

# Swimming on a stellar stream

## *Re-discovering the Sagittarius tails with Gaia*

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 @PBR117



**IEEC** 

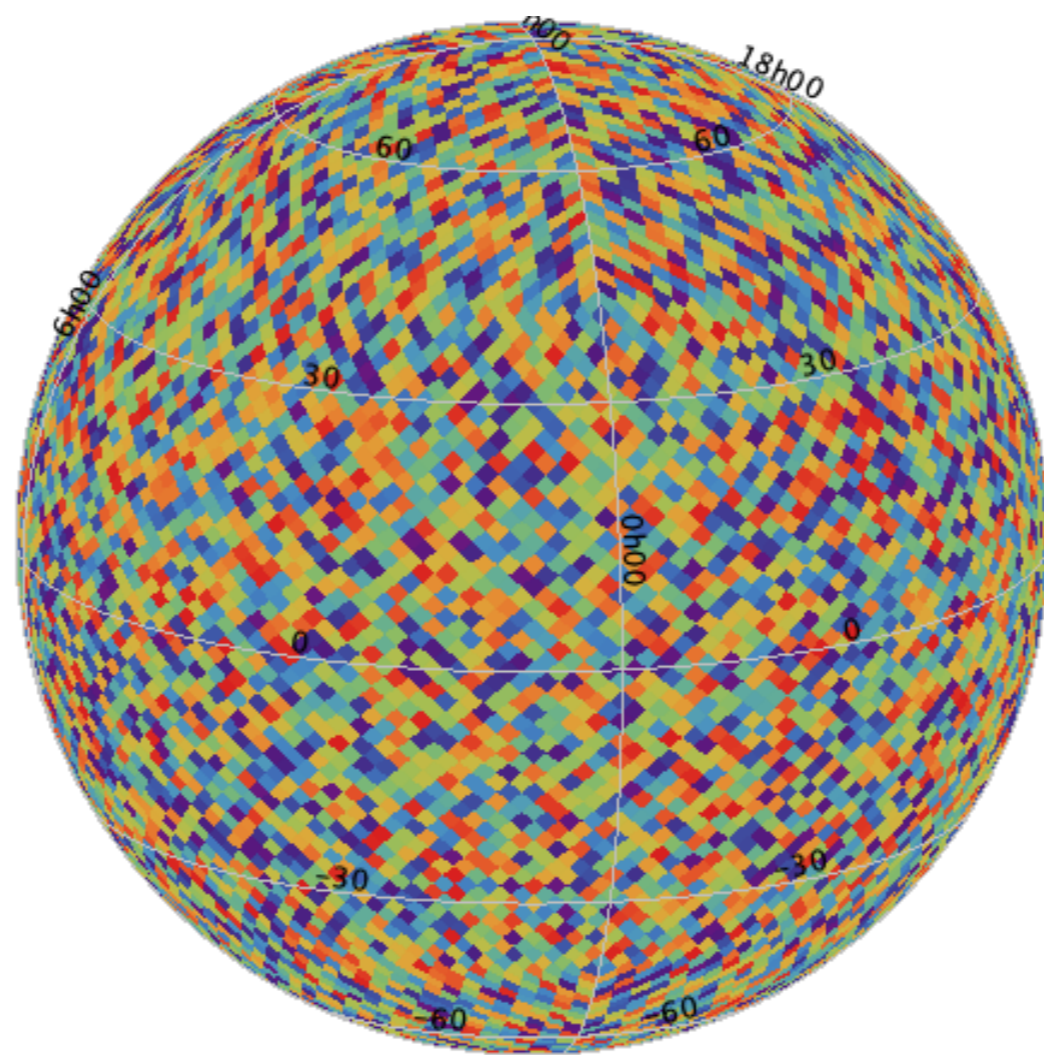


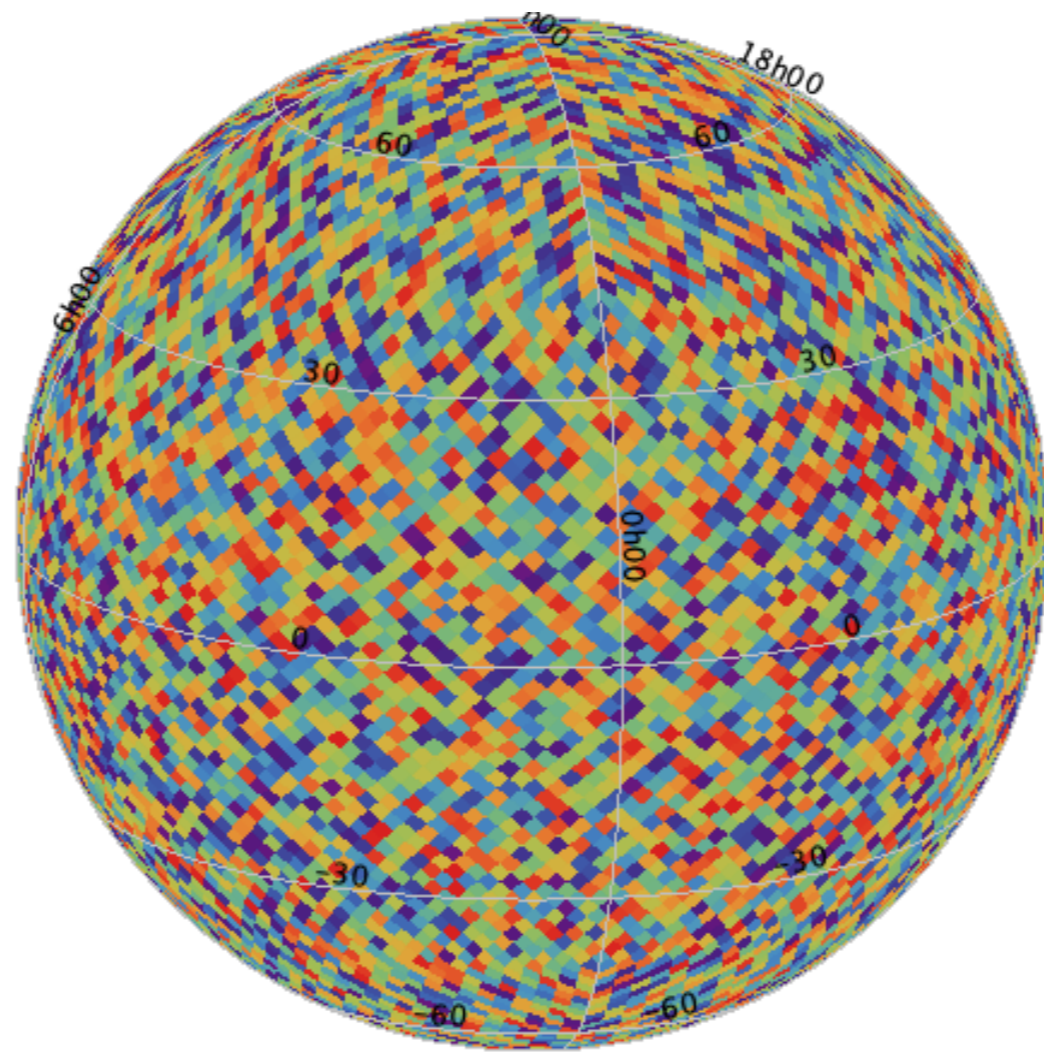
**gaia**

Ibata+1994: "We have detected an extended group of comoving located in the far side of the Galactic Centre, we propose to call it the Sagittarius dwarf galaxy

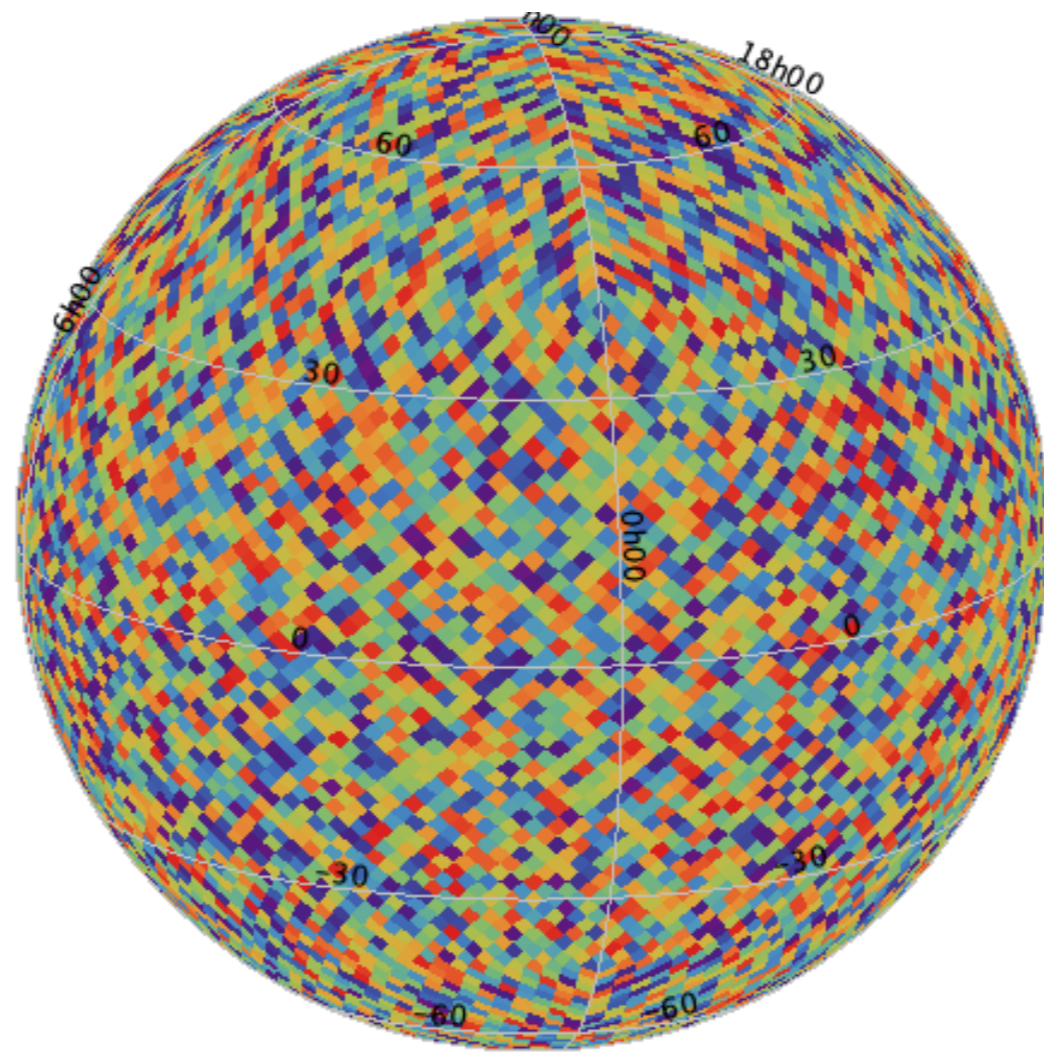


...suggesting that it is undergoing some tidal disruption before being absorbed by the Milky Way.



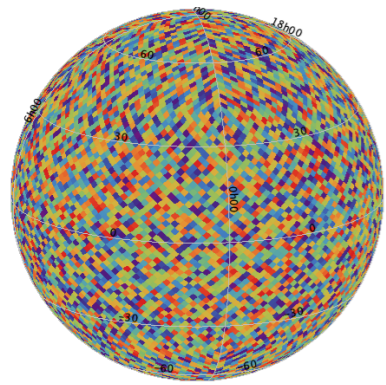


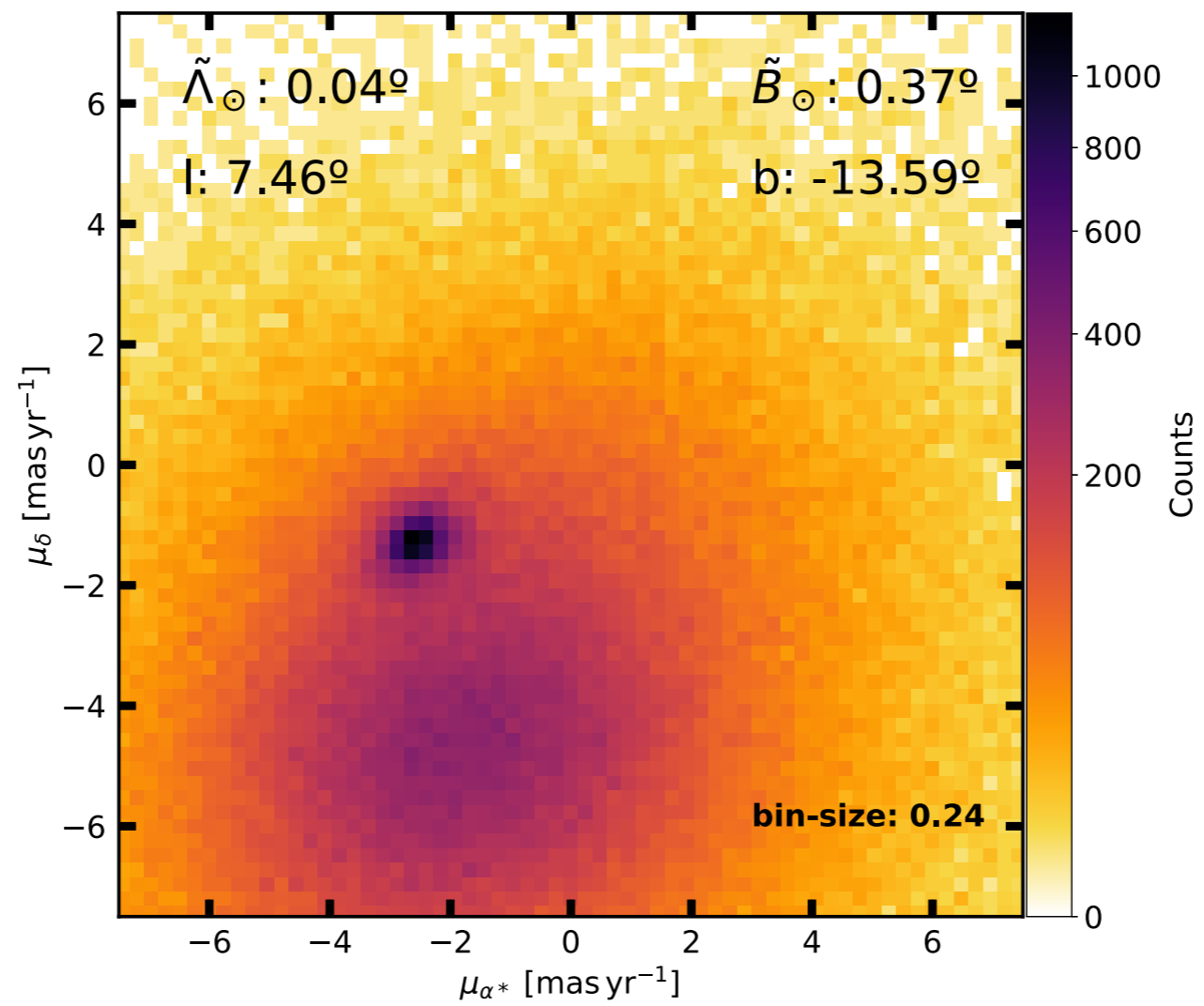
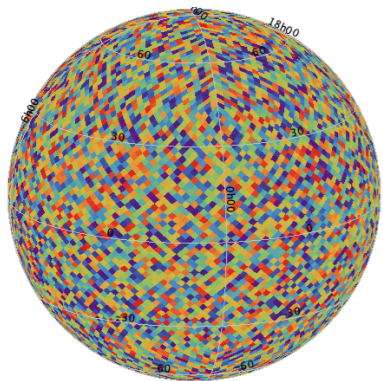
**HEALPix map  
level 5  
(#pixels = 12 288)**

