



CAMK Annual meeting:

Metallicity gradient with OCs

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3rd year PhD student

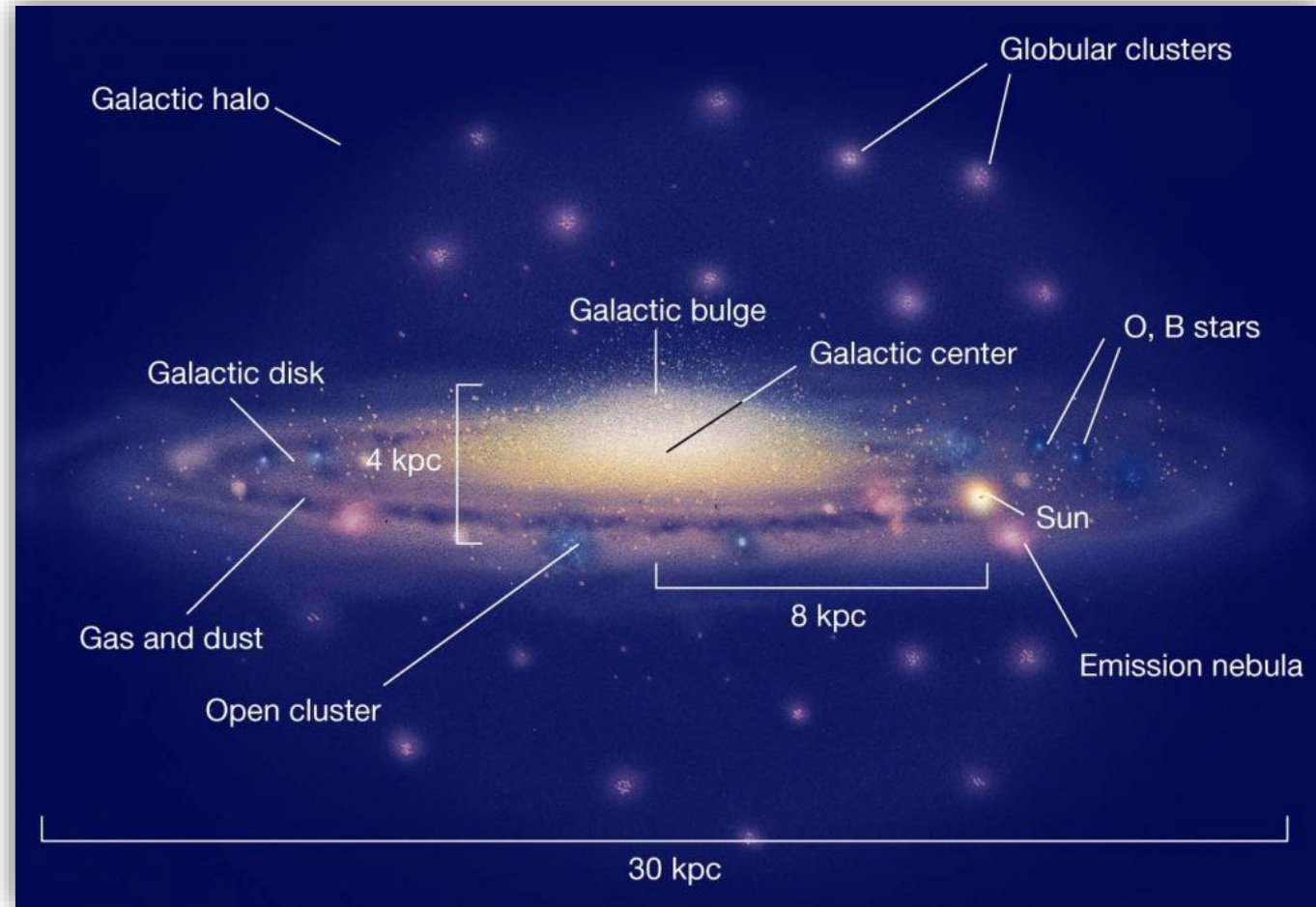
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Open Clusters (OC)

Main characteristics:

- Stars formed from **same molecular cloud**.
- Low star density.
- Found in the **thin disk**.
- Mostly young but can be old. They can have a **wide range of ages**.
- Common **age** and **composition**.

Can be used to study **stellar evolution**, **chemical evolution** of the Milky Way, **Galactic dynamics**...



Credit: Pearson Education Inc.

