



# Tracing Milky Way spiral arms with High-Resolution spectroscopy of Classical Cepheids



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# Classical Cepheids in less than a minute

Young

Bright

Pulsating variable

- Mass 3-13  $M_{\odot}$
- Central Helium-burning phase
- $10^3$ - $10^4 L_{\odot}$
- Periods 1.5-70 days
- Famous for the Period-Luminosity

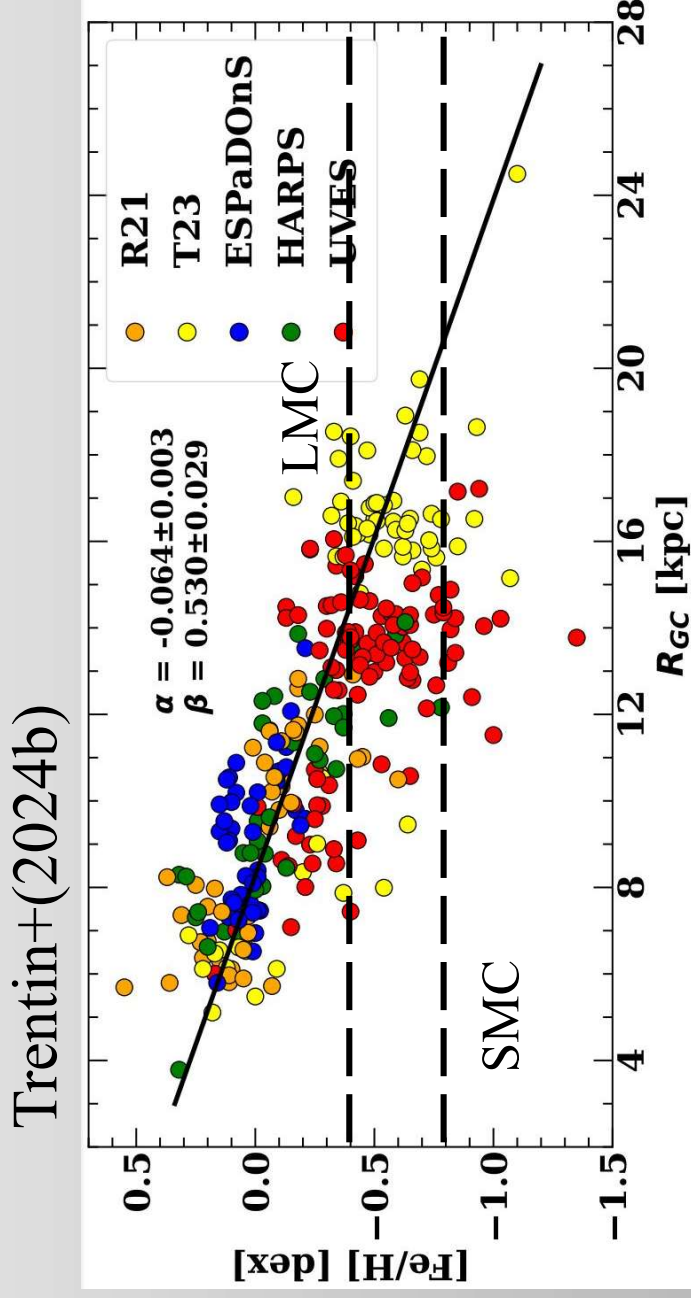
- **Total: 290 individual DCEPs analysed homogeneously, SNR ~ 80**

Published in Trentin+(2024b) (C-MetalL VI):

- 111 spectra (101 stars) with UVES@VLT (R= 47.000)
- 90 spectra ( 42 stars) with ESPaDOnS@CFHT (R= 81.000)
- 130 spectra ( 37 stars) with HARPS-N@TNG (R=115.000)

