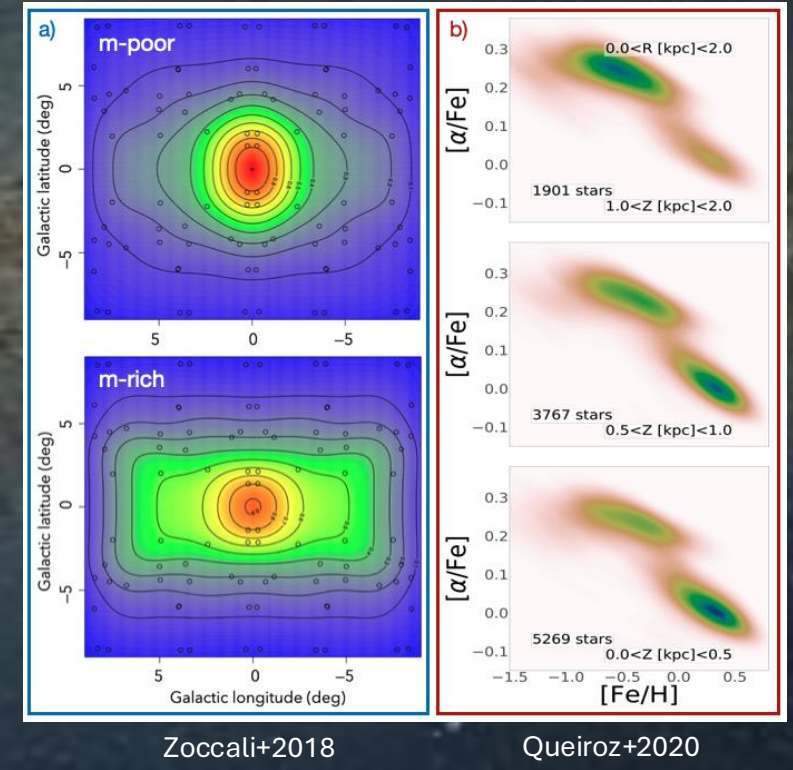
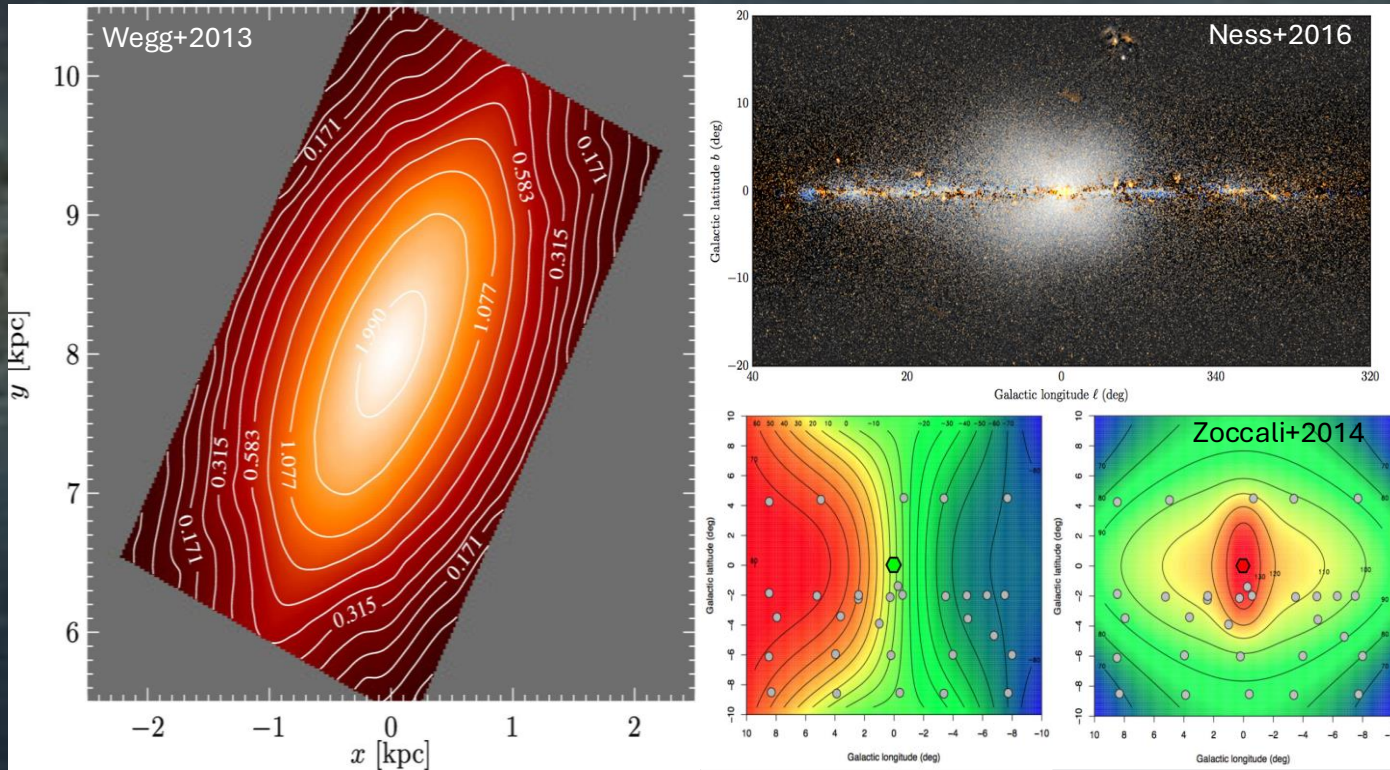


