- Establish how those patterns are linked to the SFH and dynamical evolution of the MCs;
- Study the metallicity-dependent physical and wind properties of massive stars and their evolutionary stage;
- Quantify the metallicity dependence of key distance indicators such as RR Lyrae and Cepheid variables;

SPV observations



Stellar Type	# Observed
Massive stars	1114
Cepheids	574
RRL	632
Main sequence	696
Supergiants	927
AGB & carbon stars	382
RGB & RC	1419
Subgiants	113

Cullinane et al. in prep.

First 1001MC spectra

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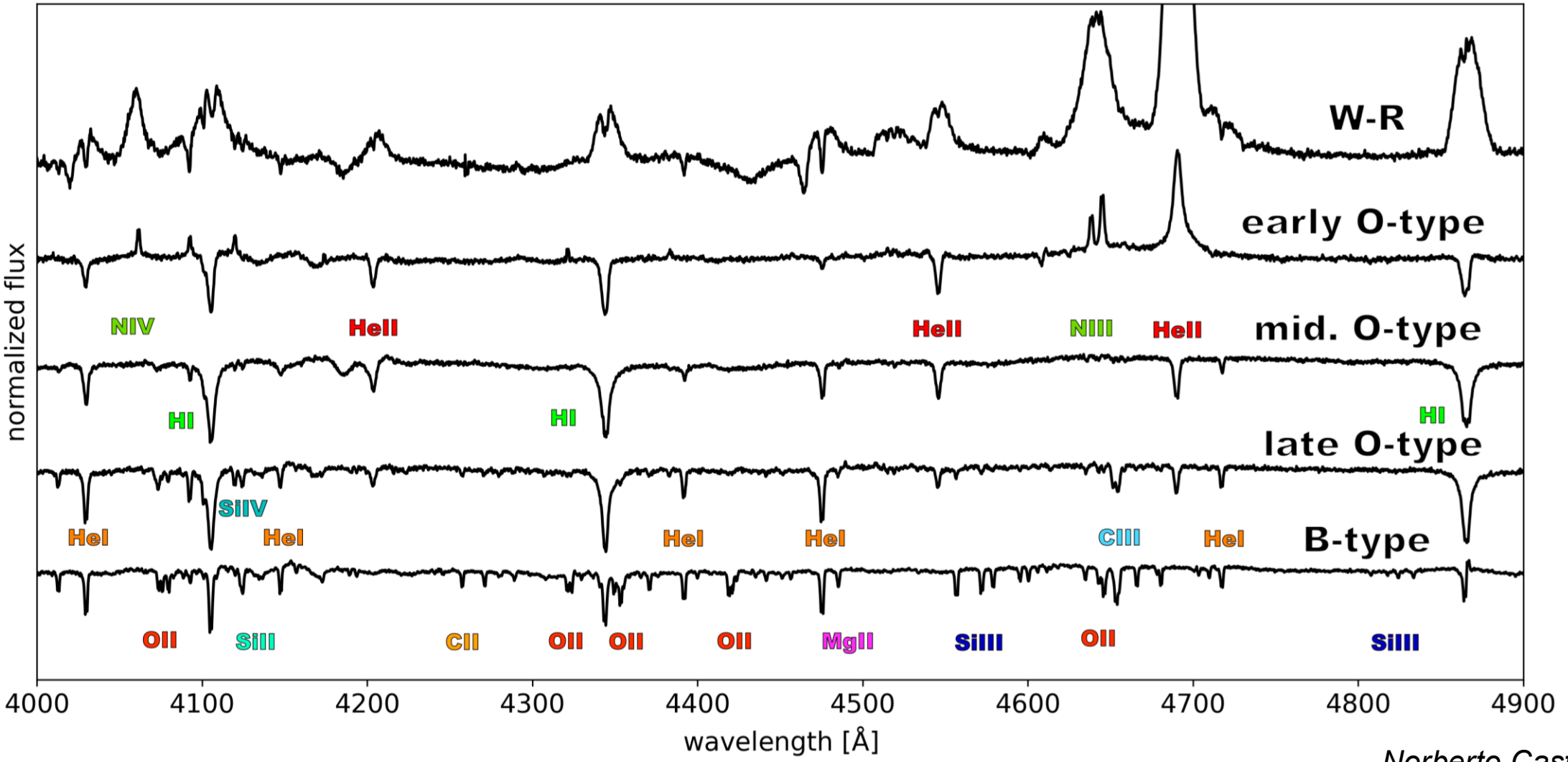
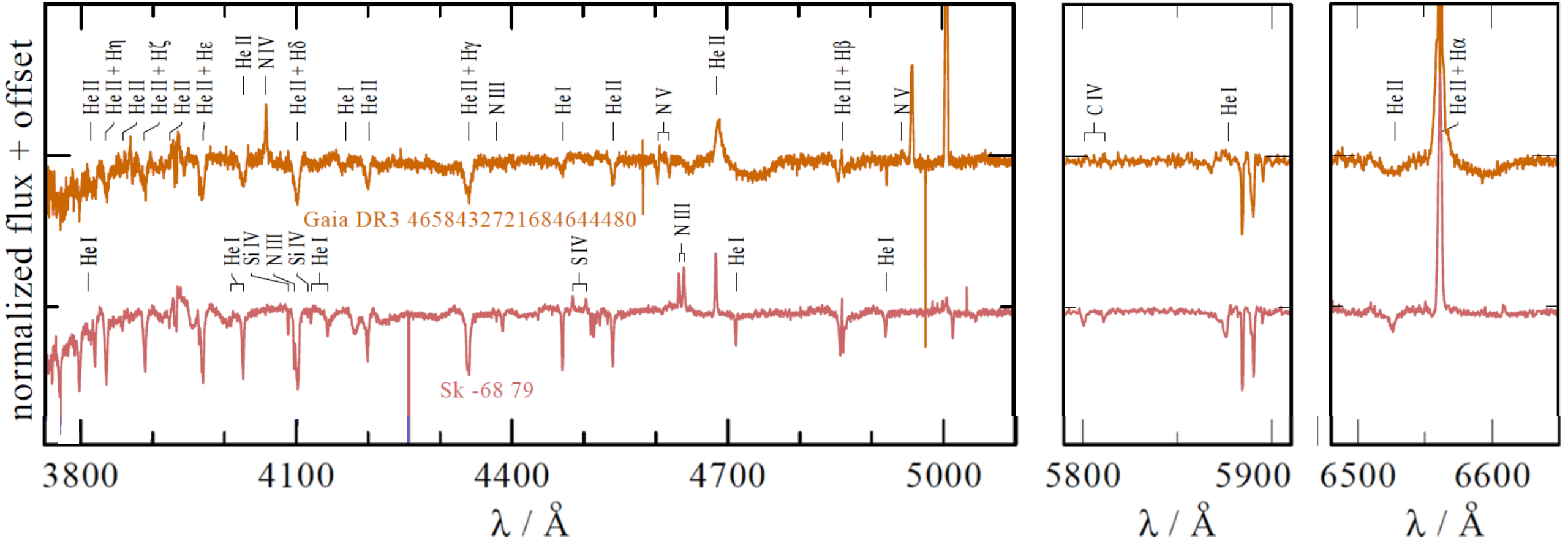


Norberto Castro, in prep.