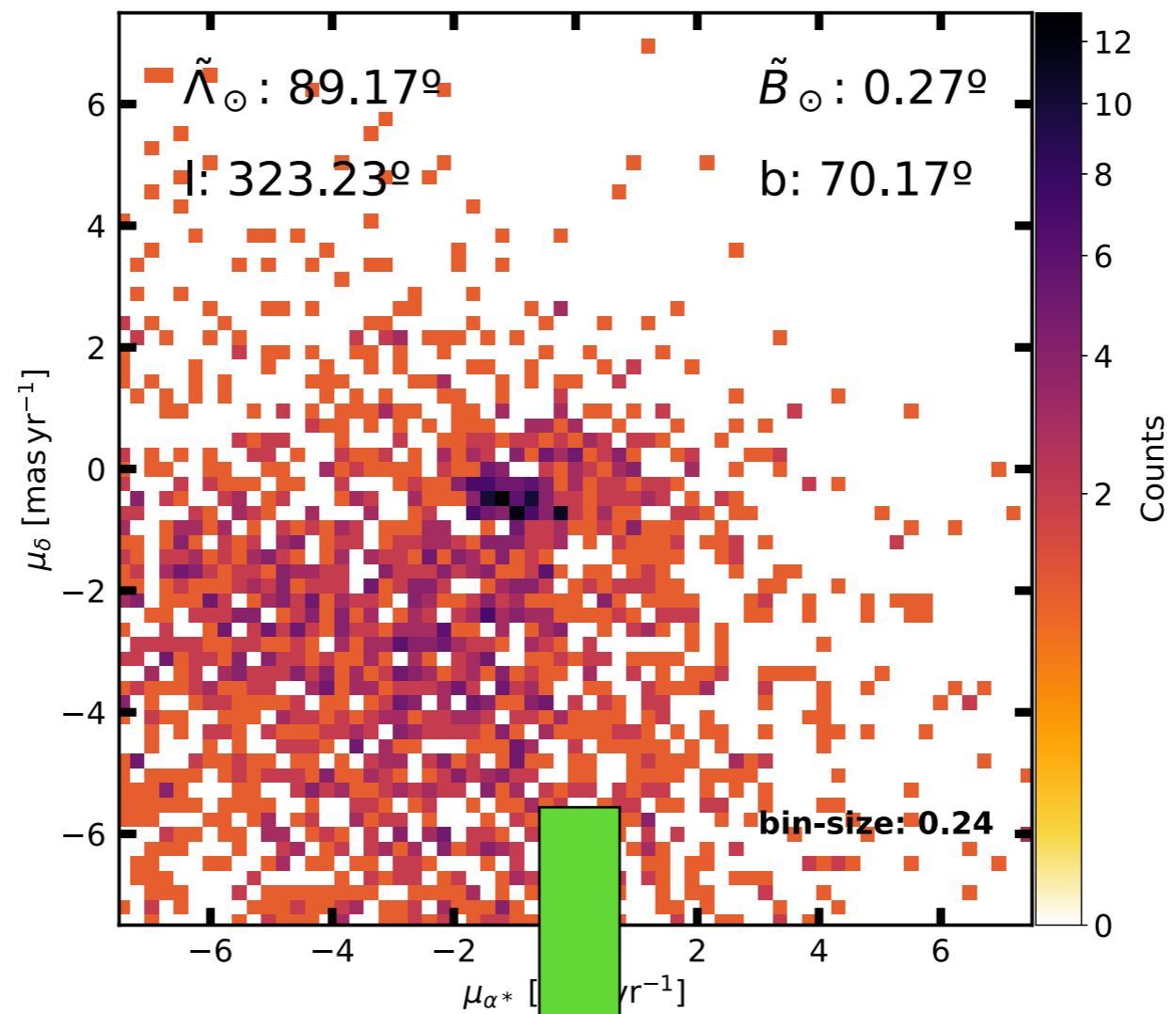
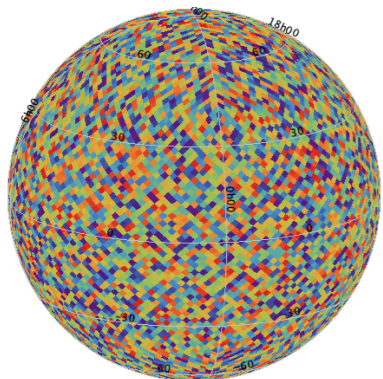


$\varpi - \sigma_{\varpi} < 0.1 \text{ mas}$   
> 10 kpc

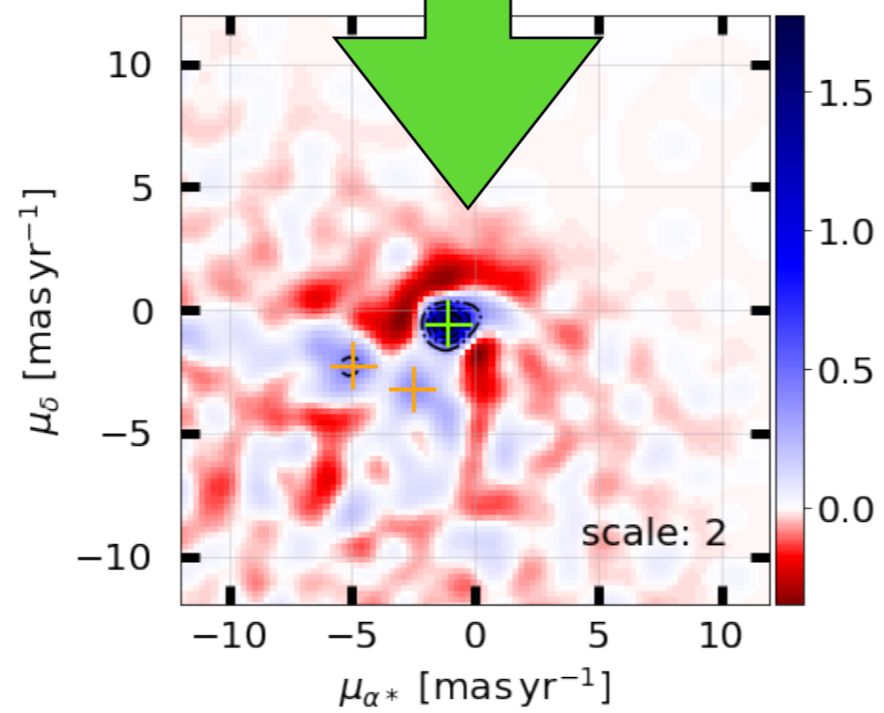
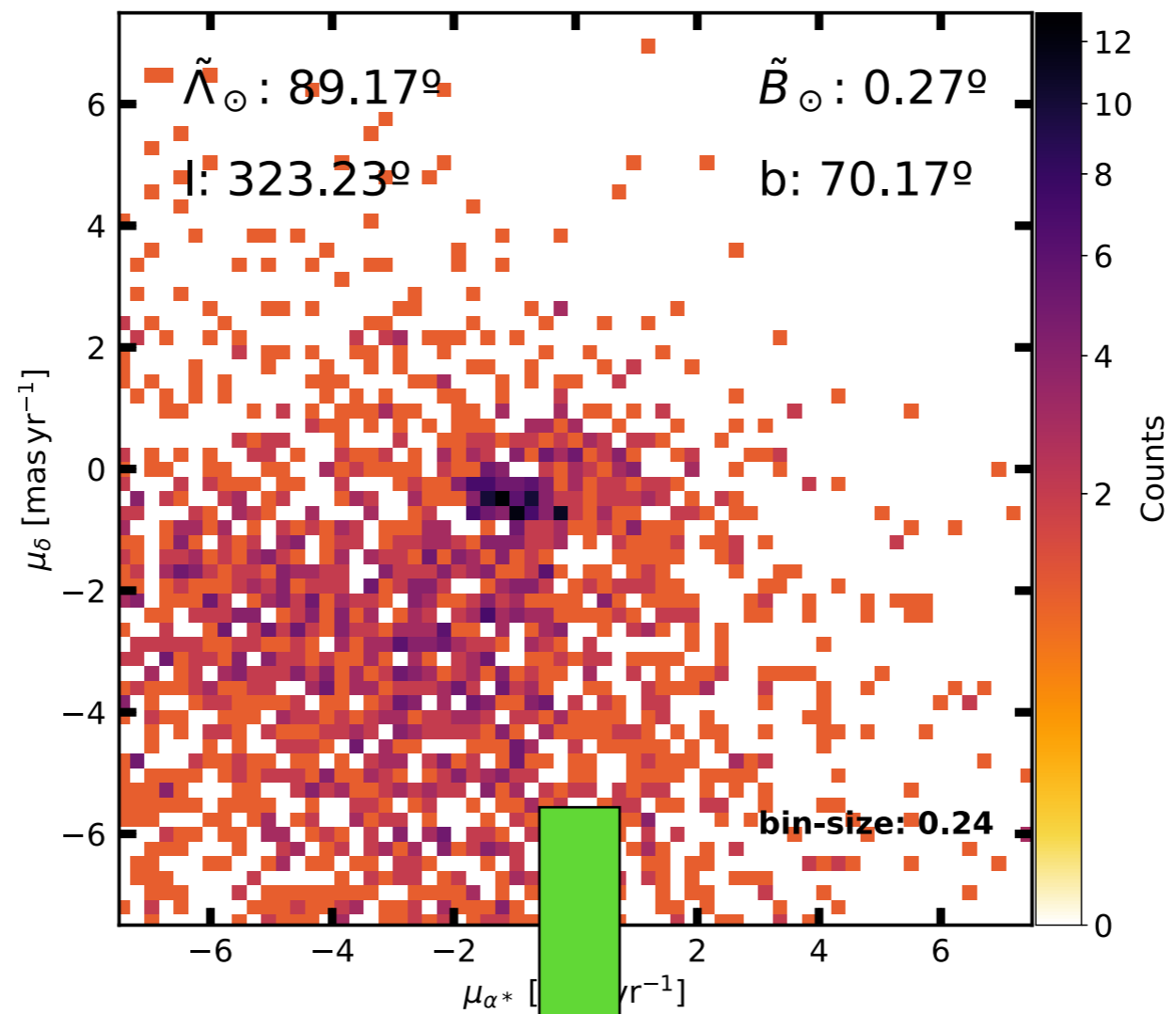
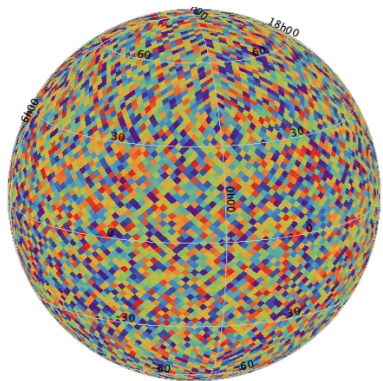
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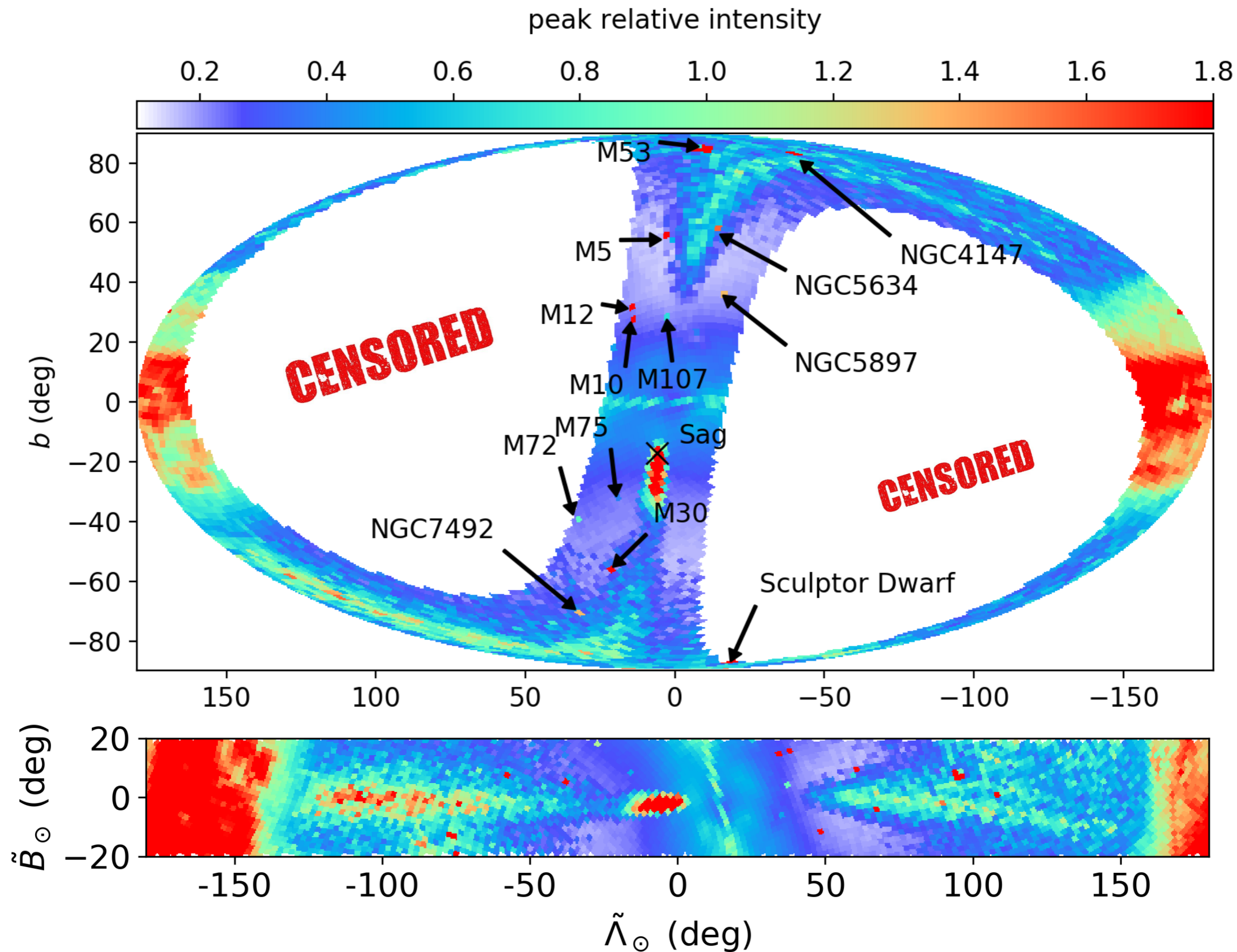