# Radial metallicity gradient.....

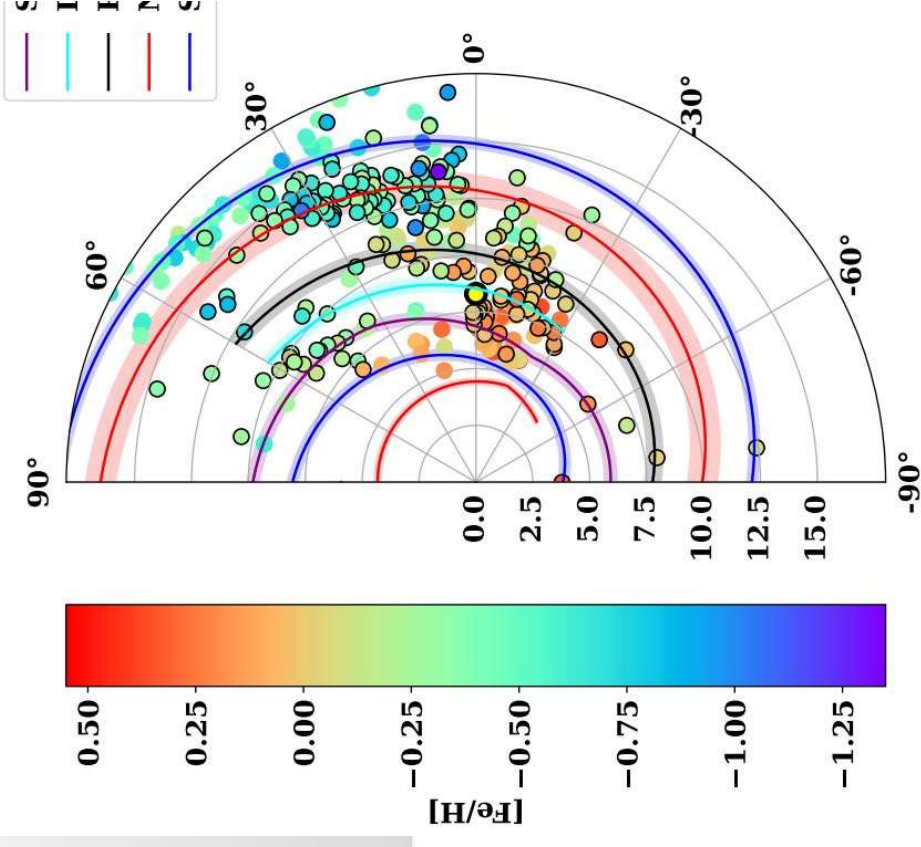
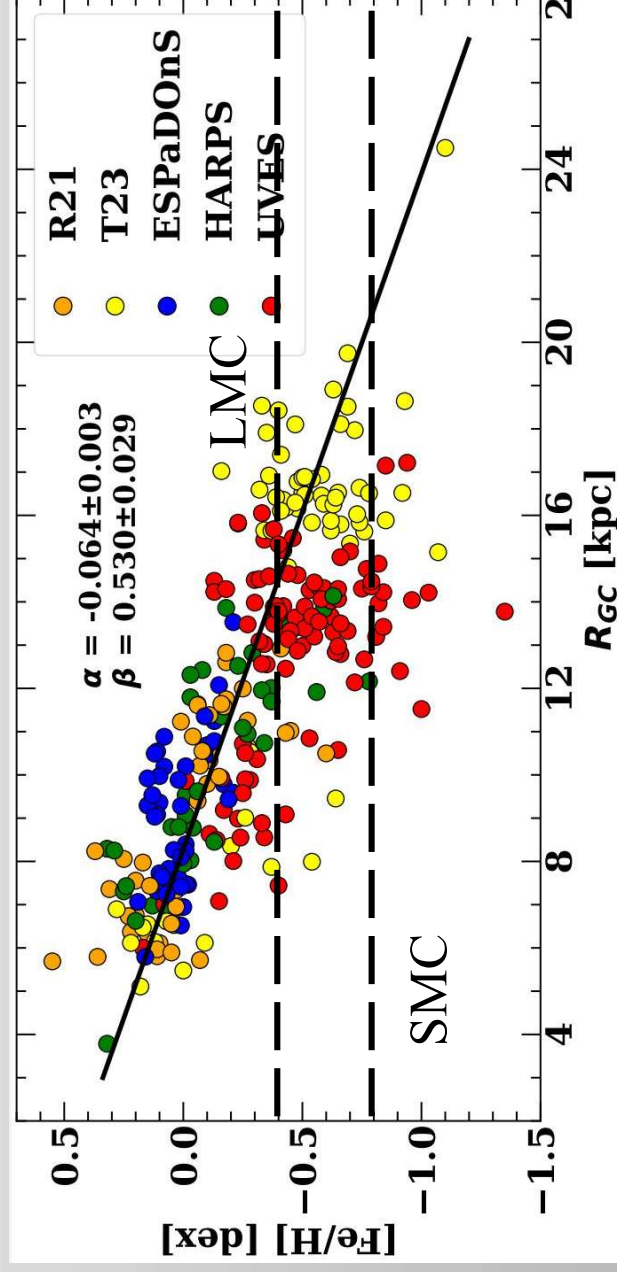
- Homogeneous and robust sample composed of HiRes metallicities
- Homogeneous distribution in both metallicities and distances