First 1001MC spectra

Leibniz-Institut für Astrophysik Potsdam



Abhinna Sundar Samantaray, in prep.

First 1001MC spectra

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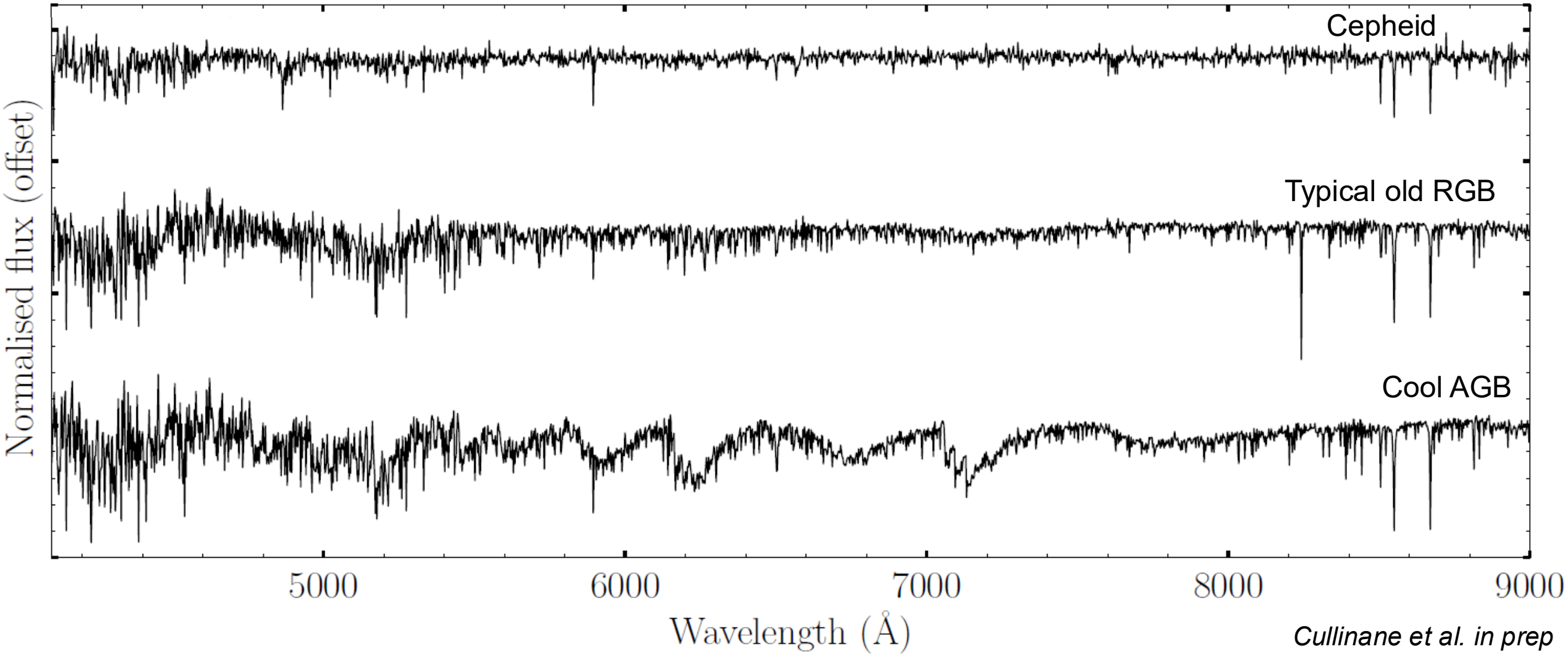
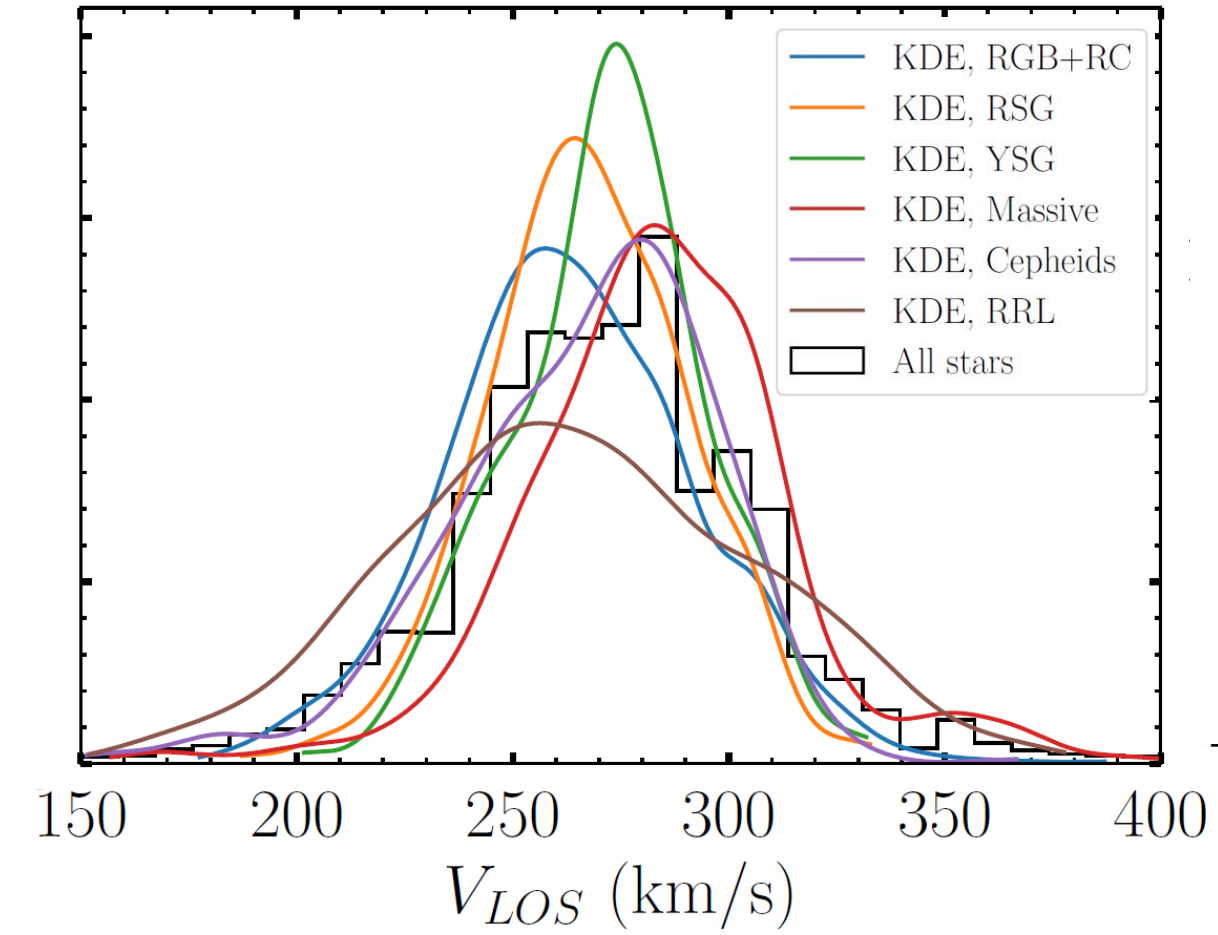
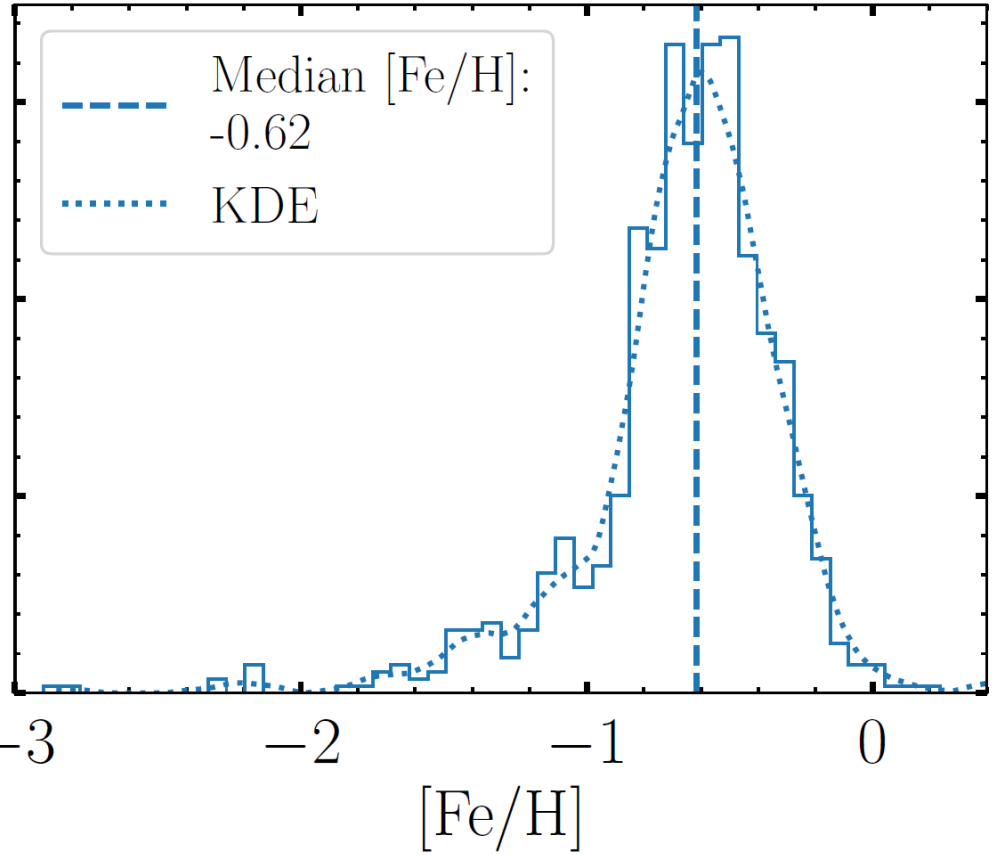
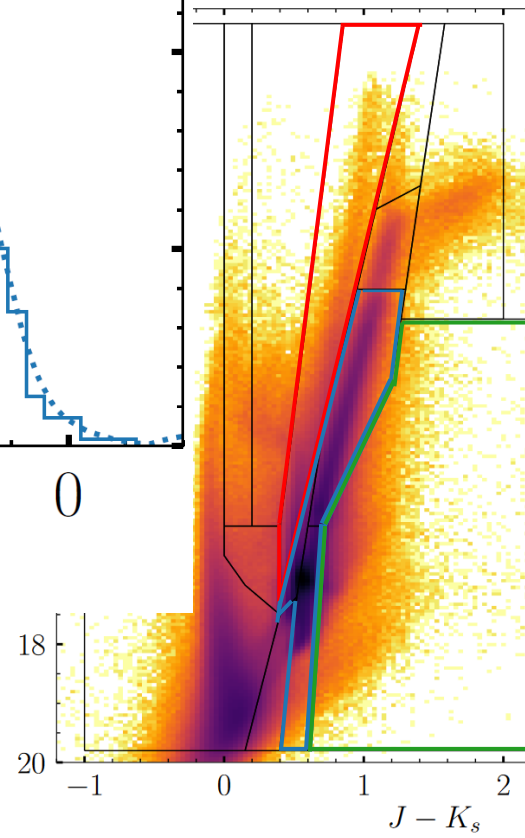