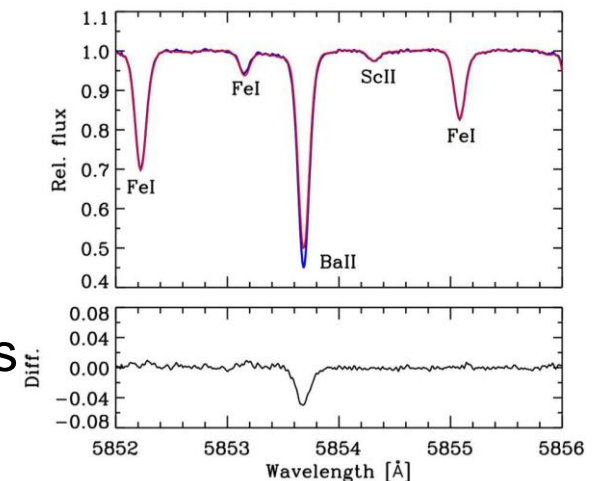
Data and analysis

- **Spectra** from the ESO Archive, observed with the **UVES instrument**.
 - Performed a **20 arcmin conesearch** in each OCs (~ 8700 spectra from ~ 300 clusters)
- **Crossmatched** observed coordinates of the spectra **with external catalogs**
 - Crossmatch with Simbad and Gaia DR3 for target identification (~ 8600 spectra correctly identified, ~ 1900 stars)
- **OCs list and stars membership** probability obtained from the **Cantat-Gaudín (2020)** catalog.
- **Spectra homogenization**. Radial velocity correction, normalization, ...

CHES (CHEMical Survey analysis System) Pipeline:

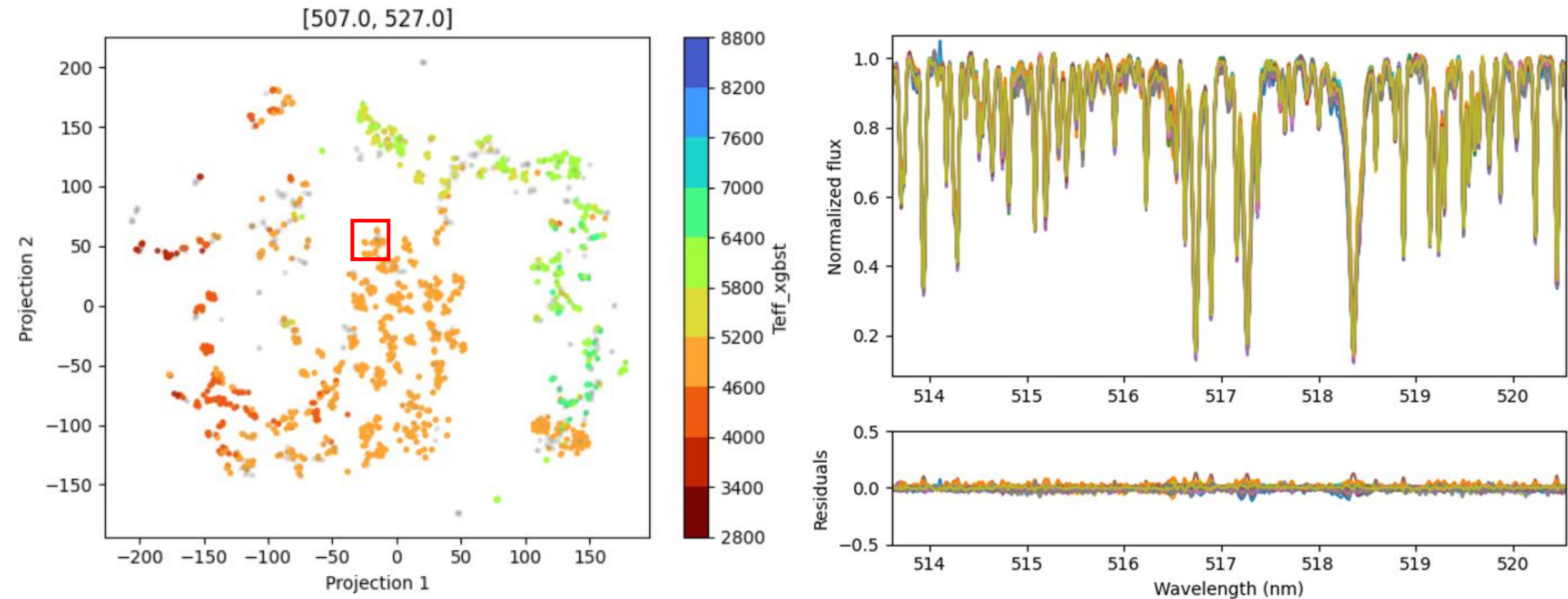
High quality chemical abundances using the **differential analysis** technique on **similar stars** in a large sample of data. This technique **removes** any possible **systematic errors**.

I focus on OCs stars, but the final goal is to provide chemical abundances of **all F,G,K stars found in the ESO ARCHIVE**.