The RR Lyrae population in the inner Galactic bulge

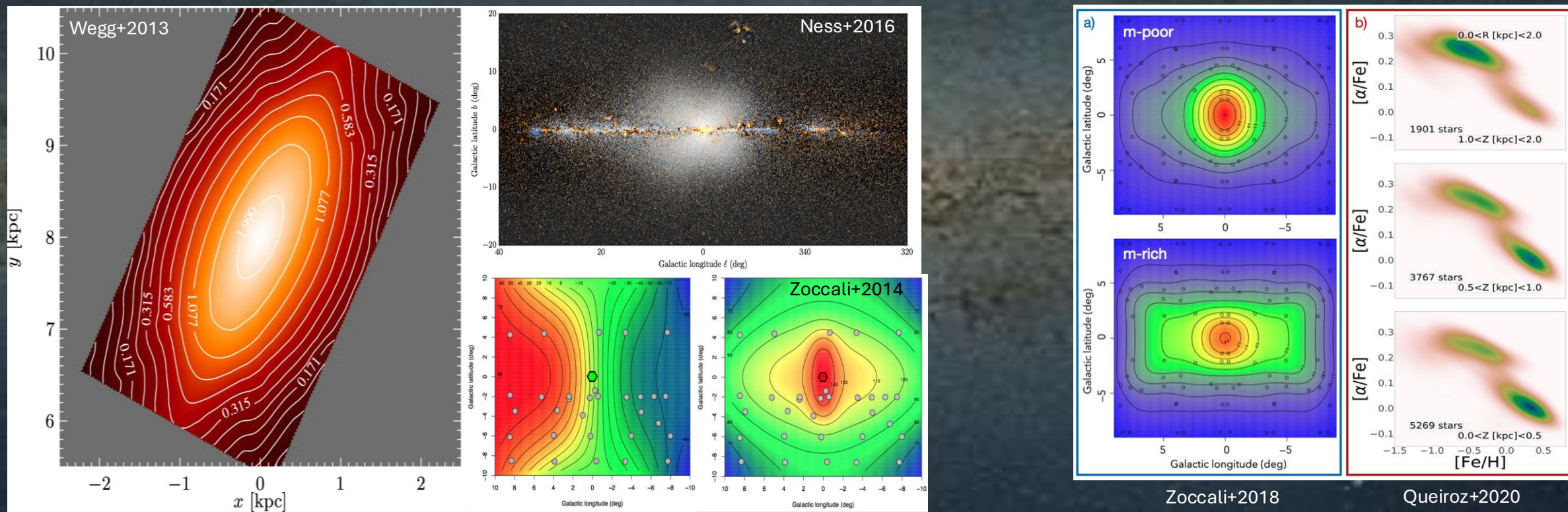
Elena Valenti



The MW bulge in a nutshell



The MW bulge in a nutshell

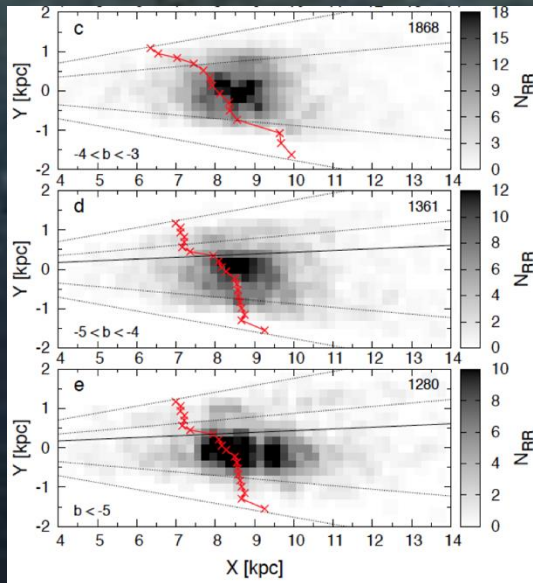


- Bar structure properties based on RC counts (including m -poor) might be not correct
- The spheroid – especially in the central regions – is still poorly characterized

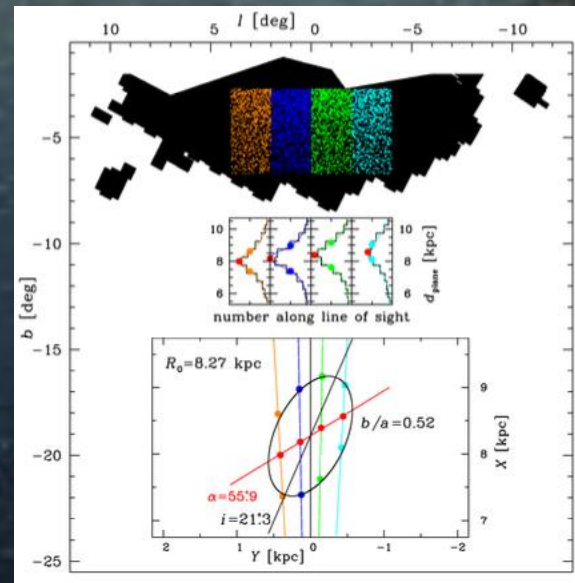
The MW bulge spheroid component

- RRL are possibly the cleanest tracers to infer 3D structure
 - Old (i.e., >10 Gyr)
 - Metal-poor
 - Accurate standard candles