Cullinane et al. in prep

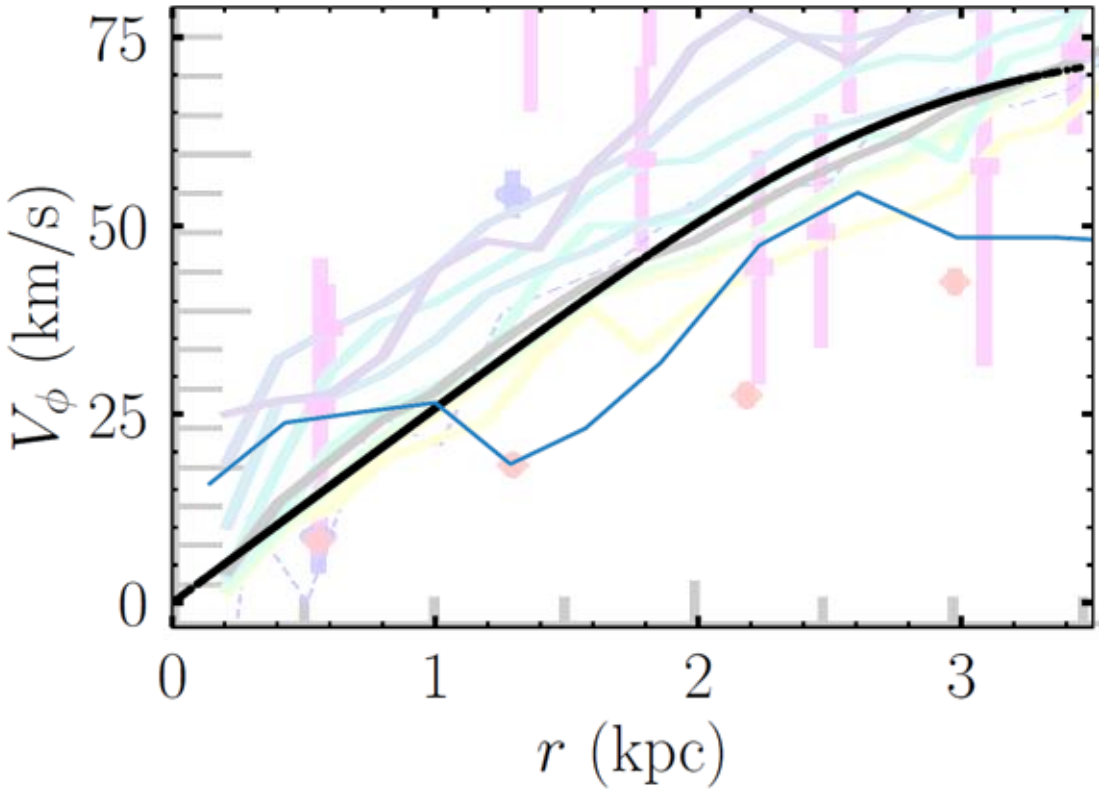
SPV data: sanity check

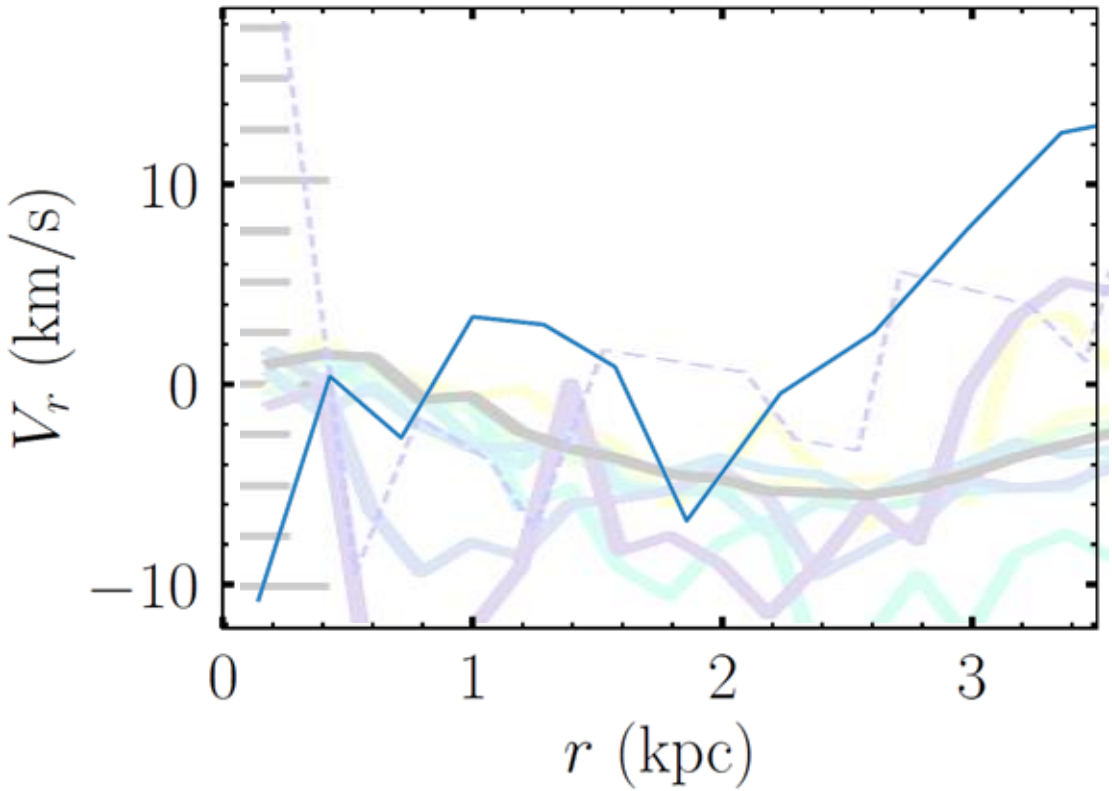






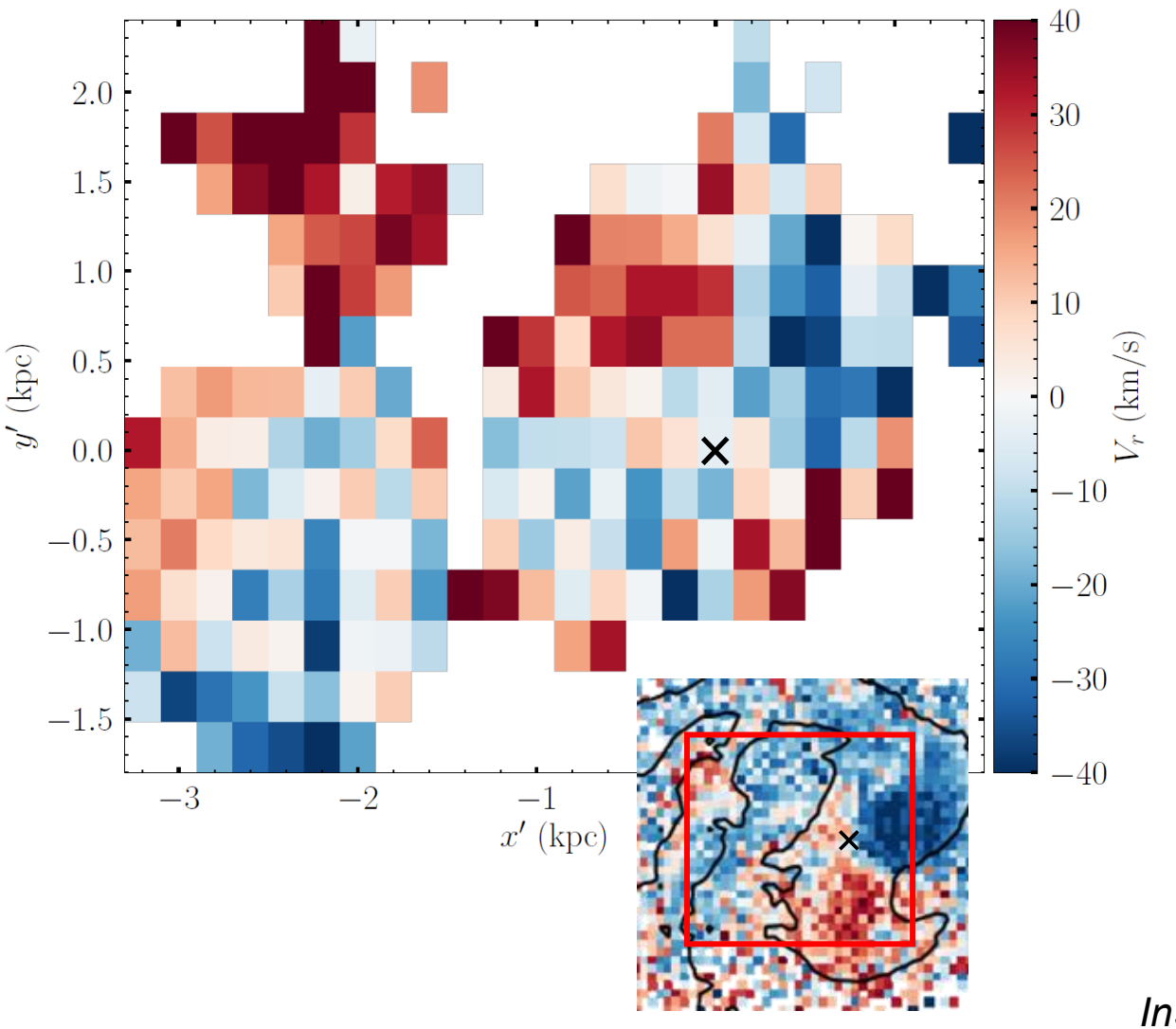