# Radial metallicity gradient...and polar distribution

- Homogeneous and robust sample composed of HiRes metallicities
- Homogeneous distribution in both metallicities and distances

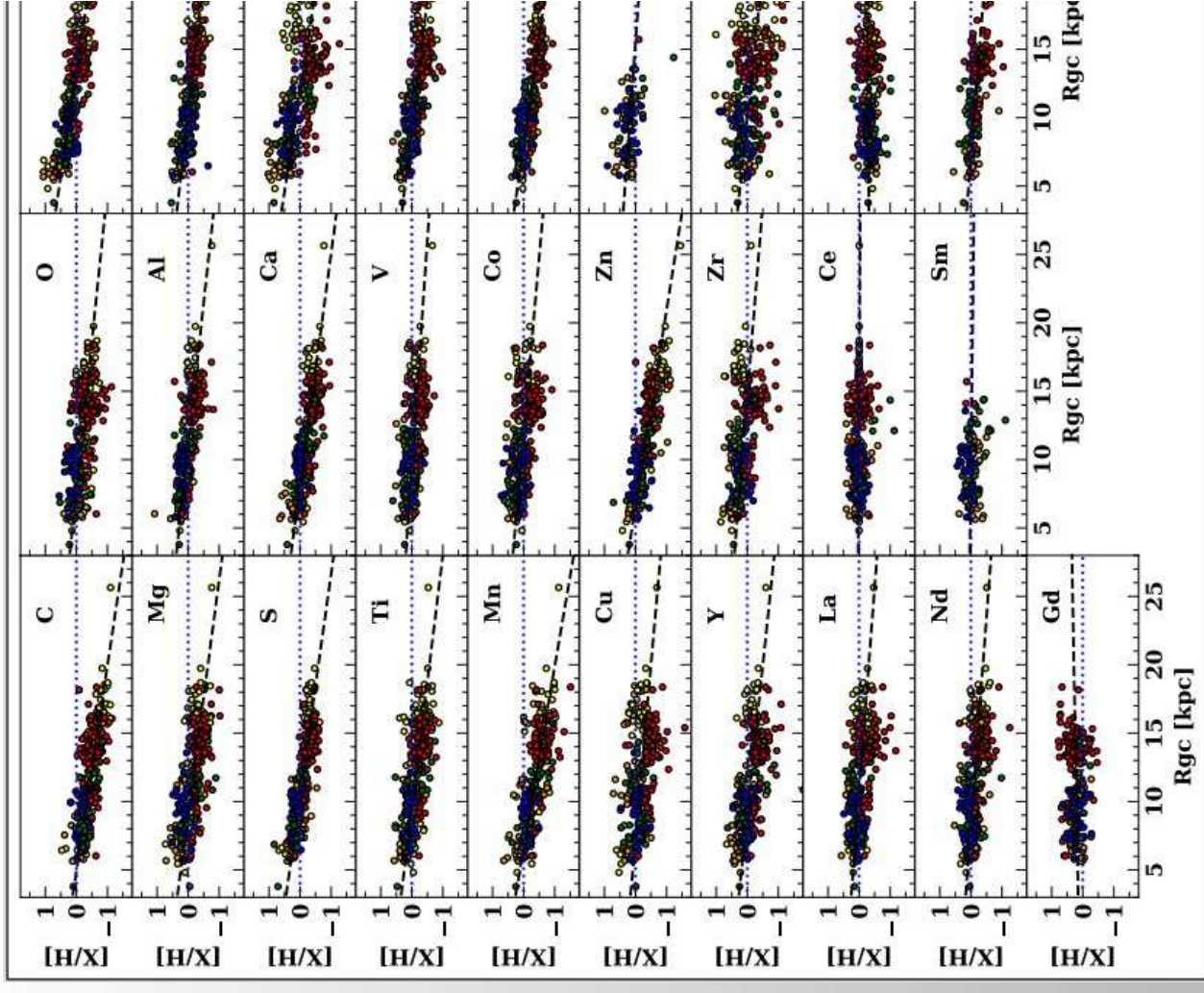
Trentin+(2024b)