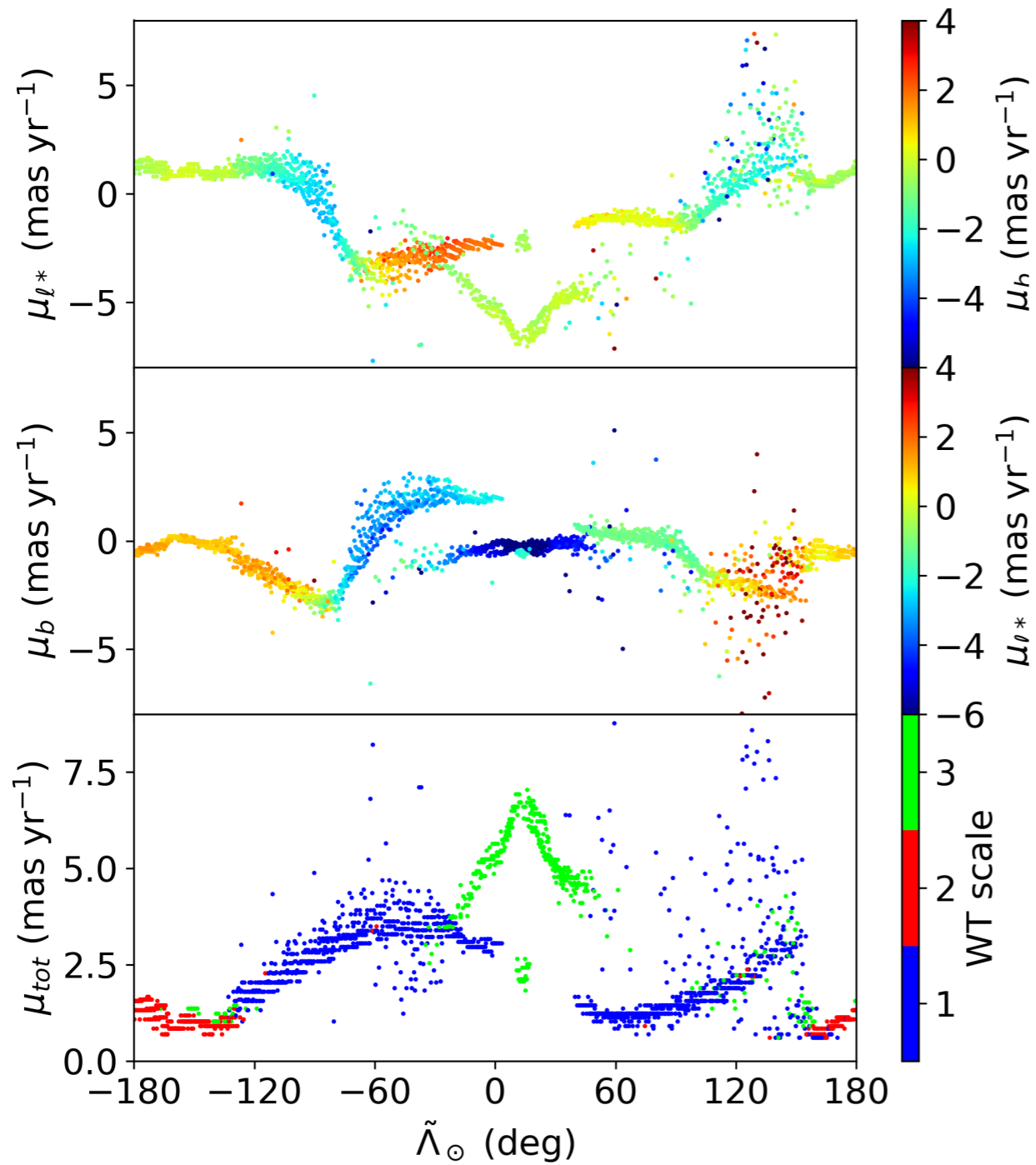




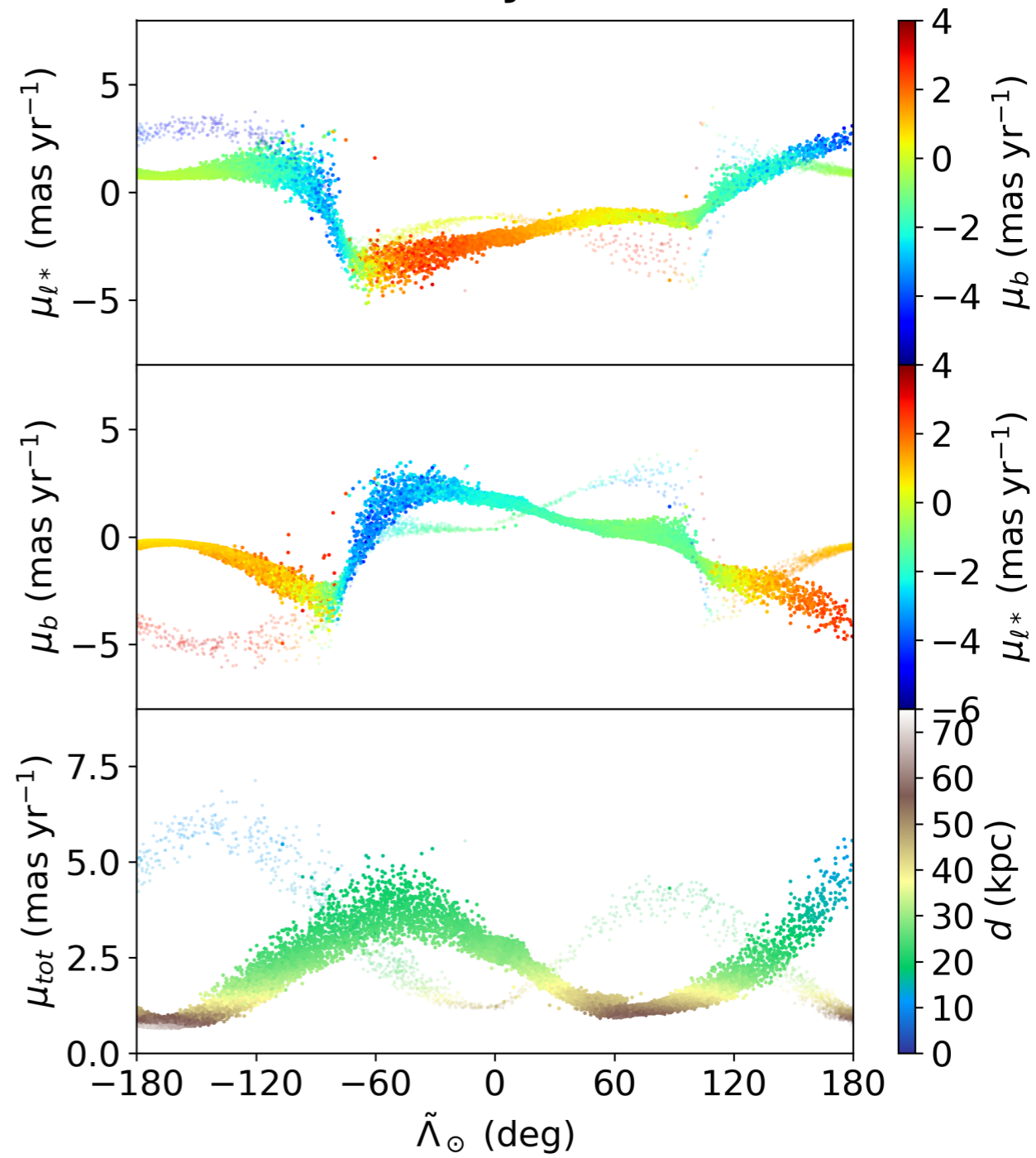


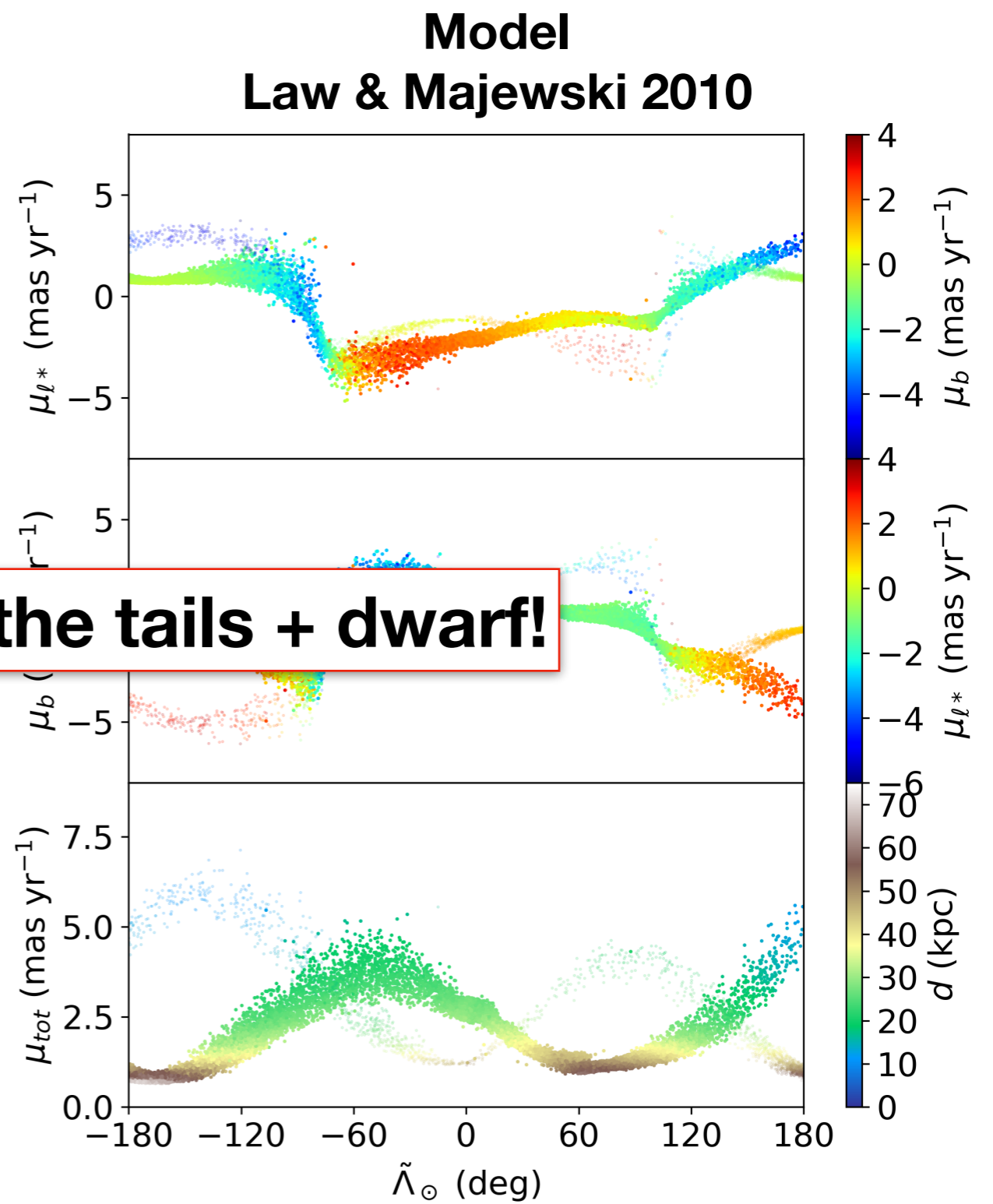
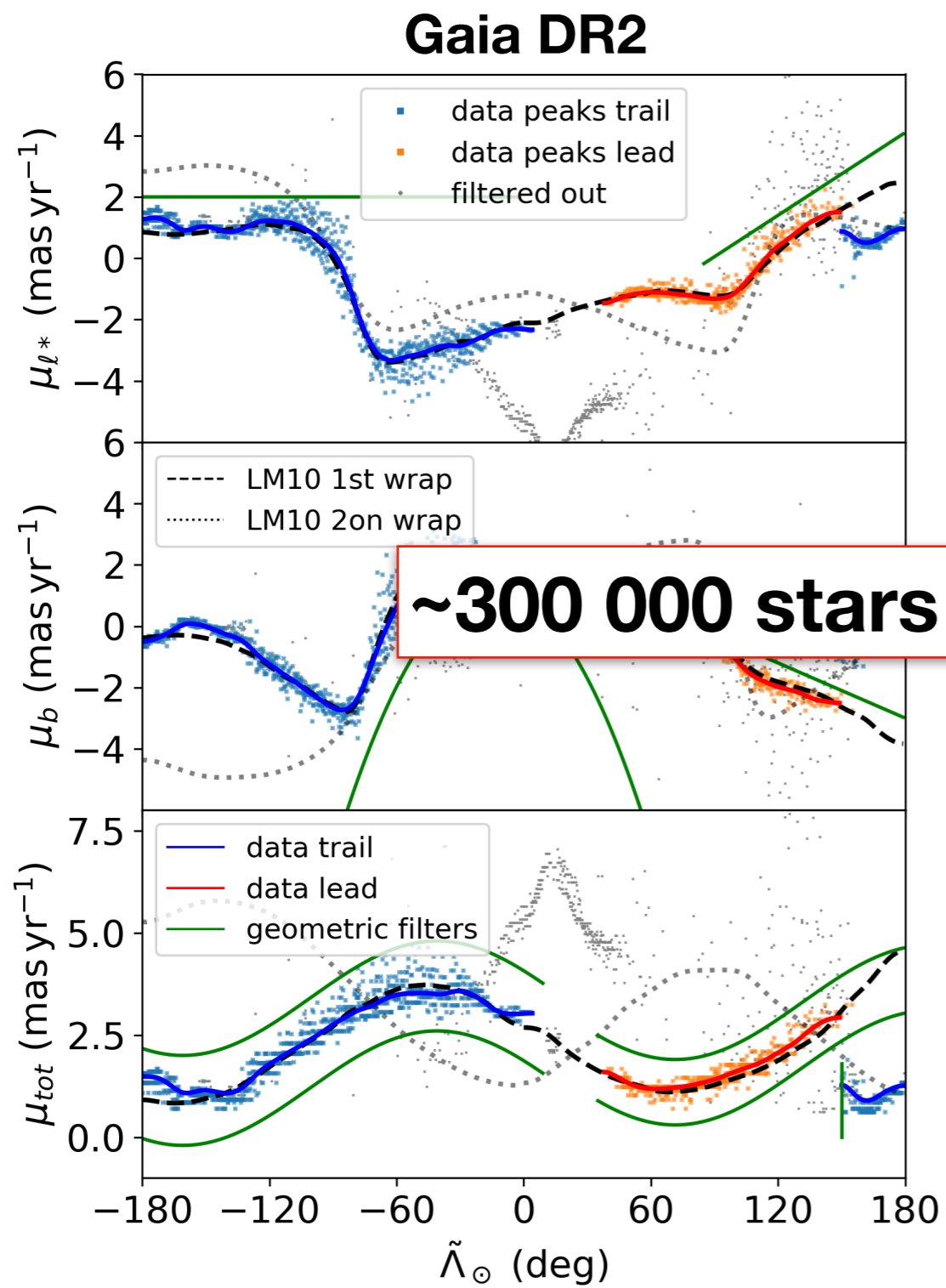