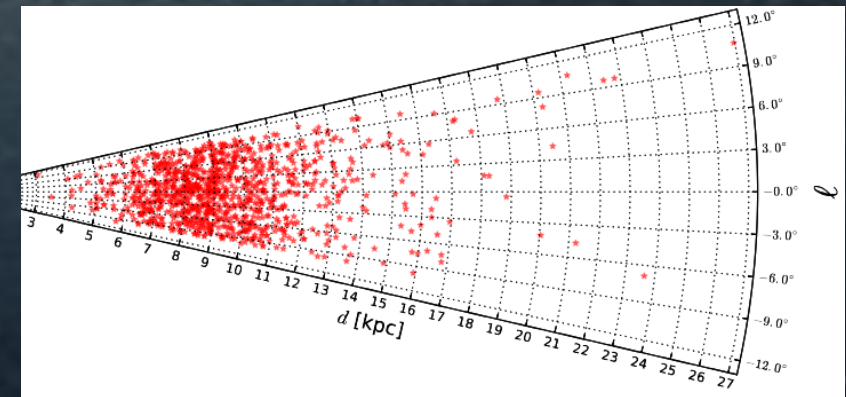
Dekany+2013(VW+OGLEIII)



Pietrukowicz+2015 (OGLEIV)

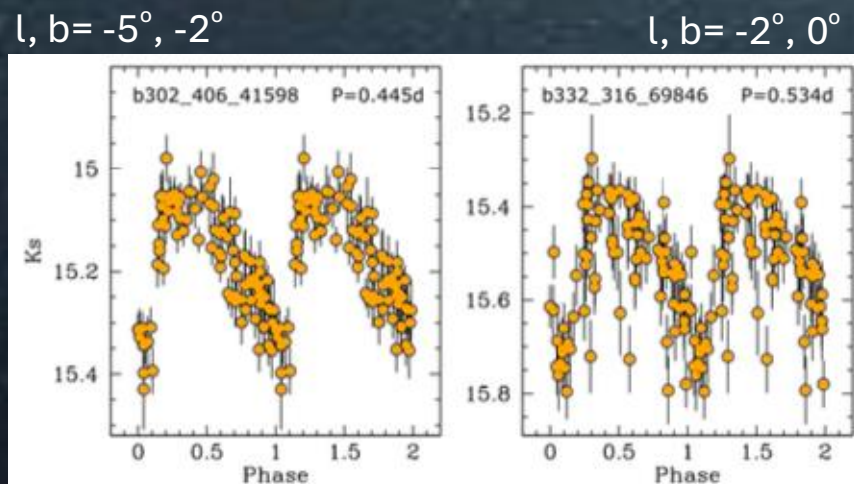


Gran+2016 (VW)

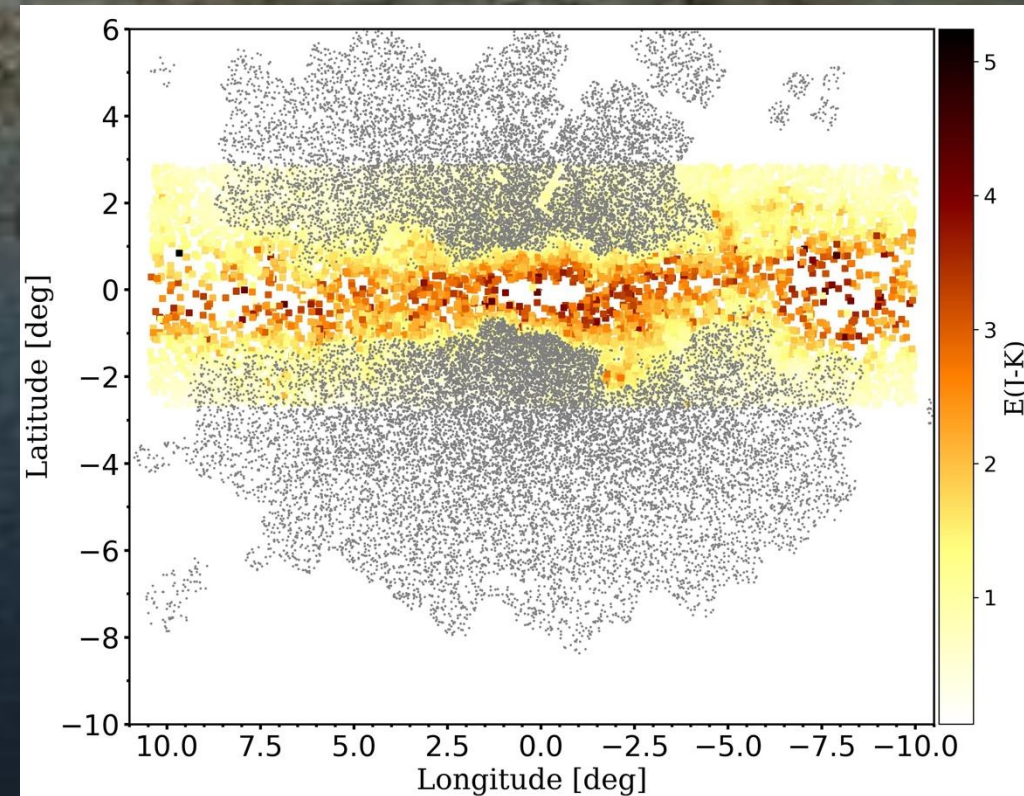


The Data

- VV multi-epoch PSF-fitting photometry (10yr baseline)
 - Mags, position, PMs: $-10^\circ \leq l \leq 10.5^\circ$ & $-2.6^\circ \leq b \leq 2.5^\circ$
- Automatic ML (Random Forest algorithm) variable classifier (training set based on OGLEIV)
- Conservative filters selection: *purity vs completeness*
- Visual inspection
- Total of 16488 RRab (**12965** new + 3523 from OGLEIV) available on CDS