Adapted from Reid+(2019)

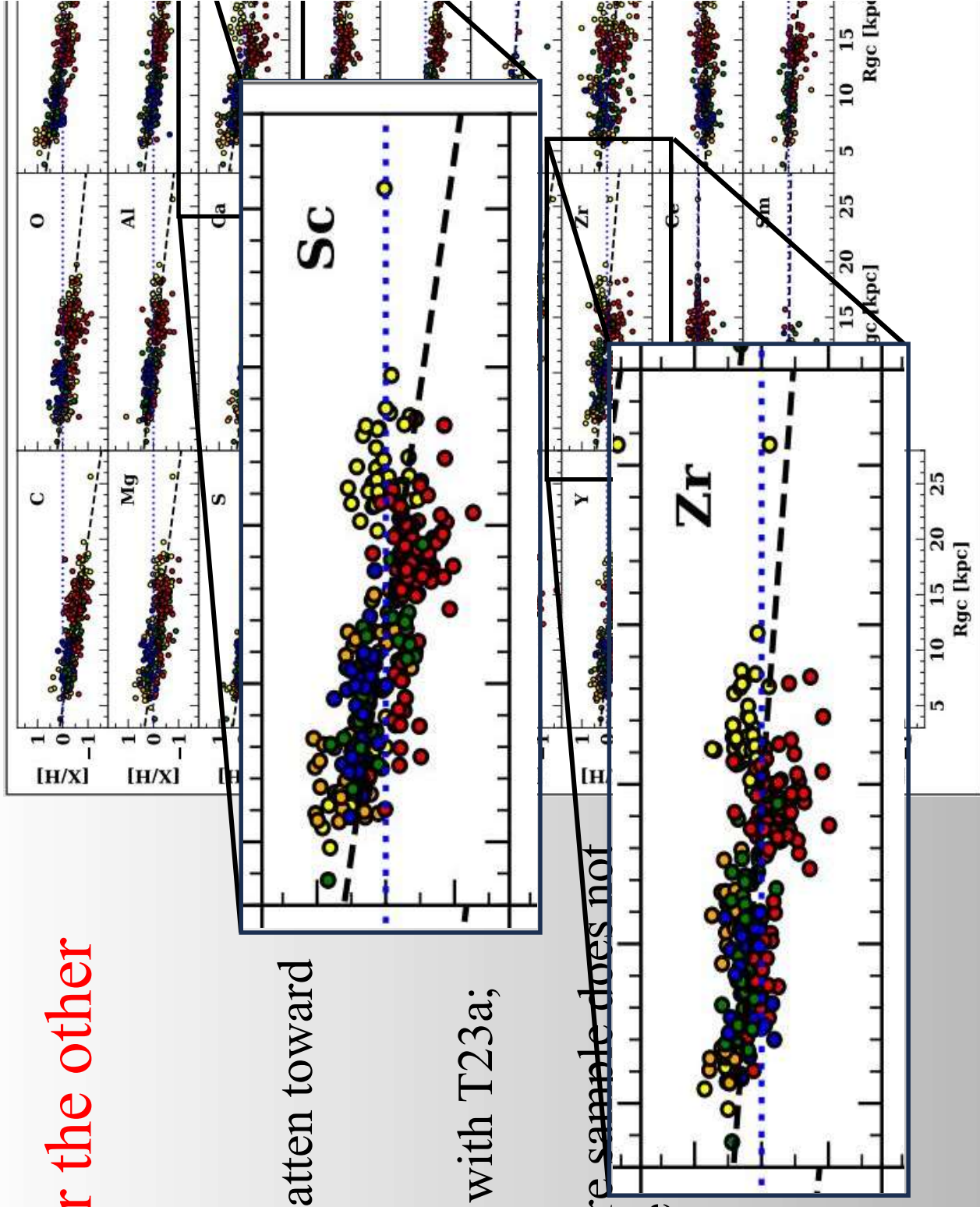
## Radial gradient for the other elements

- Gradient tends to flatten toward heavier elements;
- General agreement with T23a;
- Adding the literature sample does not change sensibly the results.