### Gaia DR2

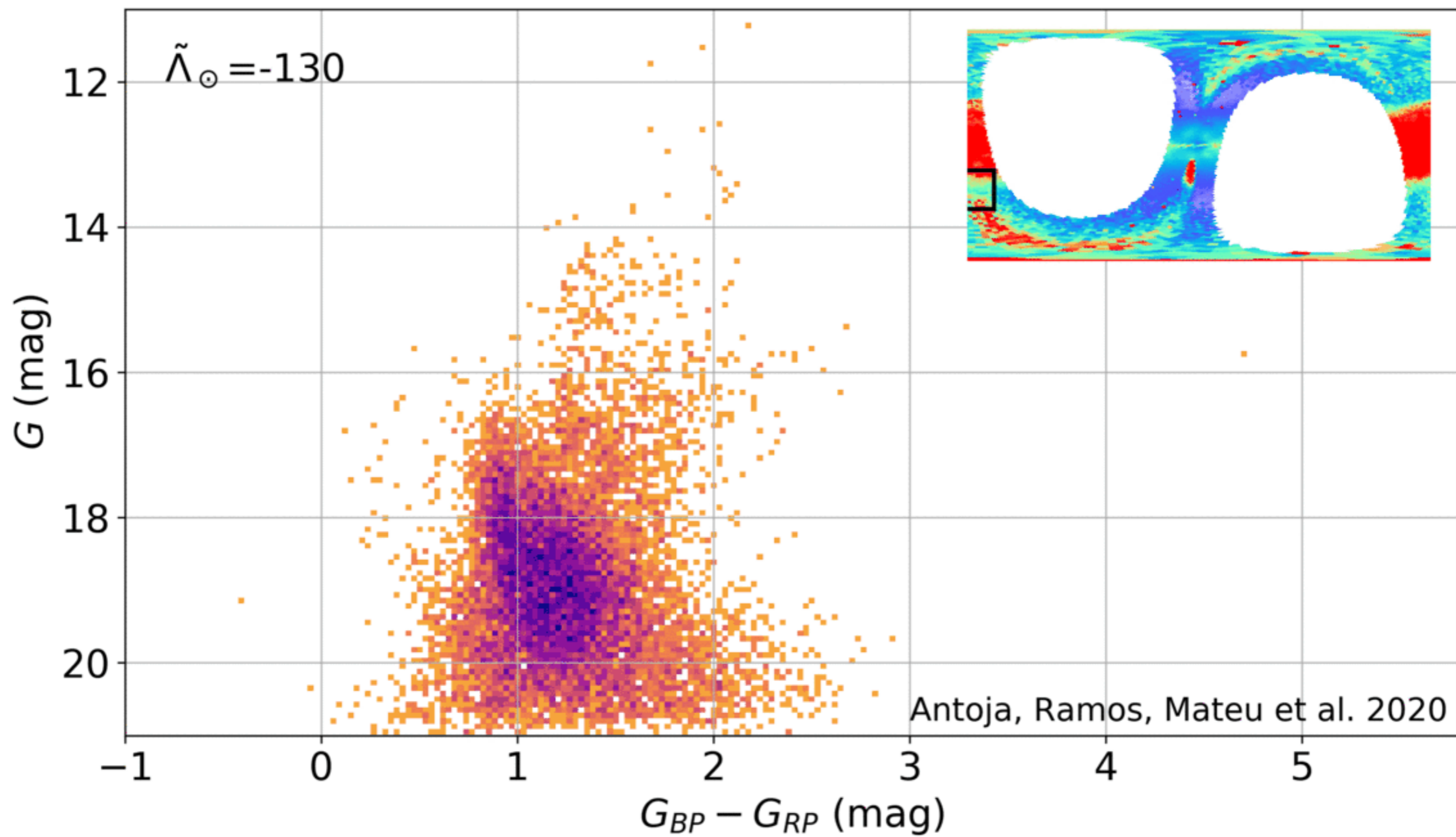


### Model Law & Majewski 2010

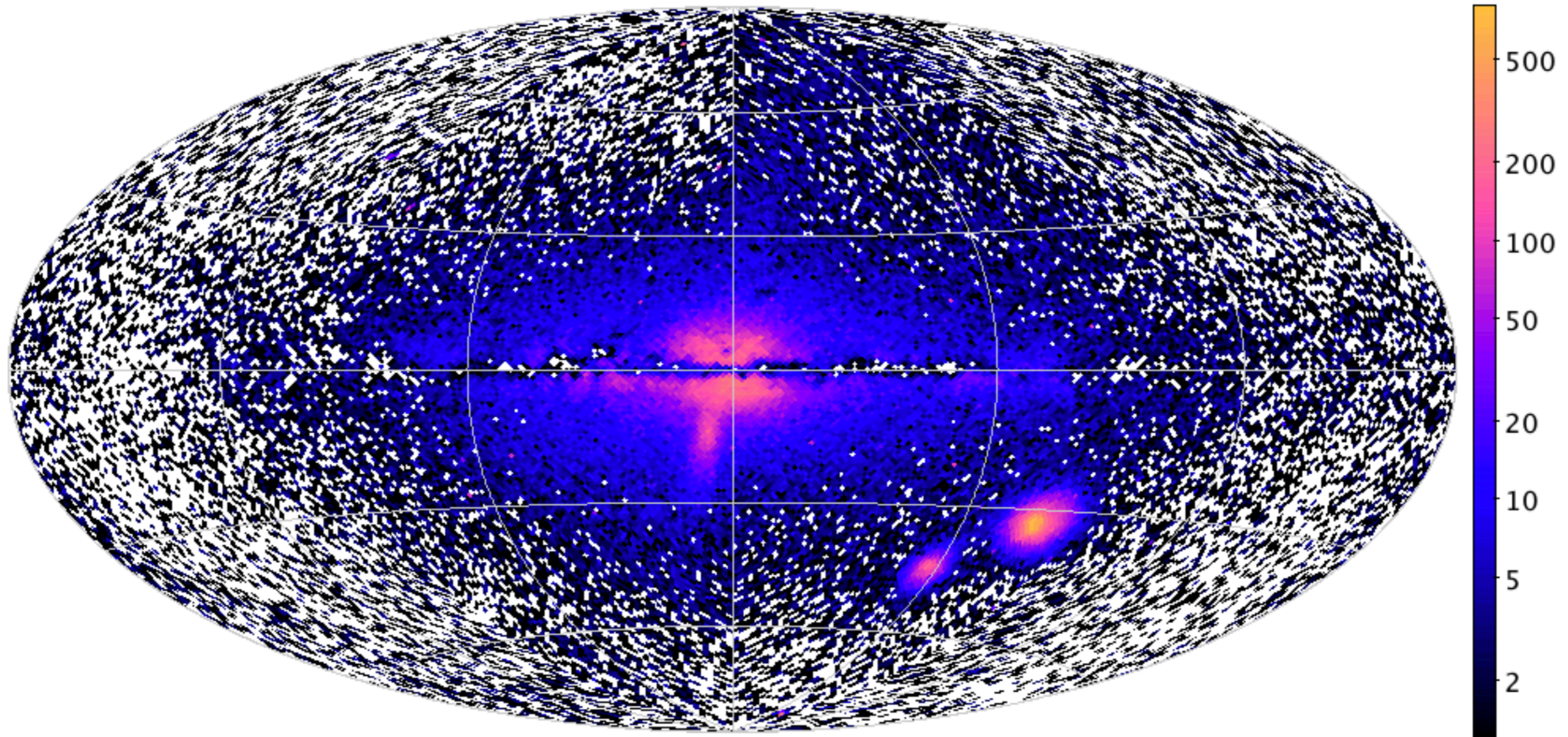




**~300 000 stars in the tails + dwarf!**

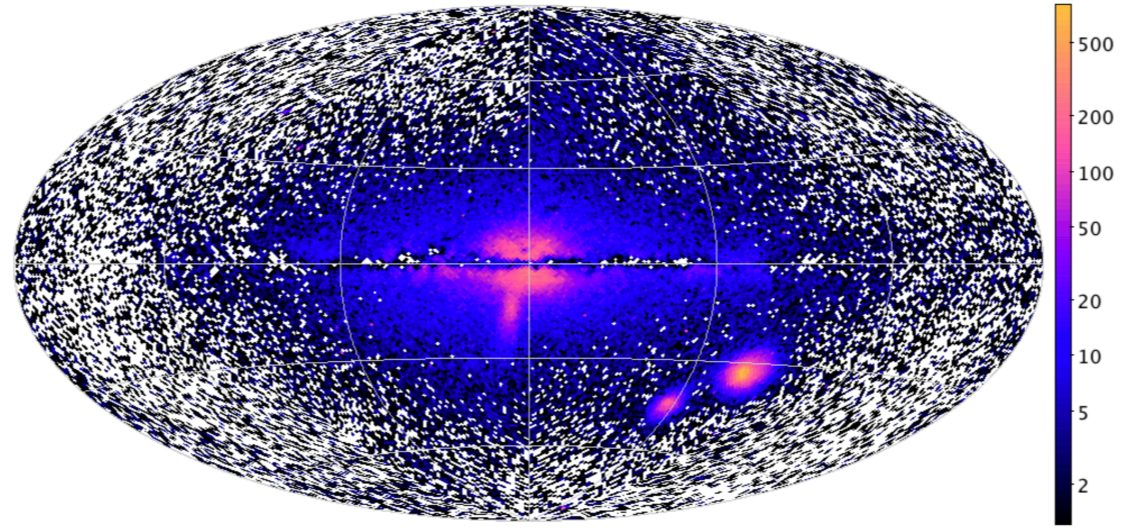


Classif.: RR Lyrae stars (RRAB, RRC, RRD, ARRD)

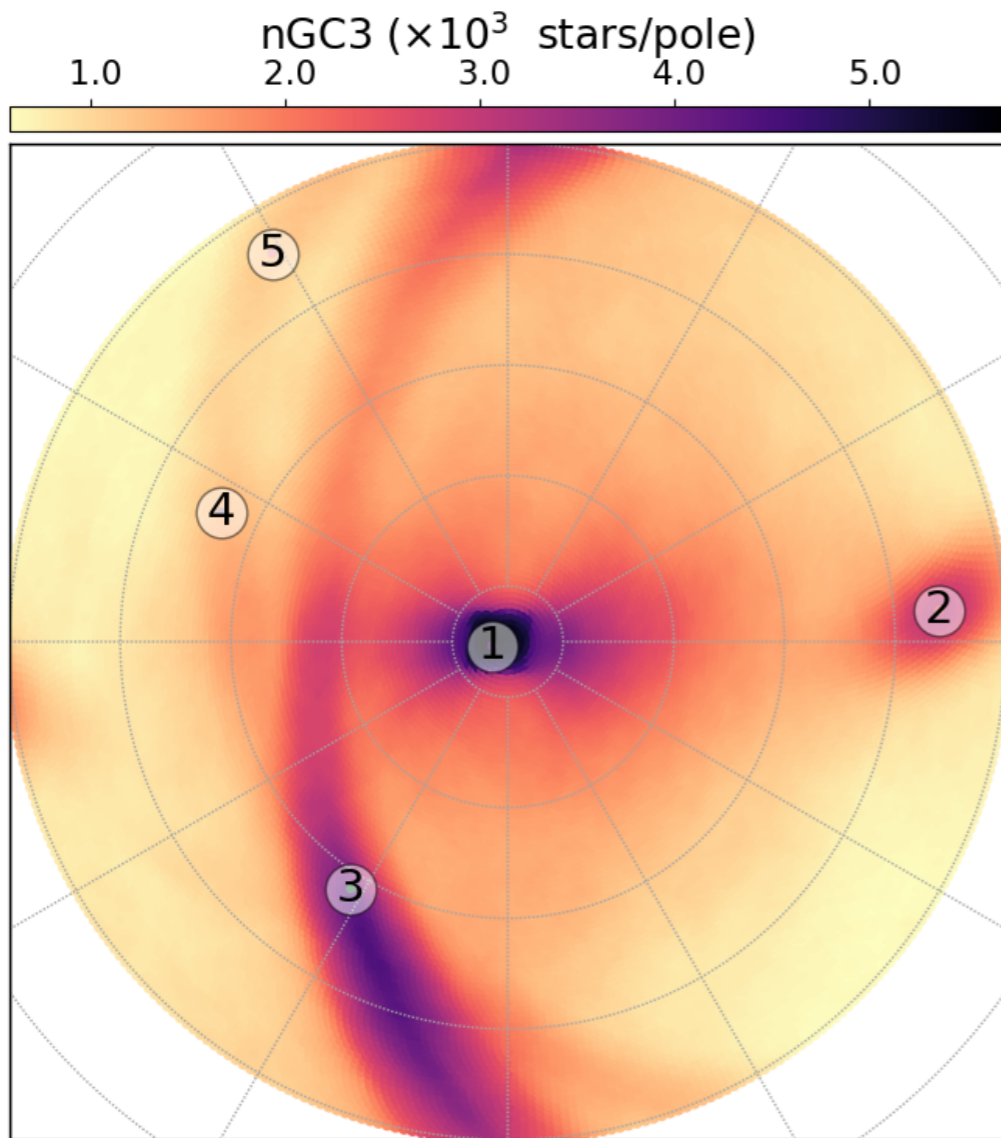


Holl et al. 2018

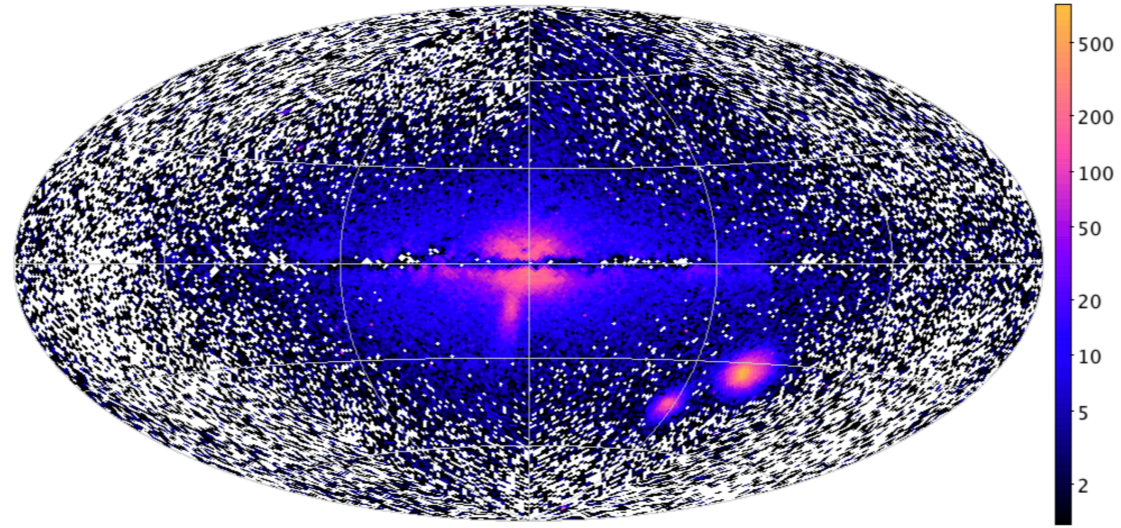
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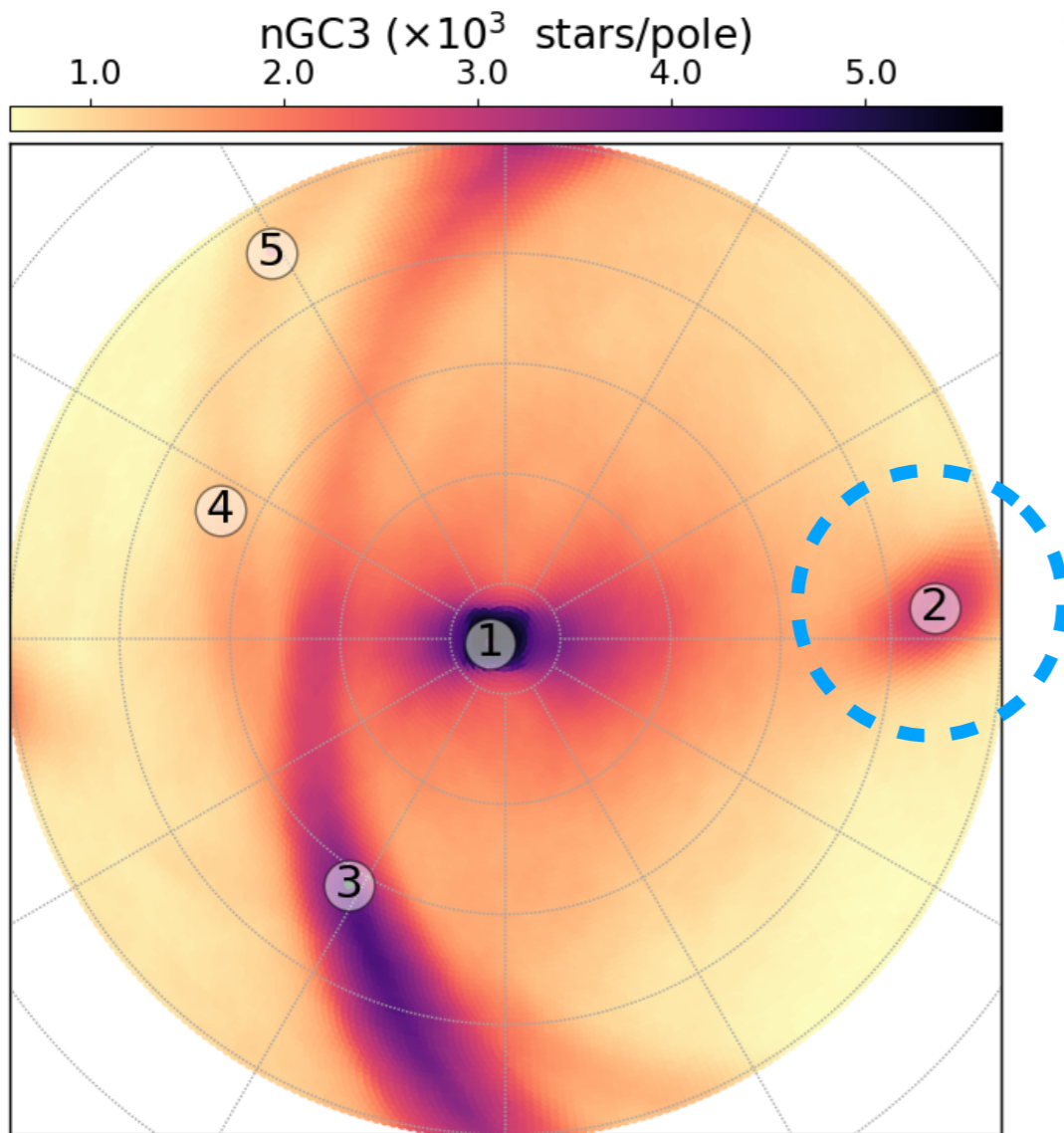
Holl et al. 2018



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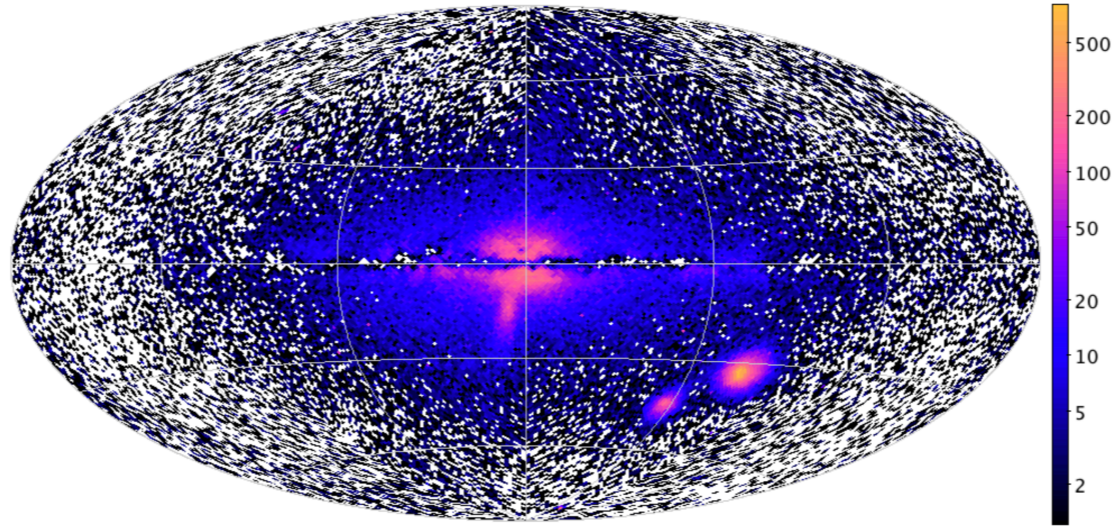
Holl et al. 2018



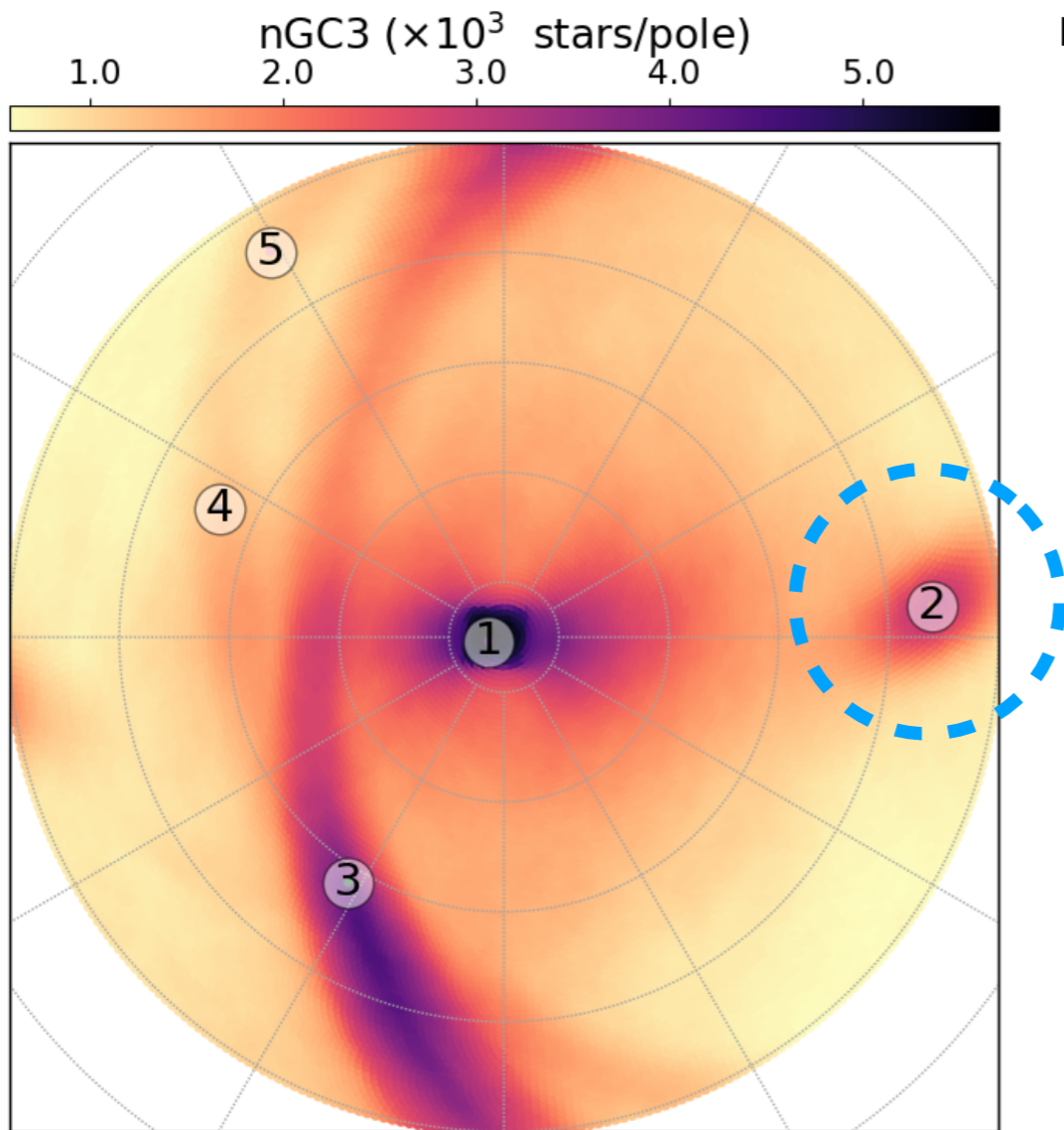
nGC3 sample



Classif.: RR Lyrae stars (RRAB, RRC, RRD, ARRD)