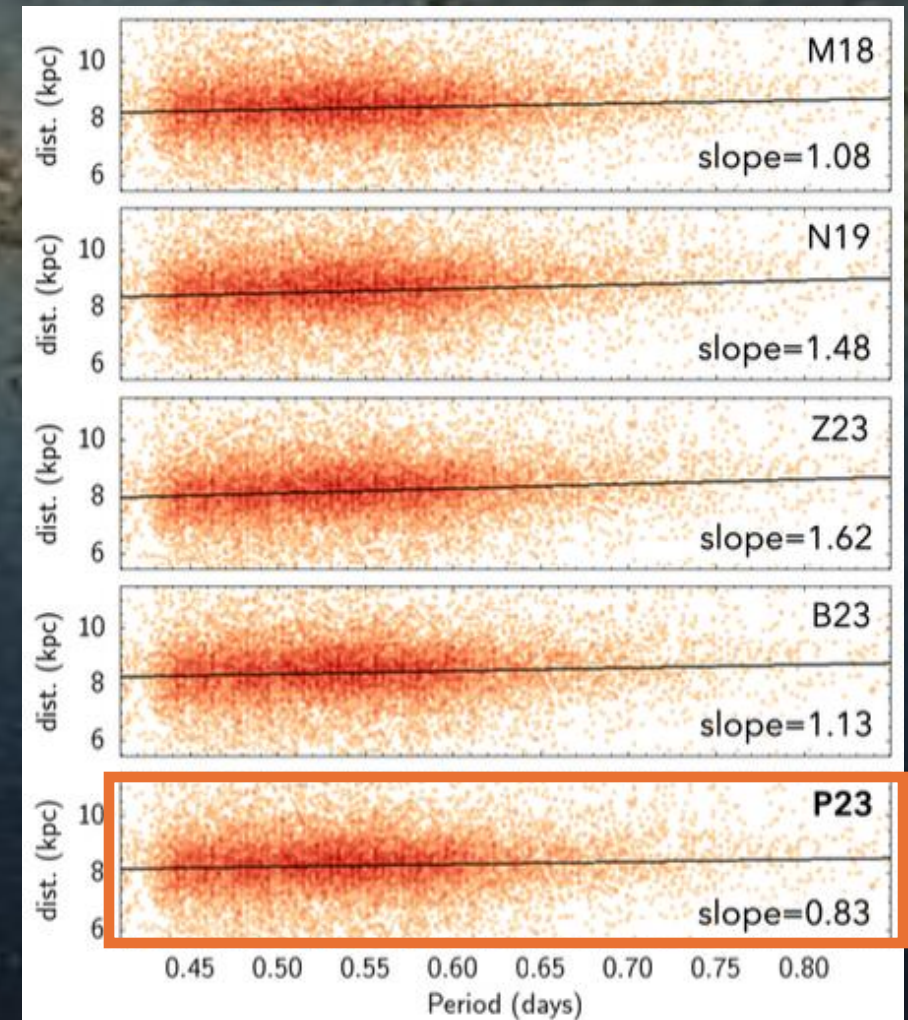
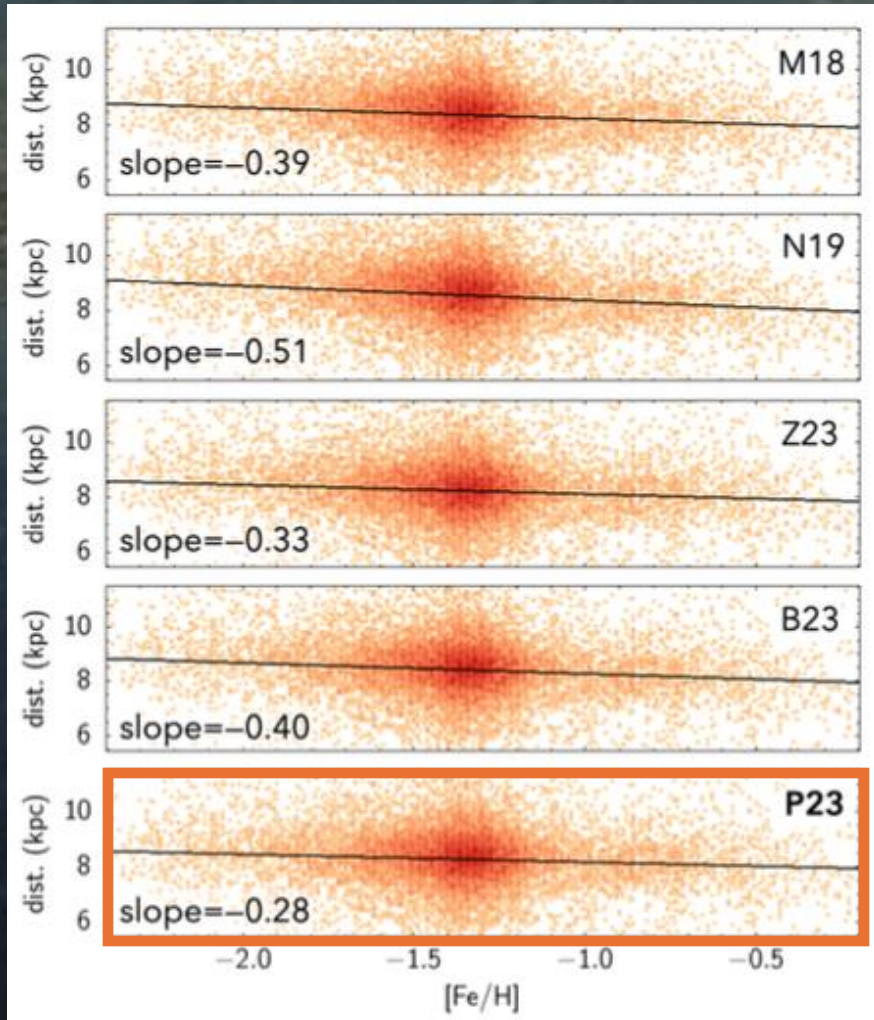
**HIGH-PURITY RRab SAMPLE
IN THE INNER BULGE**