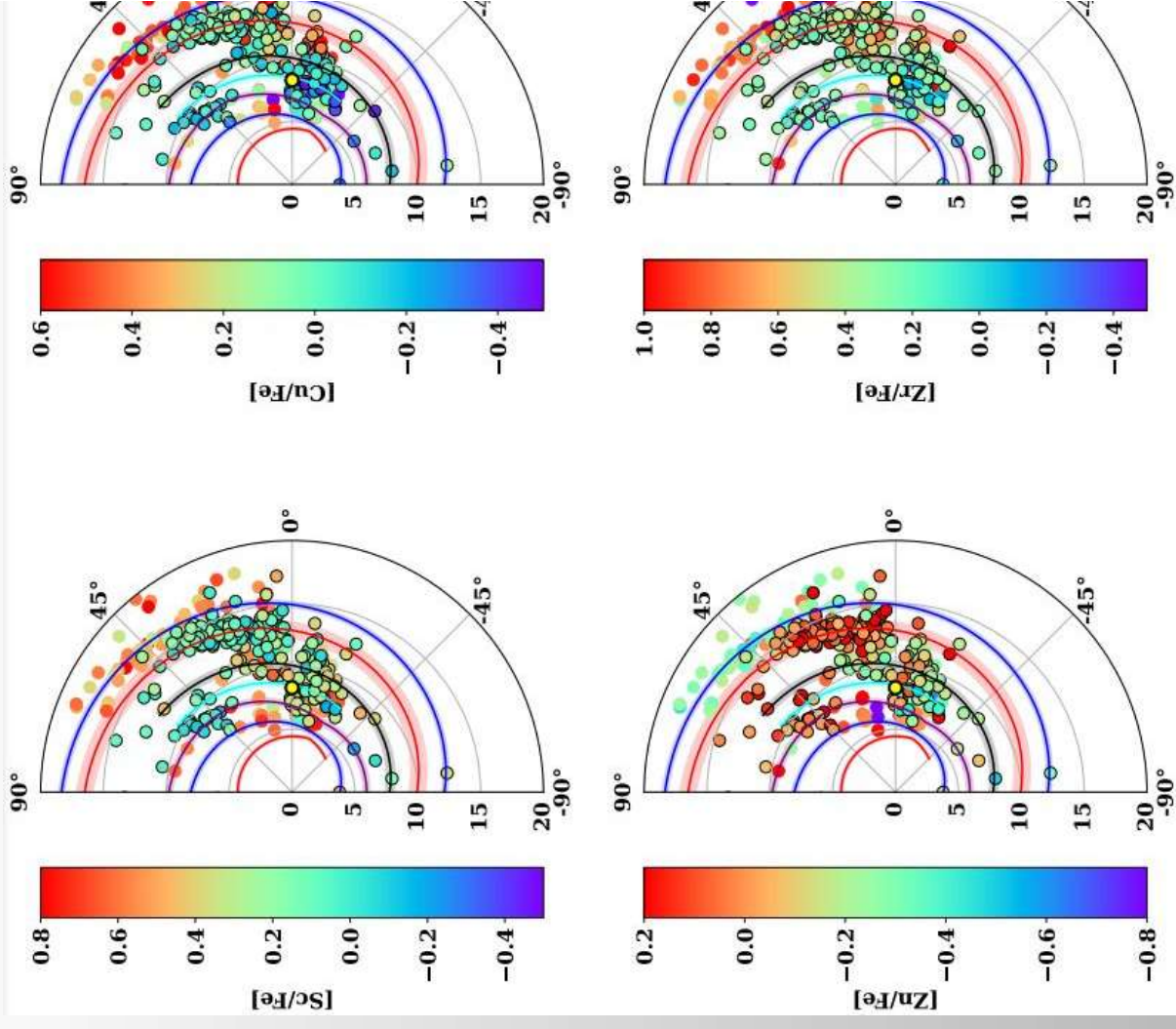
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## Polar distribution of the tricky elements

- The level of discrepancy depends on the element
- The discrepancy appears while passing from the Outer arm to the (extension of the) OSC arm
- Zn has an opposite behavior



# Conclusions

- What can Cepheids tell us about the structure of spiral arms and the recent history of the Milky Way disk?
- Is the anomalous behaviour of Sc, Cu, Zn and Zr due “the passage“ from one spiral arm to another or do they hide some hint to different production channels?
- Are there other elements that behave in a similar way?
- How are the evolutionary models going to be affected?
- How much the metallicity is involved in the calibration of the PL relation