Holl et al. 2018



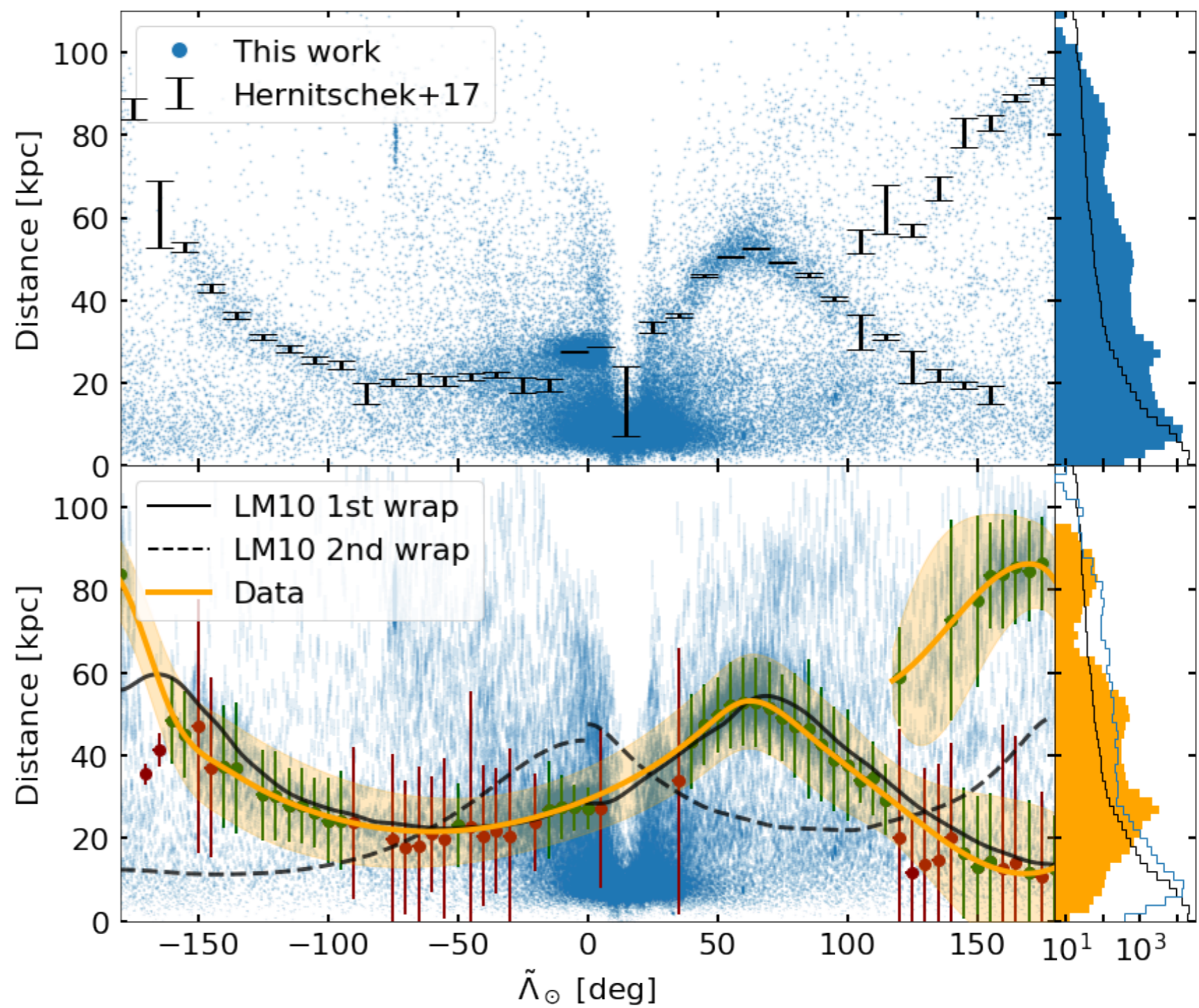
nGC3 sample

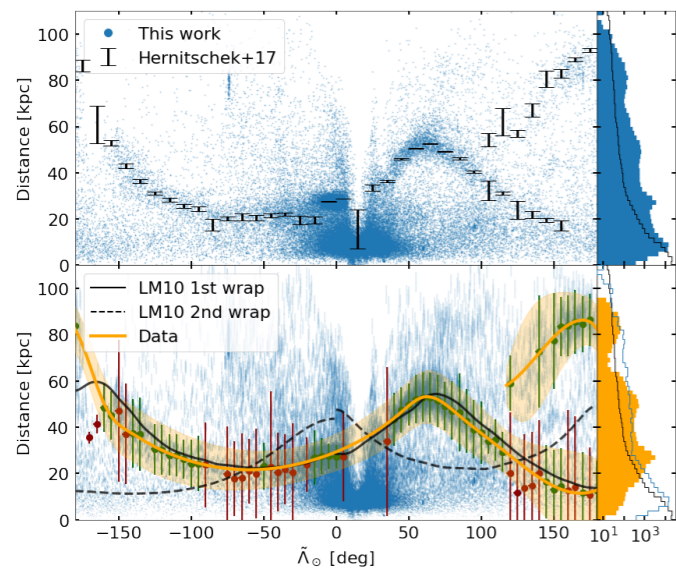
$$|\tilde{B}_{\odot}| < 20^{\circ}$$

$$(l,b)=(273^{\circ}.8; 13^{\circ}.5)$$

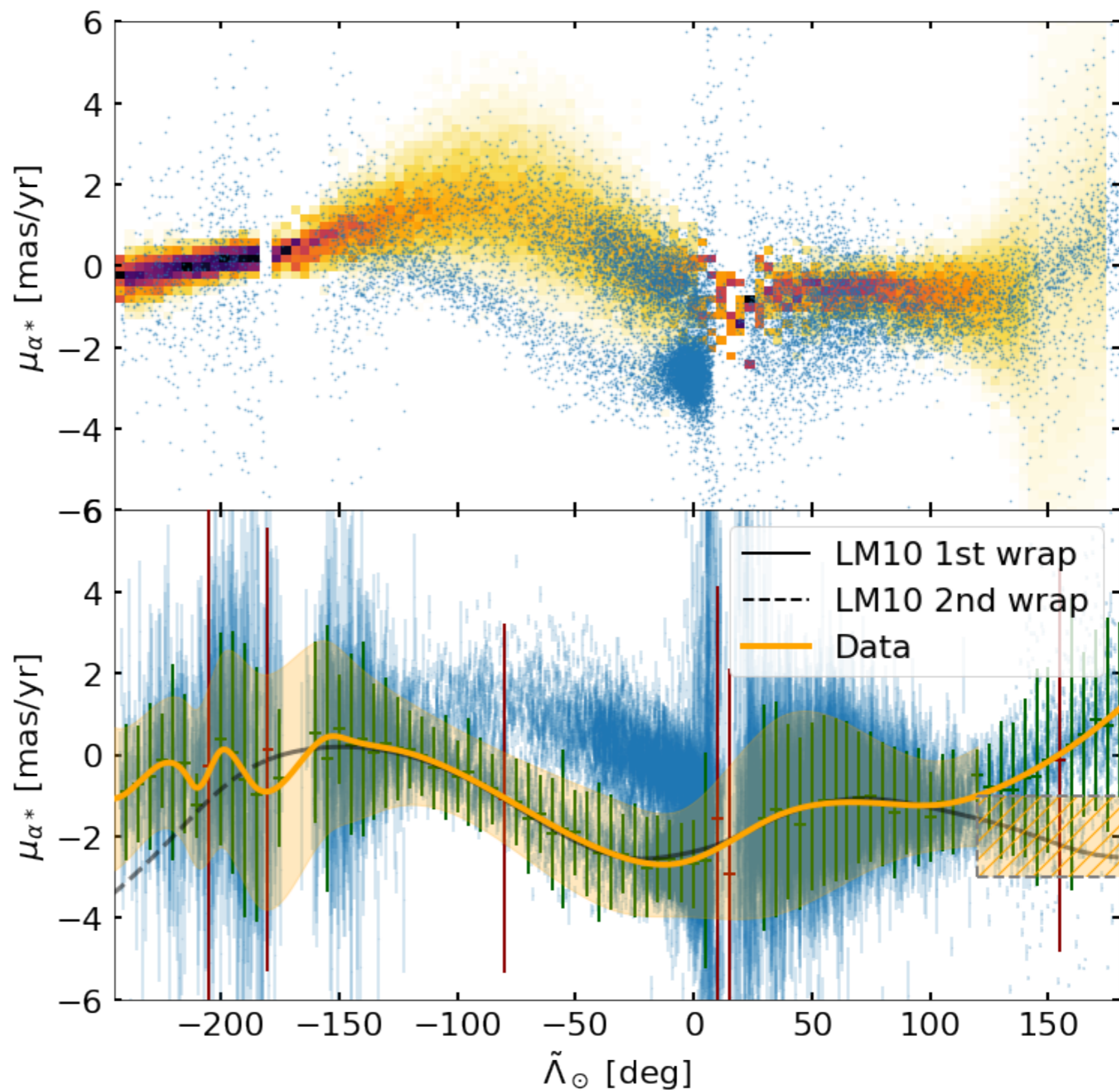
Strip sample

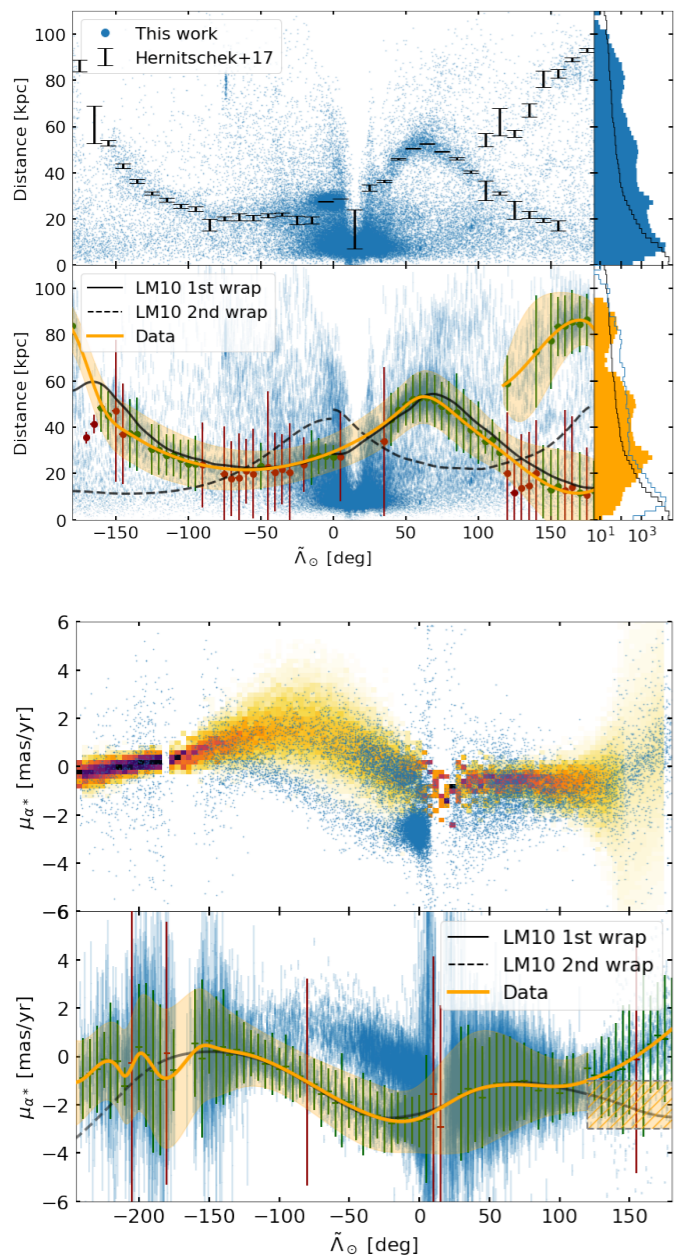
# Strip sample



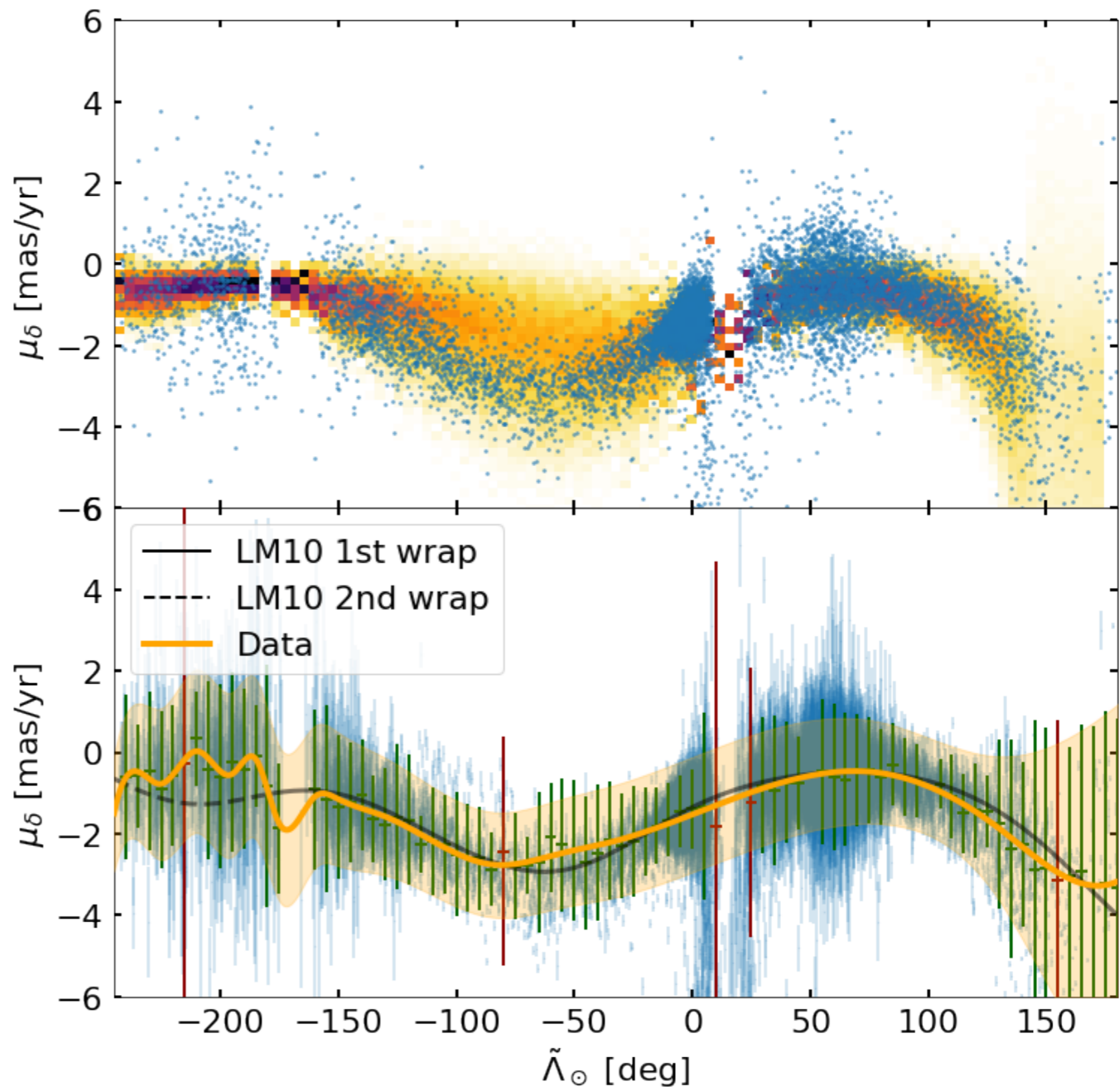


## Strip sample

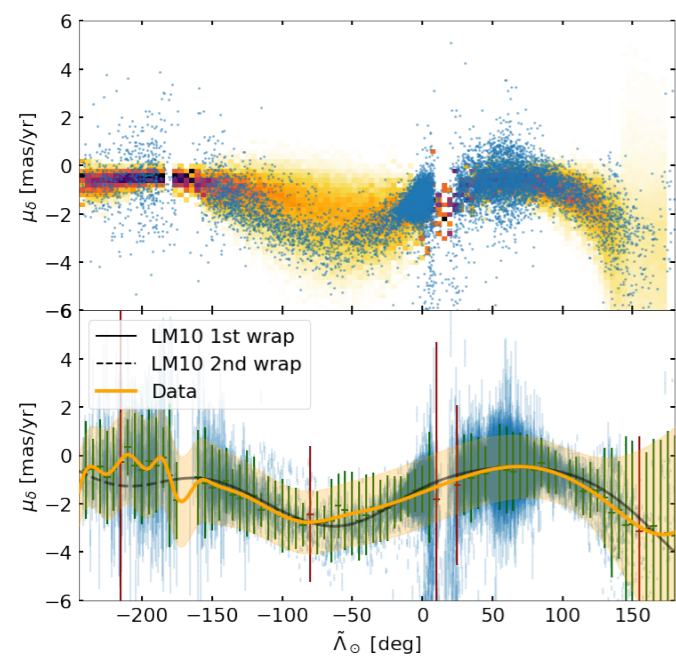
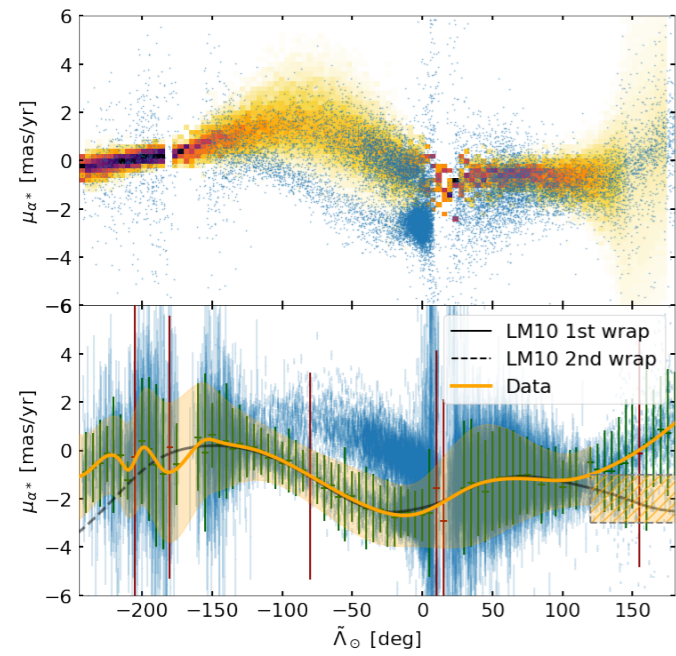
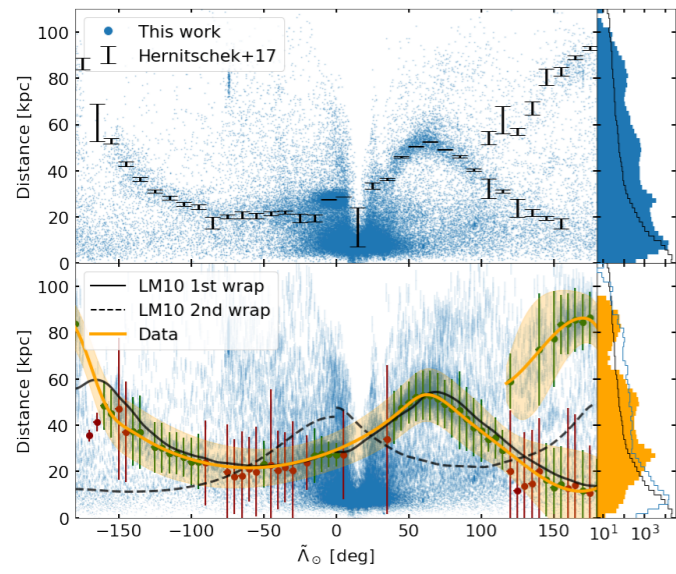