SPV results: Disk kinematics

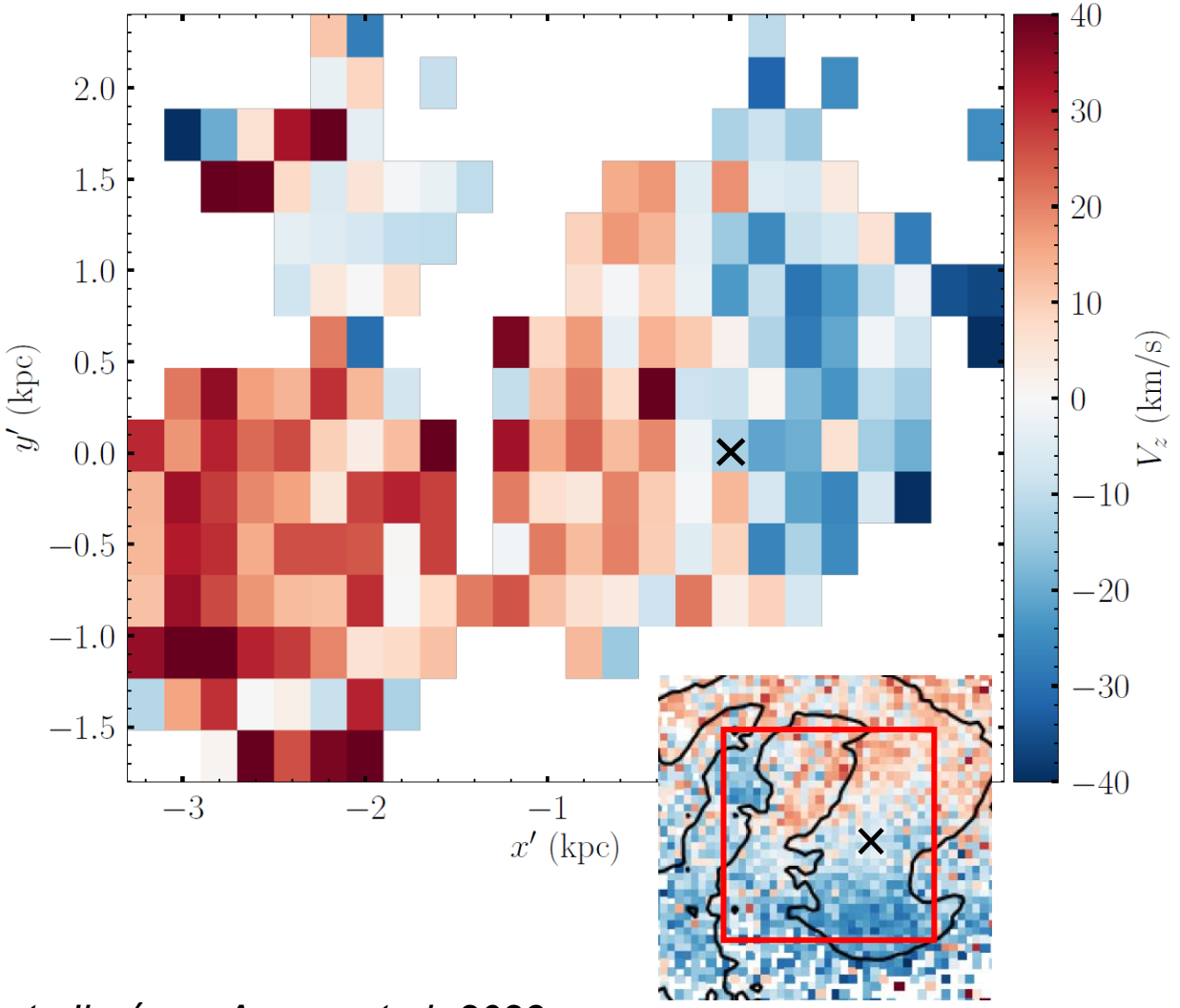




Background: Gaia Collaboration et al. 2021

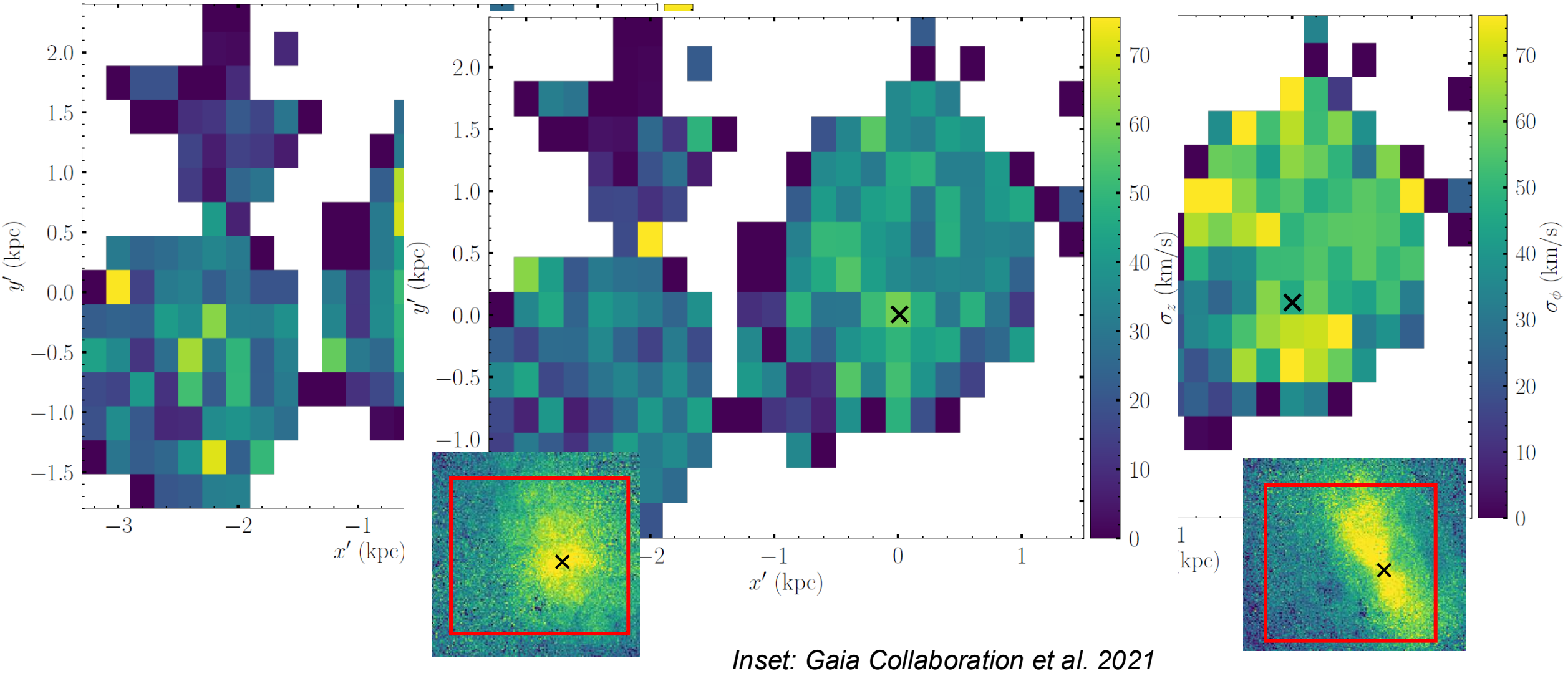
SPV results: Disk kinematics