Zoccali et al. (2024)

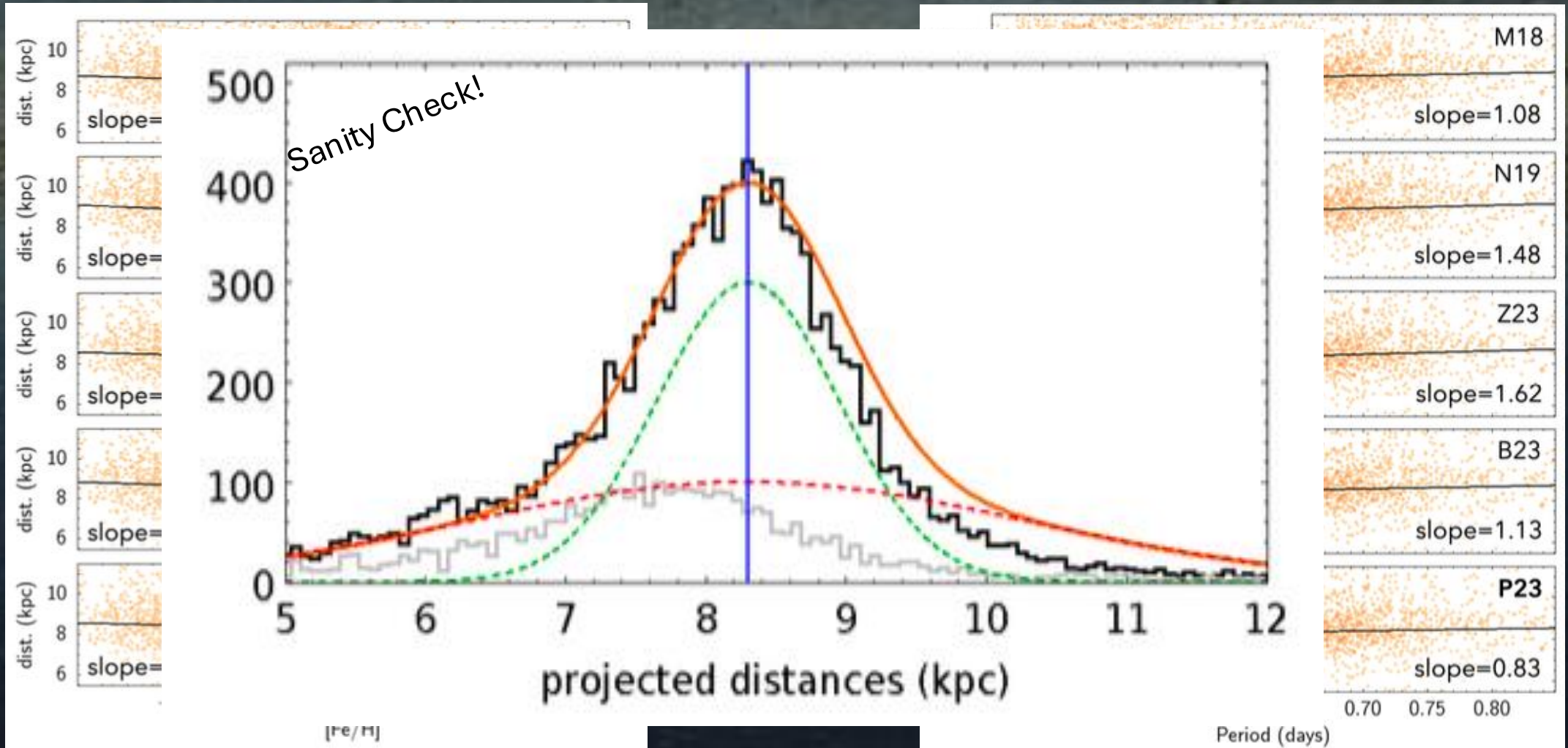
Choosing the appropriate PLZ relation

Muraveva et al. (2018, M18) – Neeley et al. (2019, N19) – Zgirski et al. (2023, Z23) – Bhardwaj et al. (2023, B23) – Prudil et al. (2023, P23)