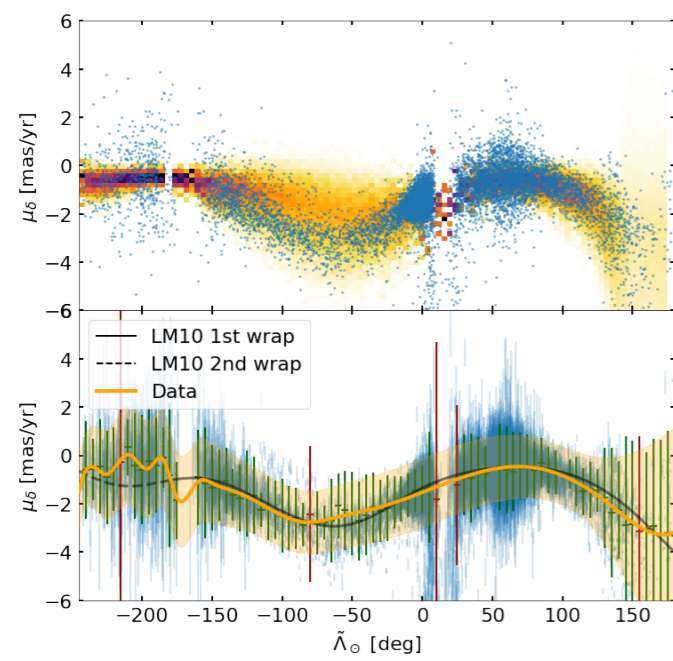
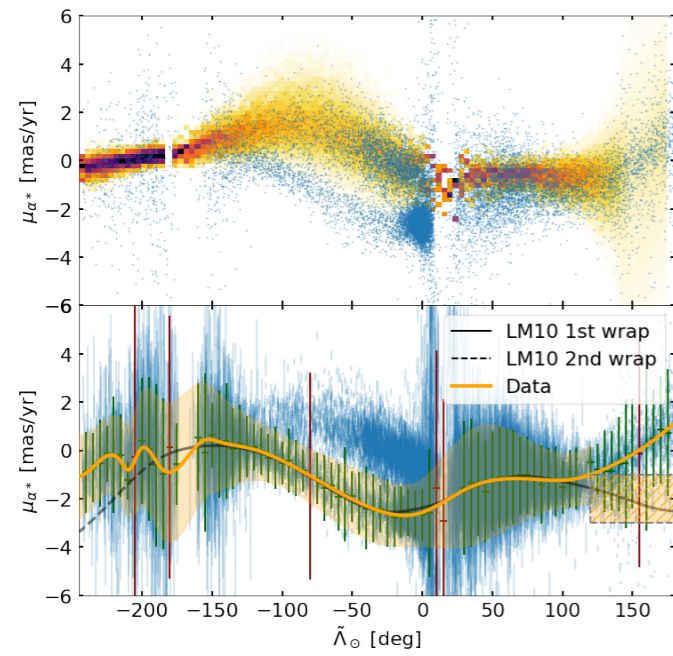
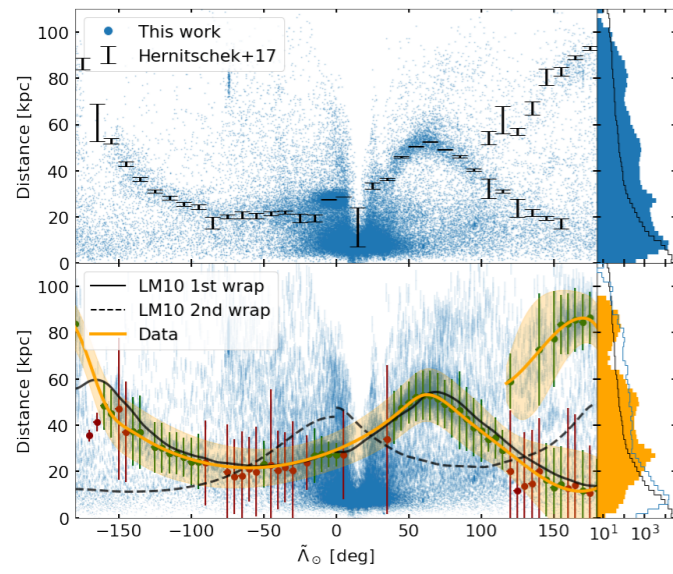
## Strip sample

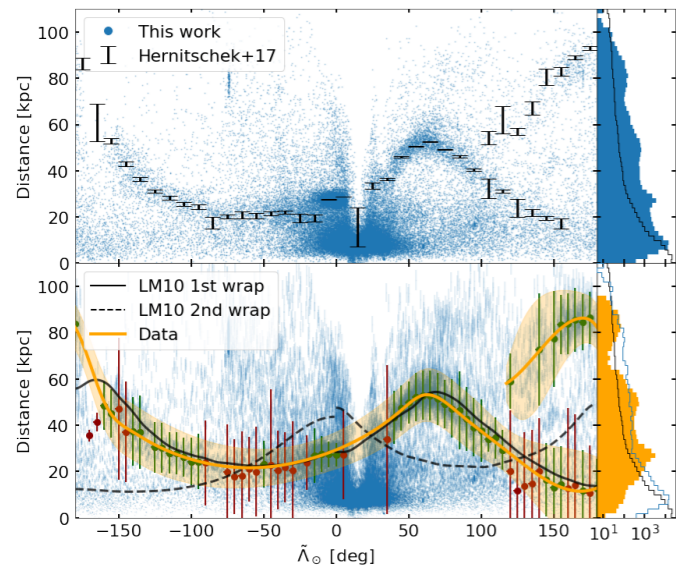


# Strip sample



# Strip sample ( 76,872 )

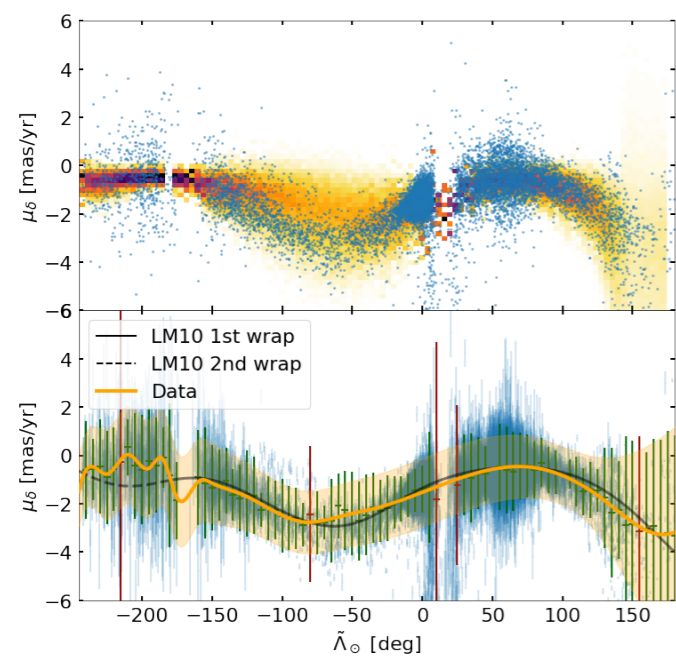
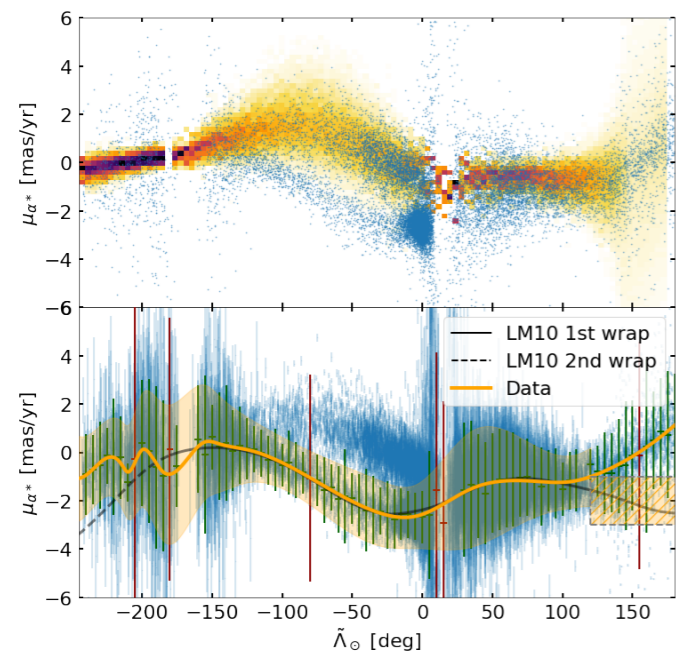


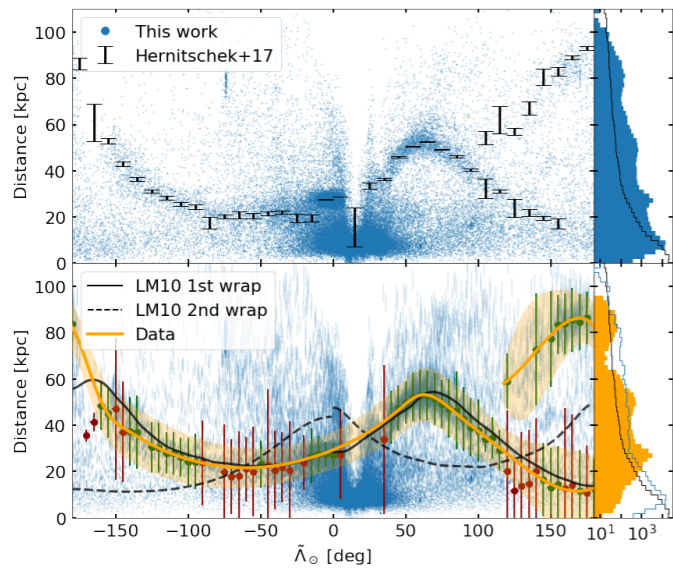


**Strip sample  
( 76,872 )**



**18,045**





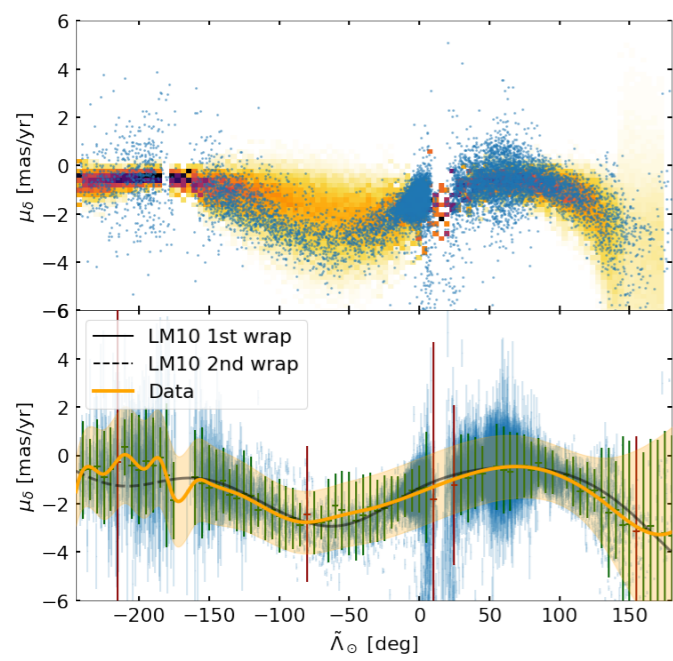
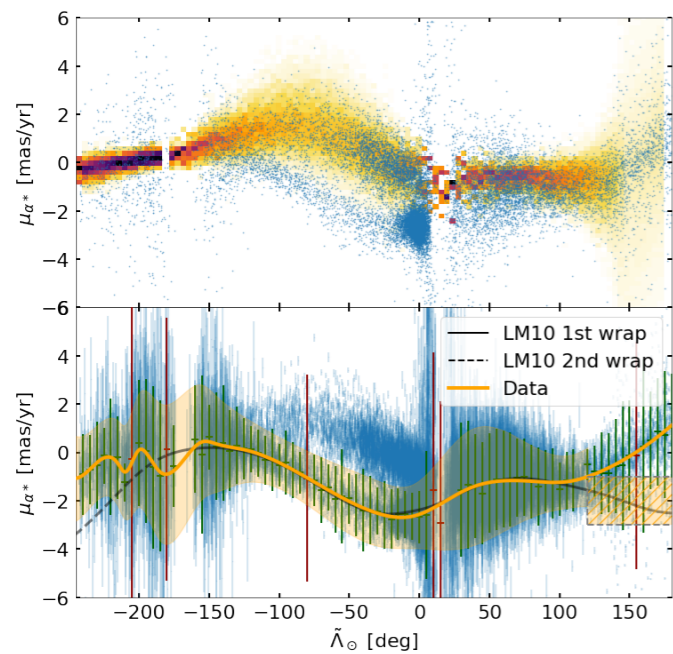
**Strip sample  
( 76,872 )**