Nissen and Gustafsson , 2018

t-SNE Map with T_{eff}



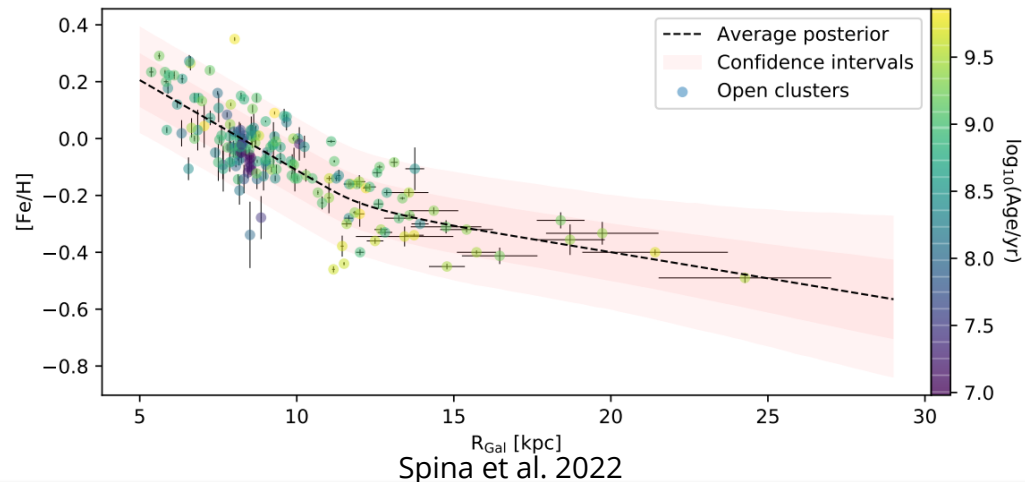
Stellar parameters from Andrae et al. 2023

Preliminary metallicity gradient

Important in the **study of the evolution and formation** of the Galaxy as it offers **observational constraints** for models of chemical evolution.

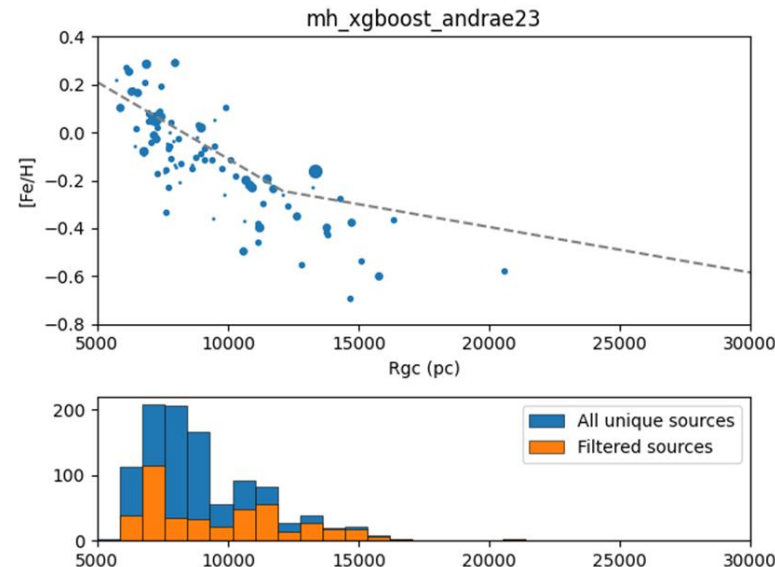
Main characteristics:

- OCs show a **change of slope** in the gradient, being flatter in the outskirts.
- OCs of different ages show us its evolution. **No strong evidence for evolution.**
- Outer regions are underrepresented.



Metallicity gradient using metallicity values obtained by Andrae et al. 2023. Using only the OCs members that we find in our sample.

- The gradient with this data seems to be **more metal poor**.
- It could be a lack of data at larger R_{gc} , **change in slope disappears**



The dashed line is the fit made by Spina, 2022

The values are the **median metallicity** of the stars with **Teff < 5000 K and log g < 3**.
With CHESS, we expect to obtain better constraints for the Galactic radial metallicity gradient.

Lectures and activities

Lectures:

- Scientist's ABC
- Selected issues of Man-Environment relations
- Introduction to Machine Learning with Python
- The Universe in X-rays
- Grant proposal workshop

Activities:

- Poster presentation in the EAS Annual Meeting 2022, in Krakow
- Poster presentation in the PTA Meeting 2023, in Torun
- XXXIV Canary Islands Winter School of Astrophysics

Other:

- Joined the Spanish Astronomical Society (SEA) as a Junior member
- Volunteering at Open Day at CAMK in the Science Festival 2023

Thank you for
your attention!