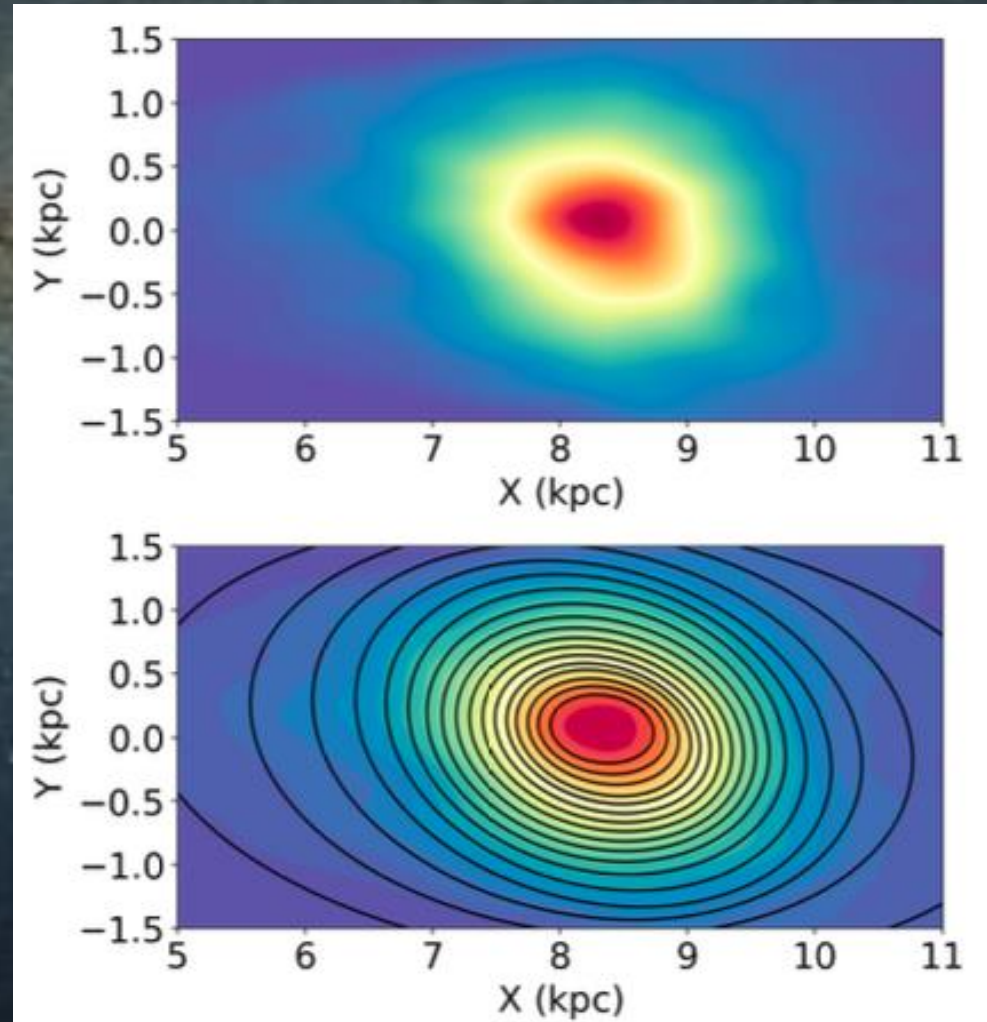
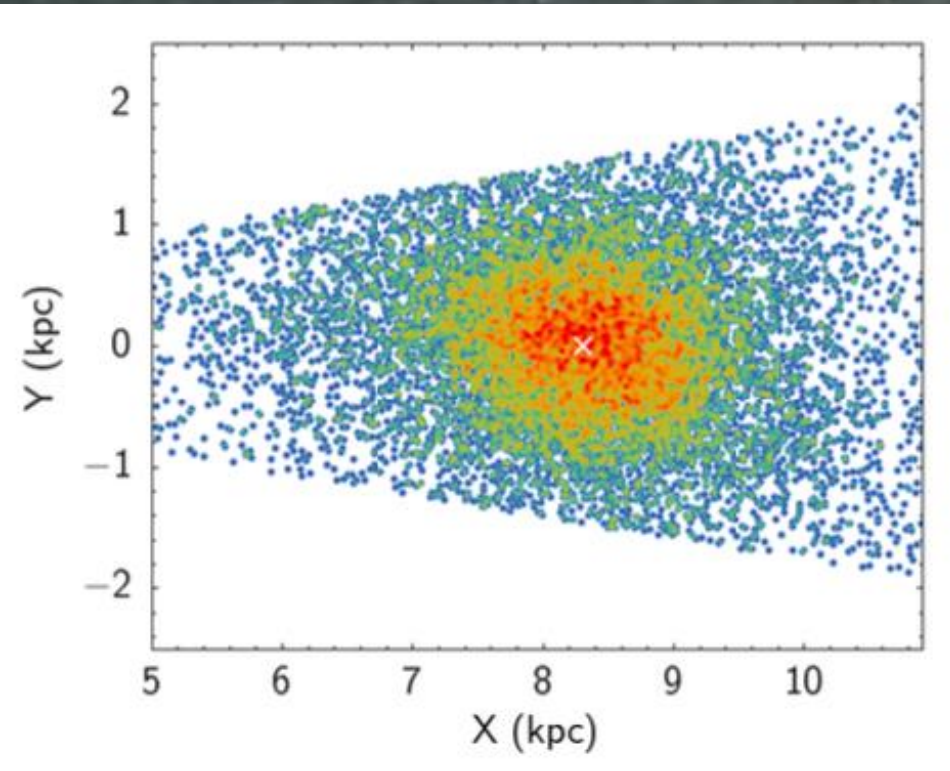