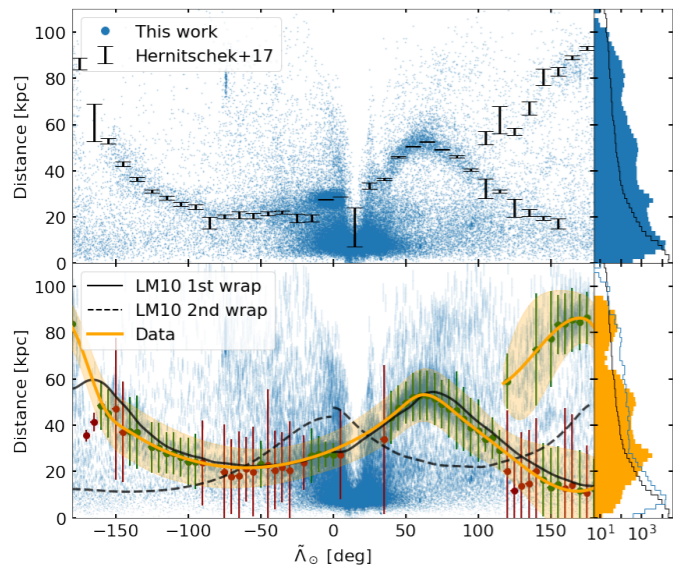
**18,045**



**12,583**



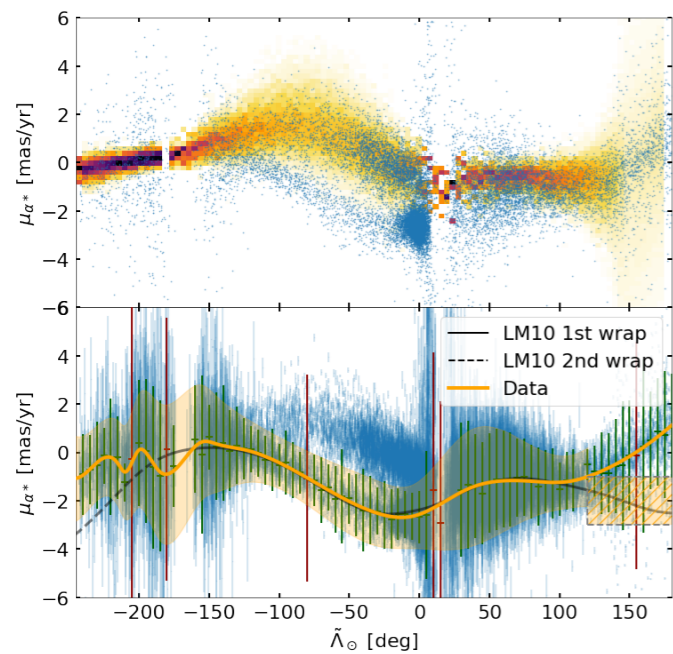




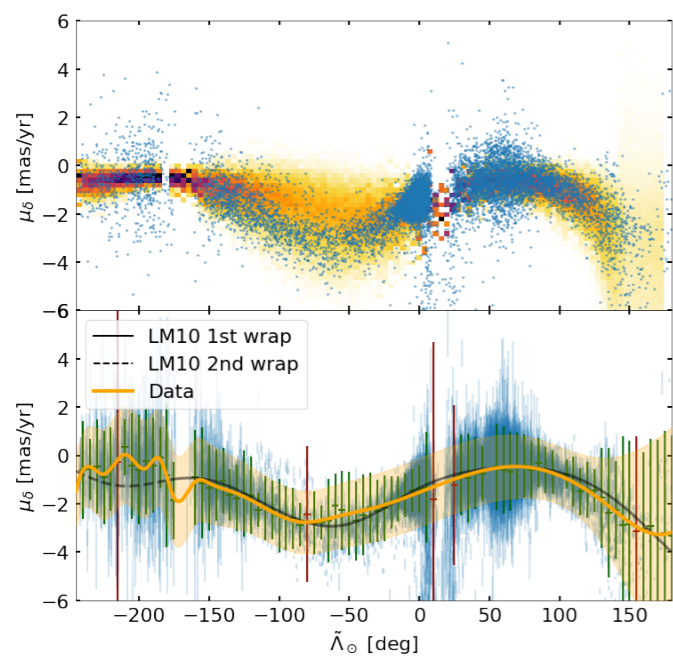
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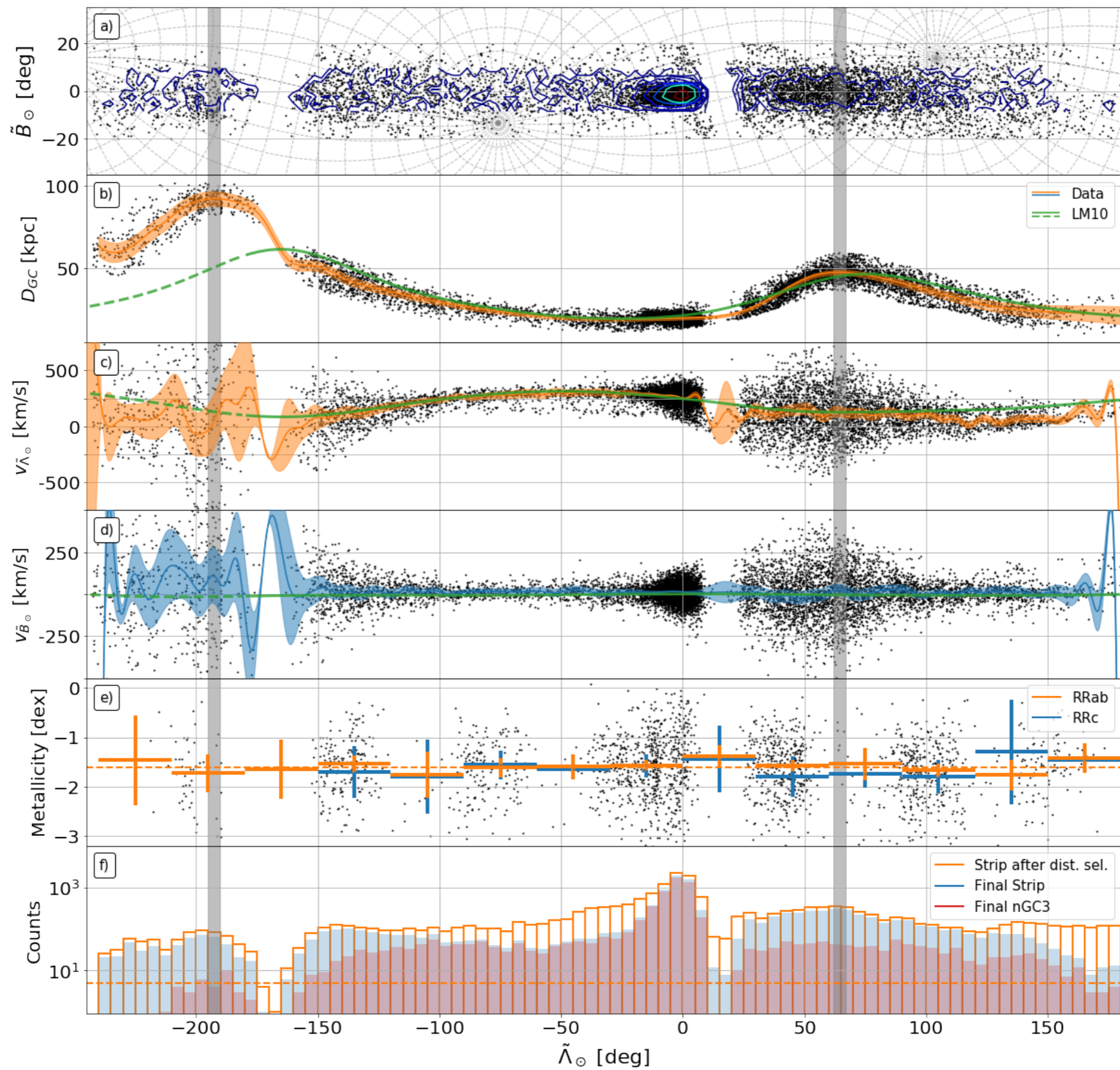
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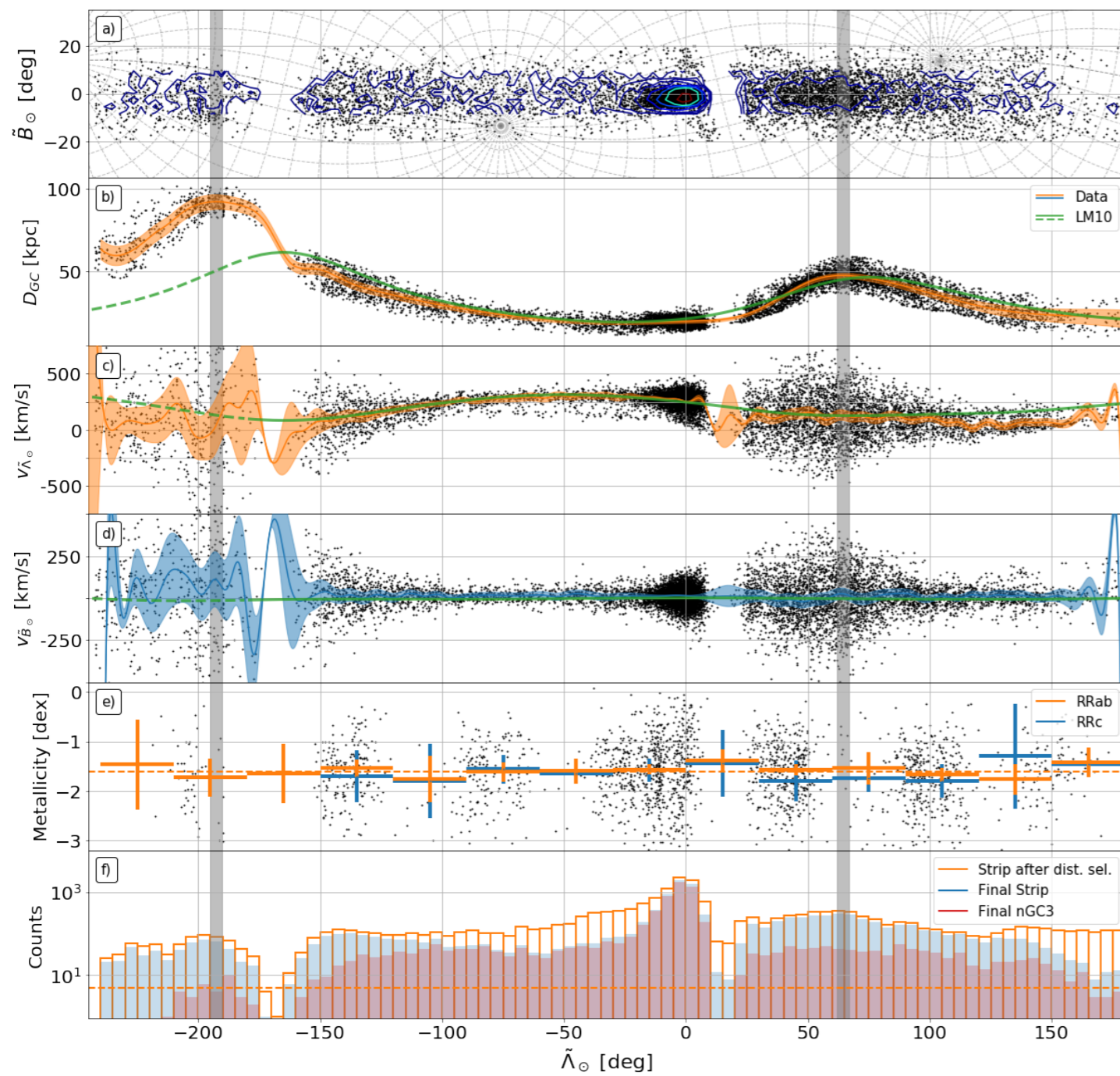


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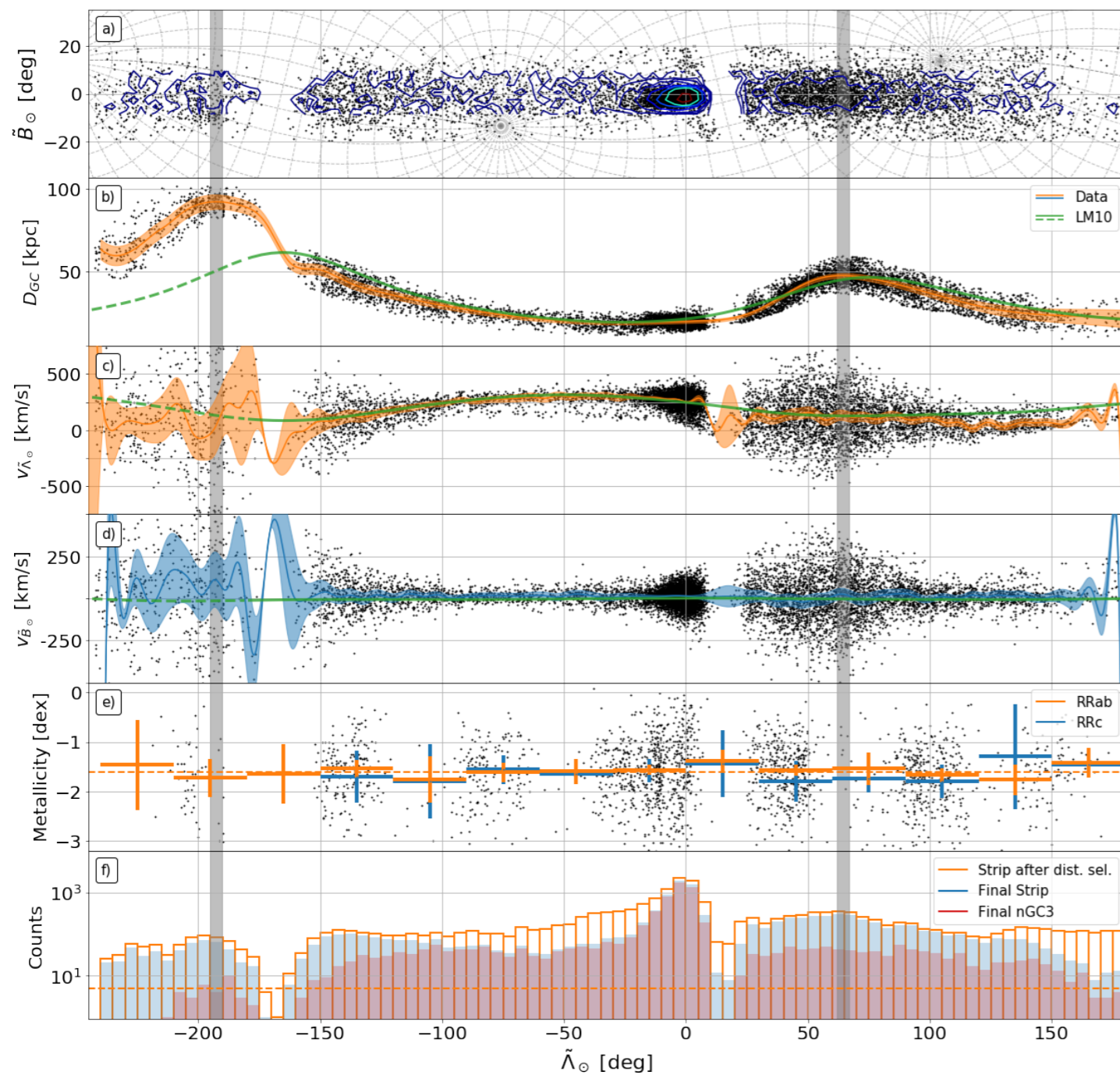