Inset: Jiménez-Arranz et al. 2023

SPV results: Disk dispersions



Inset: Gaia Collaboration et al. 2021

SPV results: RGB abundances

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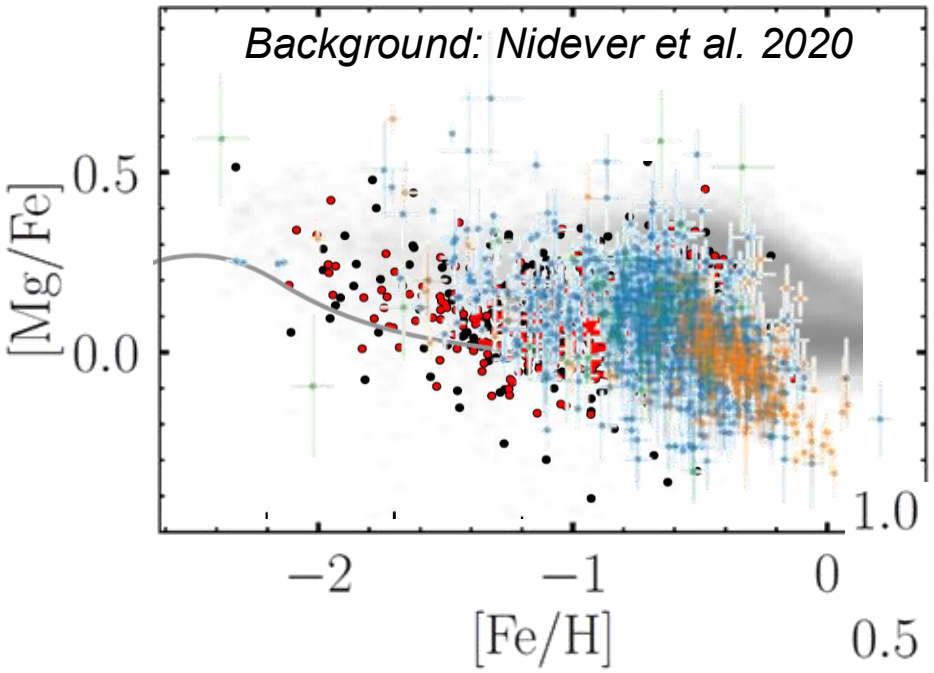
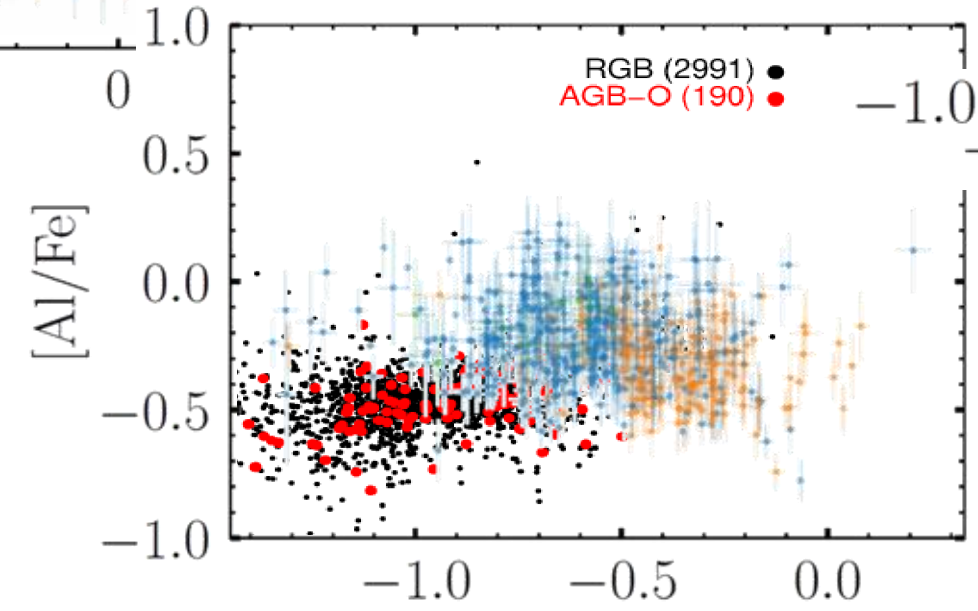
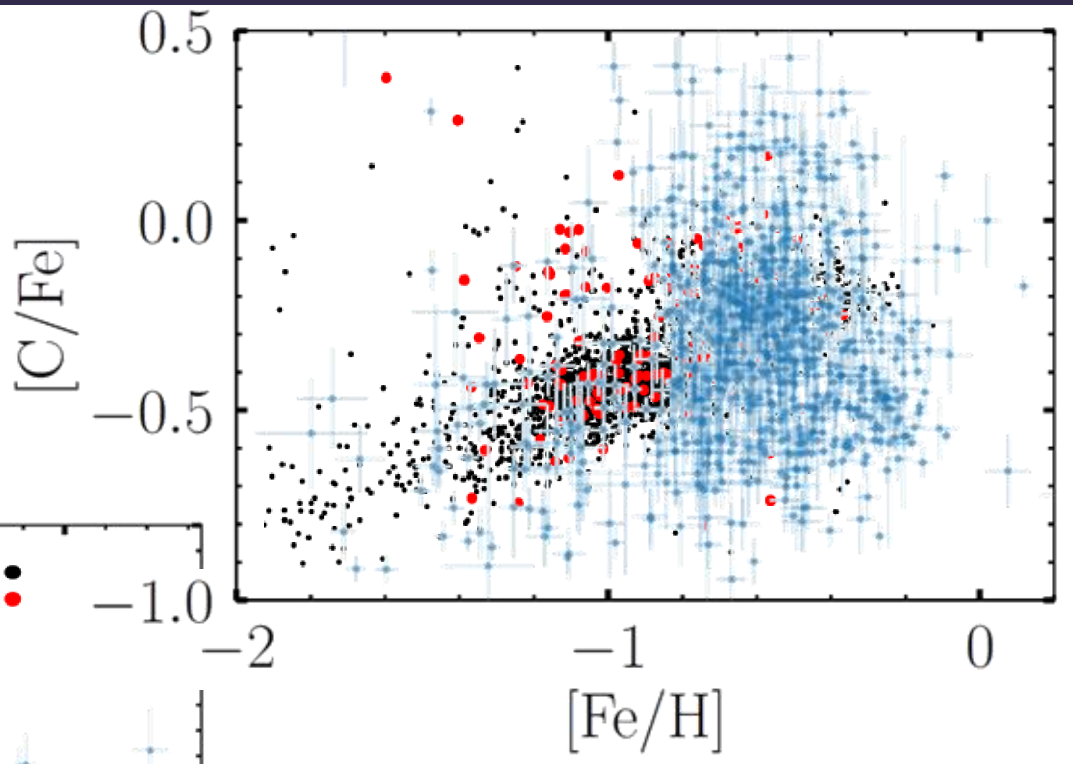
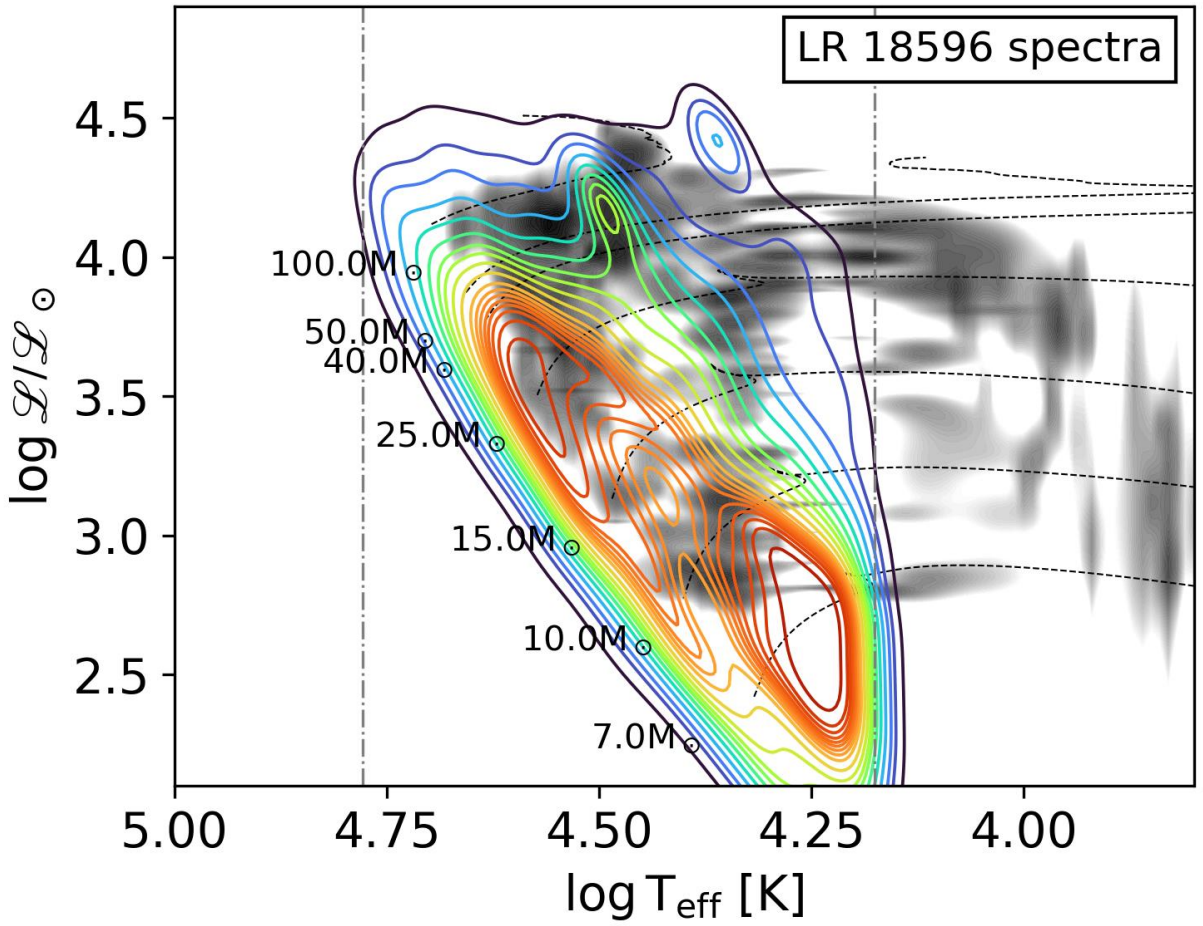