Choosing the appropriate PLZ relation

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RRab 3D structure: observed parameters

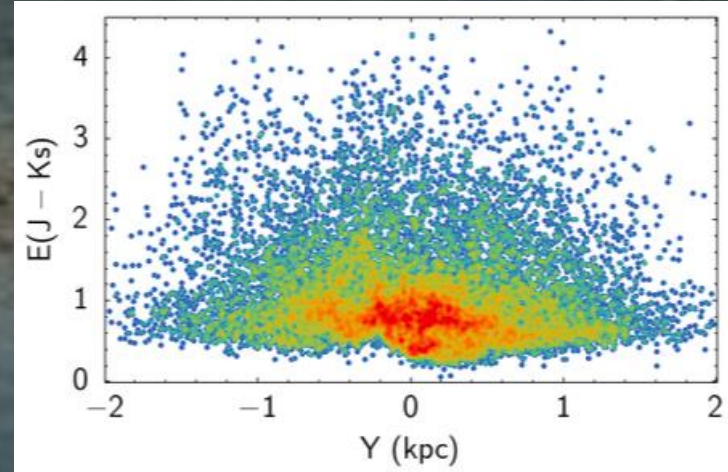


Observed
 $\phi = 15.1^\circ \pm 3.04$
 $b/a = 0.69 \pm 0.05$
 $e = 0.72 \pm 0.07$

RRab 3D structure: biased measures

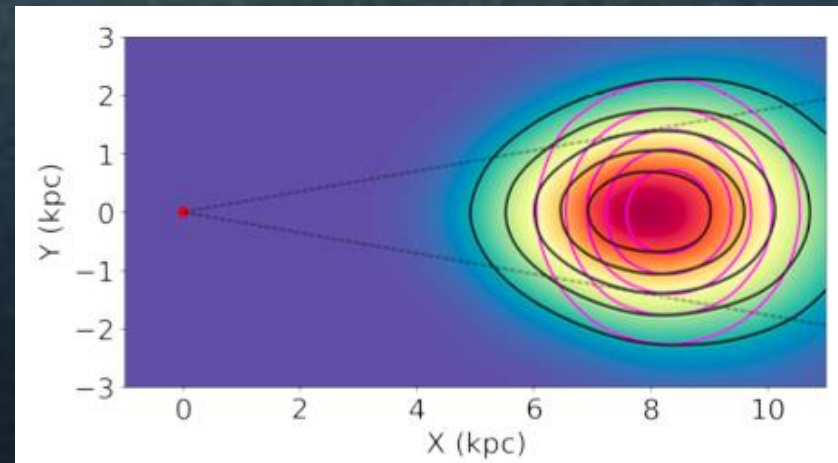
Observed
 $\phi = 15.1^\circ \pm 3.04$
 $b/a = 0.69 \pm 0.05$
 $e = 0.72 \pm 0.07$