**11,677**



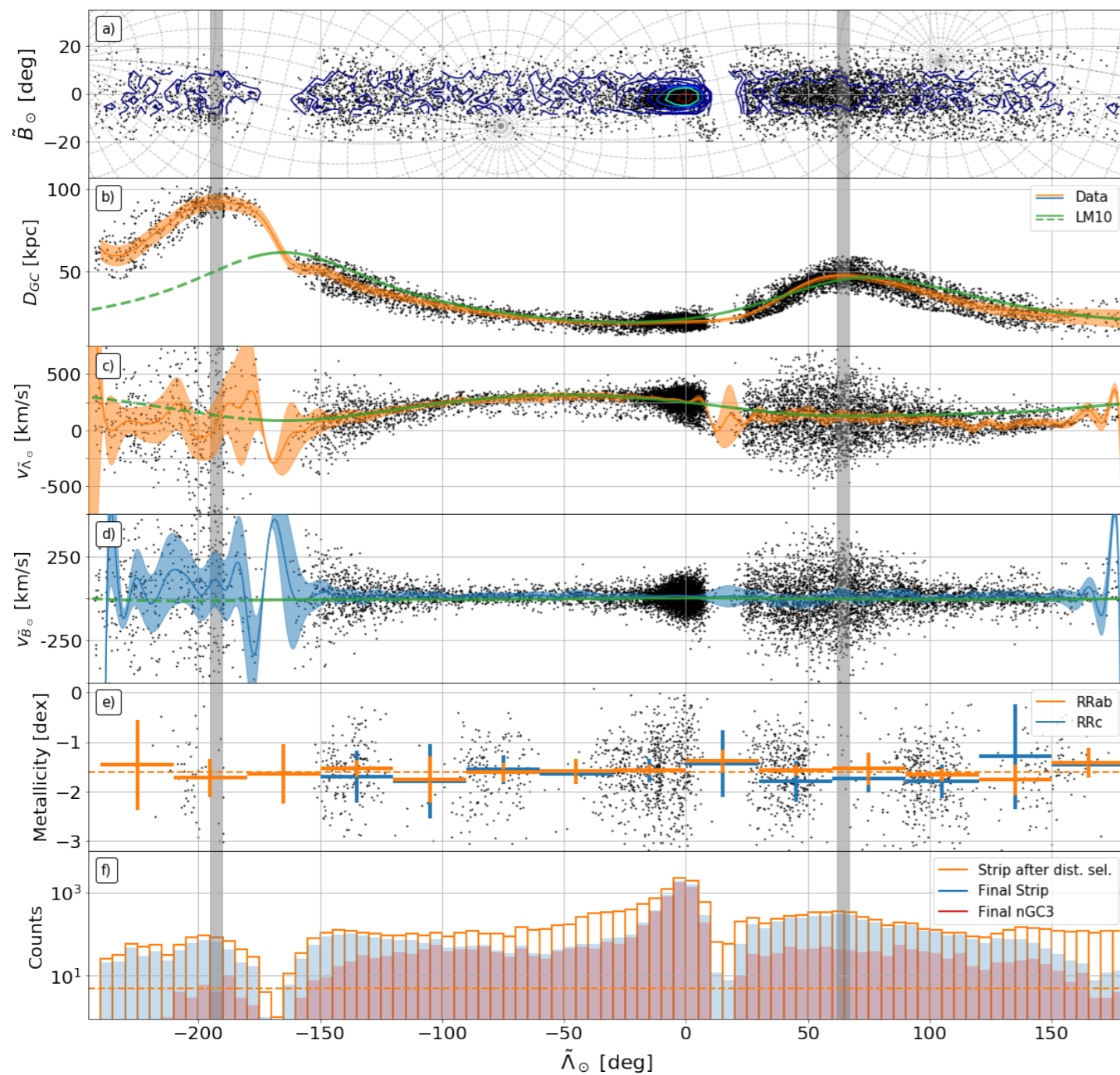


**New apocentres (debris)**  
*Slight tension with previous determinations*



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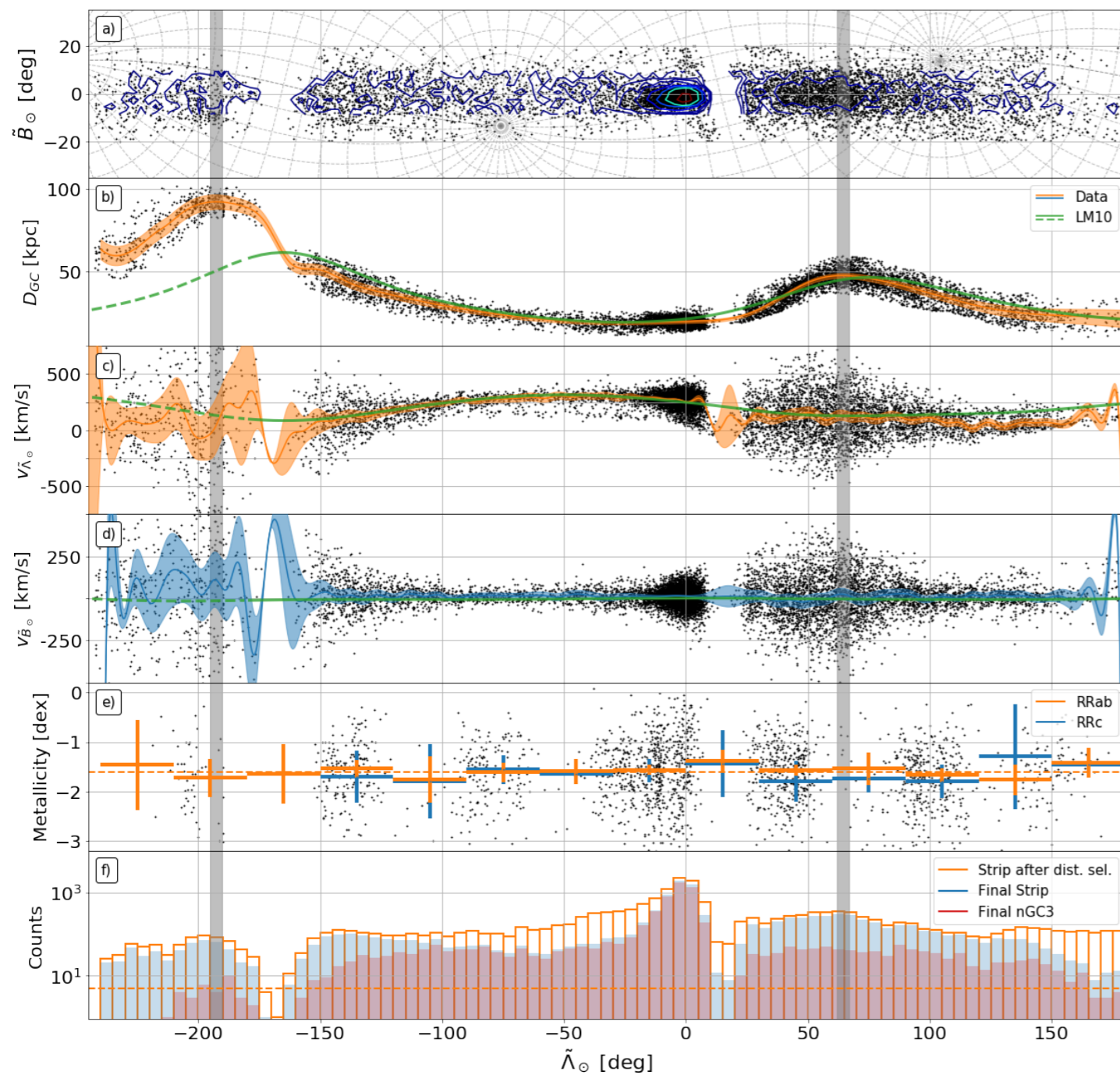
**First look at tangential velocities**  
*Close to the model, dominated by p.m. errors*



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**Transverse velocity close to zero**  
*No significant deviation*

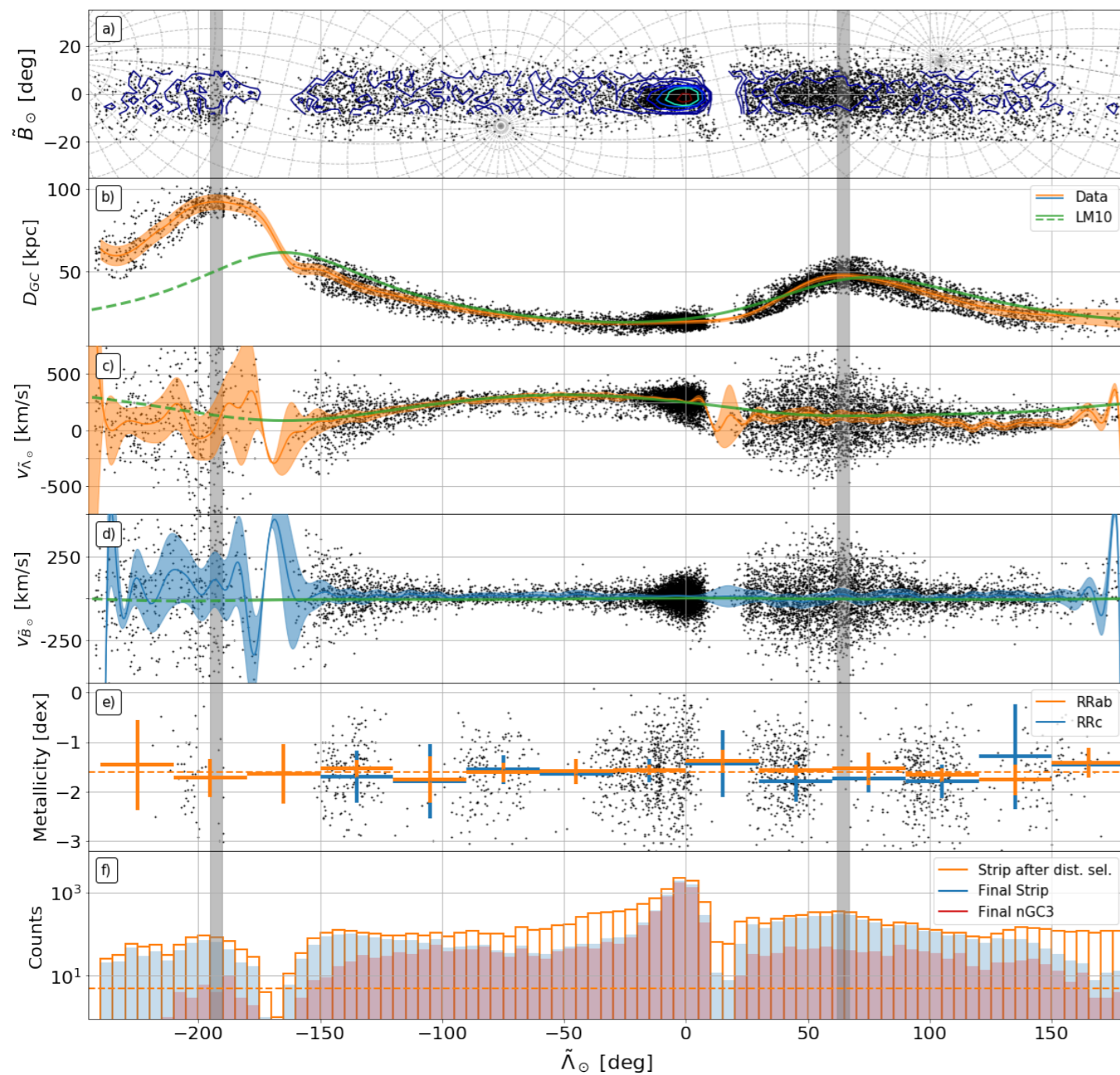


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**No metallicity gradient**  
*If existing, then  $\leq 10e-3$  dex/deg*



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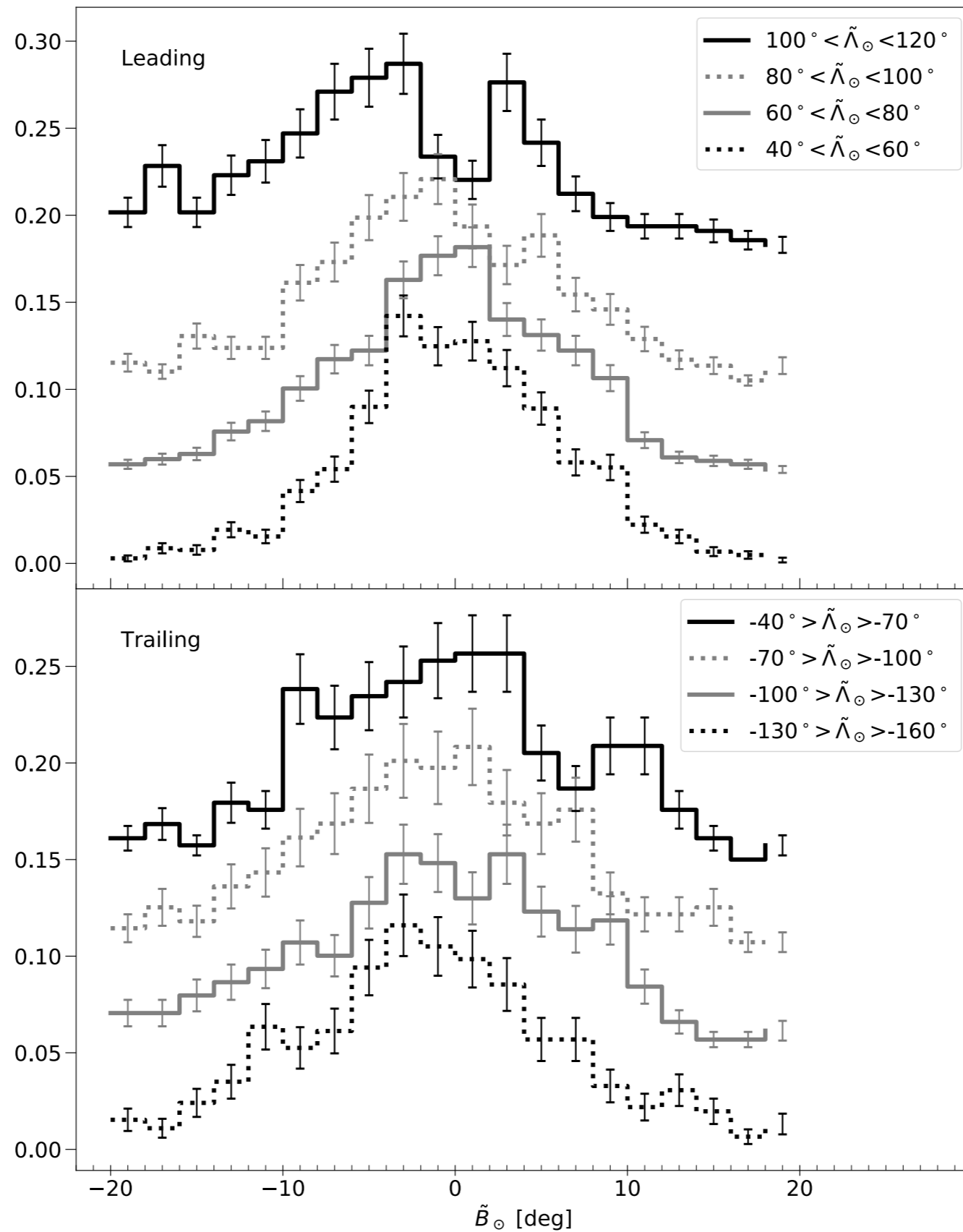
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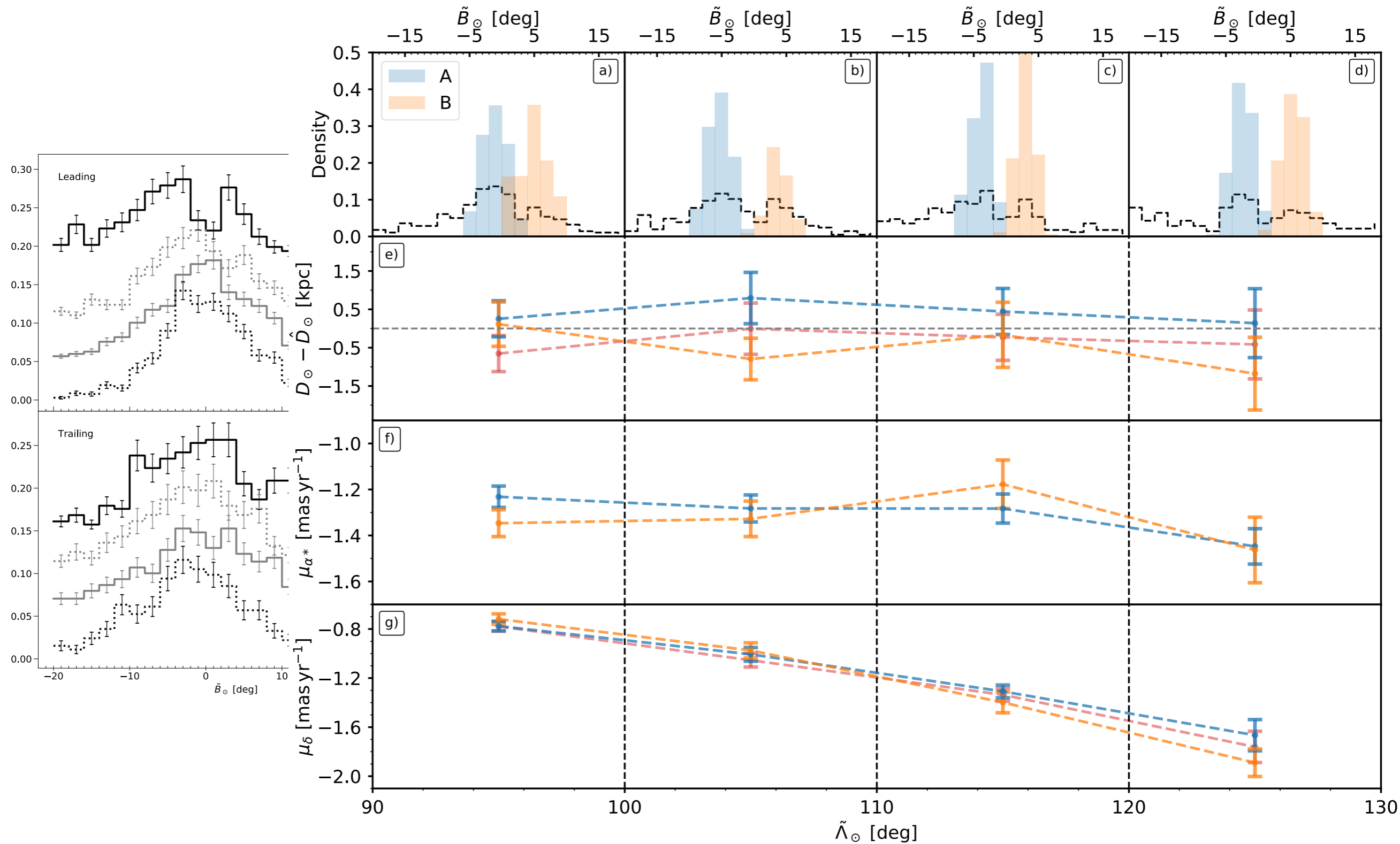
**Completeness vs Purity**  
*Strip: High completeness, low purity*  
*nGC3: low completeness, high purity*

# The Bifurcation





# The Bifurcation



# Summary

- **Largest sample of Sagittarius stream candidates**
  1. Dwarf: ~200k stars
  2. Tails: ~100k stars
- **First all-sky, continuous quantification of the proper motions**
- **CMD variations along the stream (morphology, location, ...) can be used to constrain the SFH, distance and reddening.**
- **Two RR Lyrae samples:**
  1. Strip sample: 11 667 stars (~95% completeness, lower purity)
  2. nGC3 sample: 6 608 stars (~80% completeness, higher purity)
- **First determination of the tangential velocity trends**
- **Detection of the bifurcation across all samples: no significant separation in neither kinematics nor distance.**
- **We provide interpolators to use for the modelling of the stream**

**For more information**

**[services.fqa.ub.edu/sagittarius](https://services.fqa.ub.edu/sagittarius)**

# THANK YOU!

[services.fqa.ub.edu/sagittarius](https://services.fqa.ub.edu/sagittarius)

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 [@PBR117](https://twitter.com/PBR117)

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**gaia**