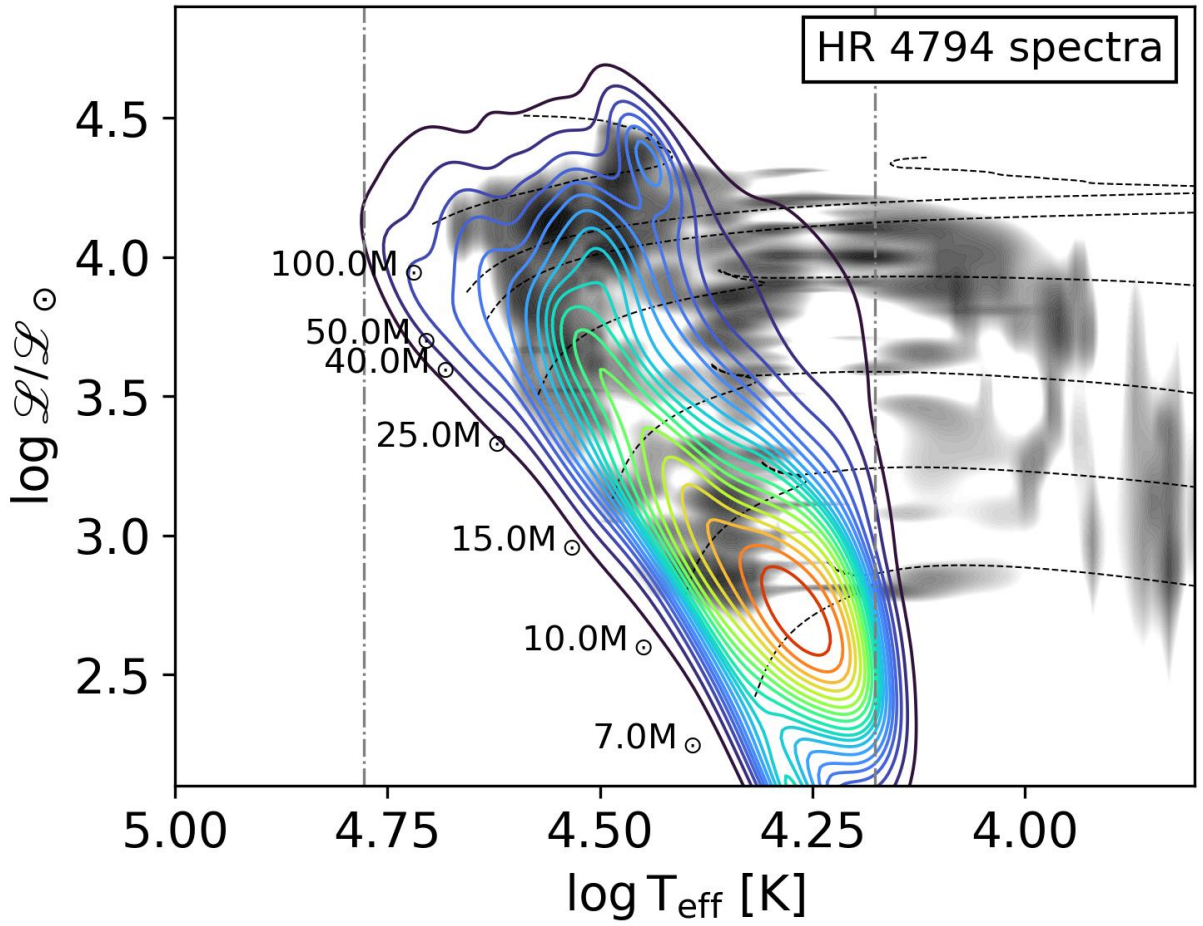




Background: Nidever et al. 2026

SPV results: massive stars





Norberto Castro, in prep.

Summary

Leibniz-Institut für Astrophysik Potsdam (AIP)

- 1001MC will be a revolutionary spectroscopic survey of the Clouds
  - ~10^6 stars
  - ~1000 square degrees, covering the LMC, SMC, & their outskirts
  - (almost) all stellar types
- Science goals range from chemodynamical patterns, dust content, the evolution of massive stars, and variables at low metallicity
- The first spectra look very promising!
  - Sensible RVs, stellar parameters, metallicities
  - Broadly recover known literature kinematics and abundance distributions
- Look forward to many more exciting results in the near future!
  - DR0 is 7 months after the survey starts! (~May 2027) or contact me