1. COMPLETENESS



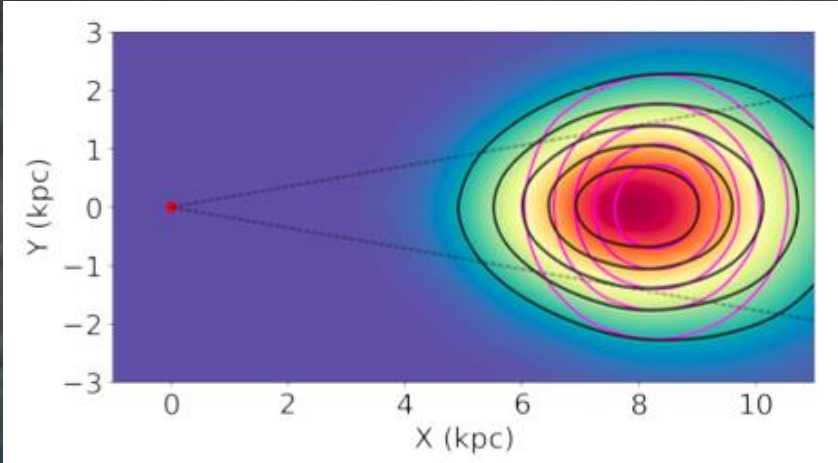
Extinction is not symmetric wrt Y

2. ERROR on DISTANCE

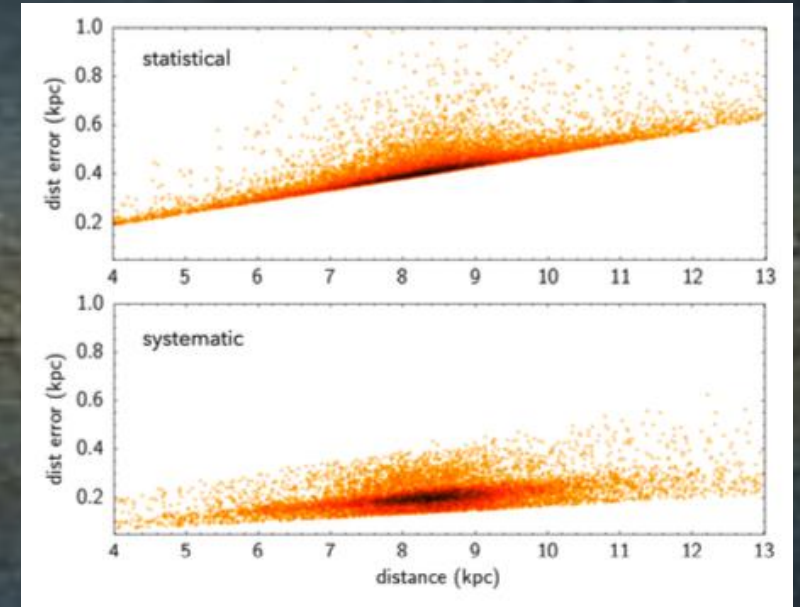


Distribution always elongated along LOS and inclination angle smaller (cfr Hey+23 and Vislosky+24)

RRab 3D structure: bias correction



+



→ $\Delta(\text{input/observed})$ is very small, within 1° for the inclination and negligible for the axis ratios

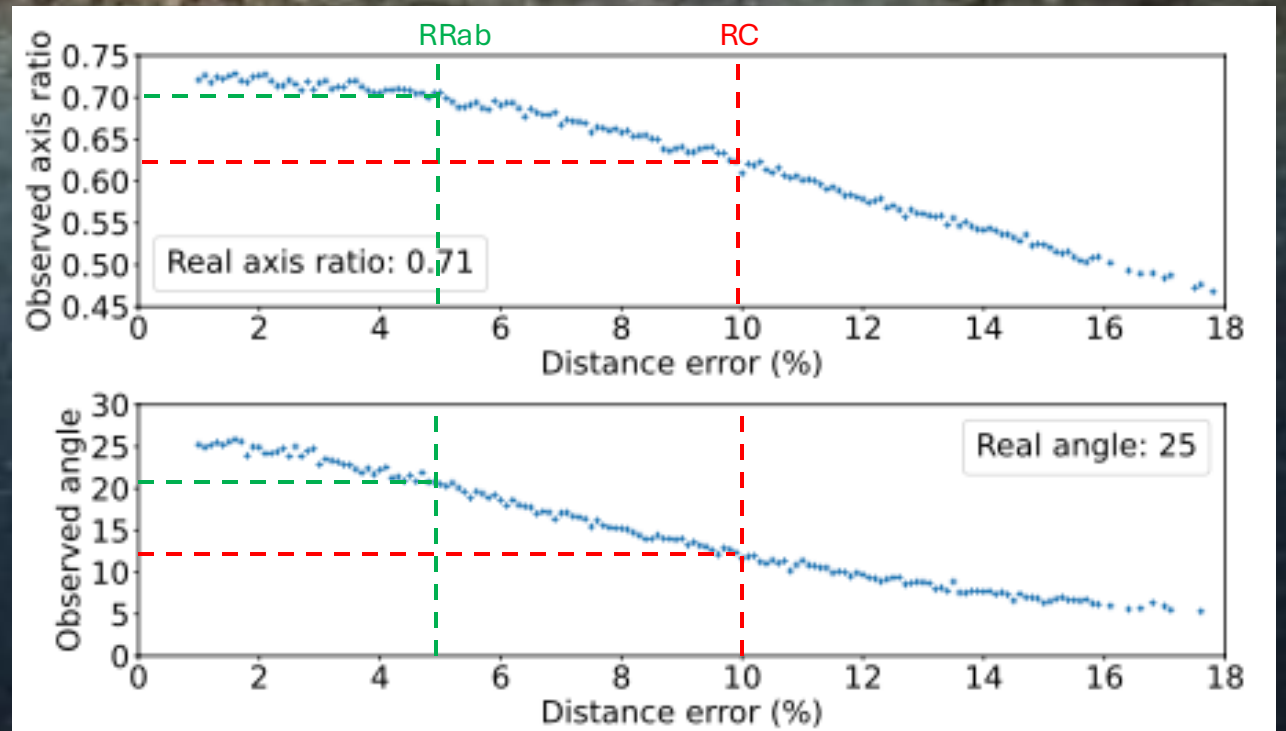
Corrected
 $\phi \sim 20^\circ$ -- $b/a \sim 0.7$ -- $e \sim 0.7$

The population of RRab in the inner region traces an elongated spheroid, which is rounder than the MW main bar, as characterized by RC, and with a slightly smaller inclination

The 3D structure of the bar from RC

SIMULATIONS: Input parameters close to typical literature values (e.g., Wegg+2013)

- **Effect introduced by the error on distances should be accounted for**
 - Observed angle is ~40% smaller
 - Observed axis ratio is ~10% smaller
- **Only m-rich RC should be considered**



THANKS

...Thank you Beatriz! Your dedication, aptitude
and work ethics have been a crucial
inspiration for many