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Annual report
2026

SAGA Meeting 2026
04/02/2026

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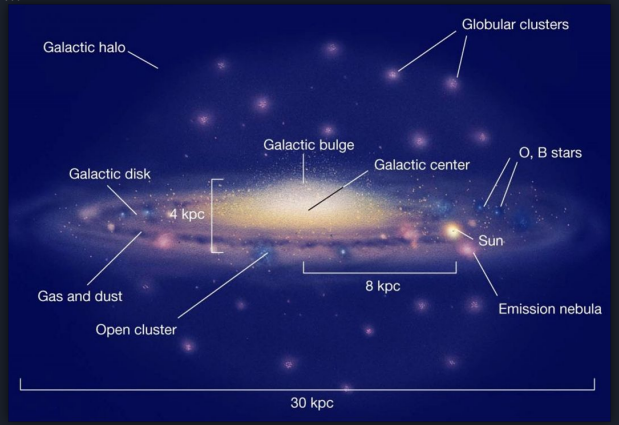
CAMK PAN

OPEN CLUSTER. Summary

Chemical abundances reflect stellar age and birthplace.

- Stars formed from the **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**.

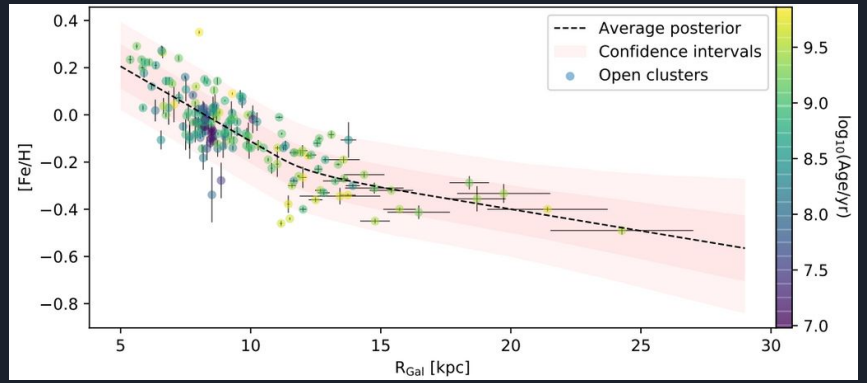
It can be used to study stellar evolution, the chemical evolution of the Milky Way...



Credit: Pearson Education Inc.

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

- **Negative radial gradient** indicates faster enrichment in the inner regions.
- OCs show a **slope change** in the gradient, being flatter in the outskirts.
- OCs of different ages **show us their evolution**.
- **Outer regions** in the galaxy are underrepresented.



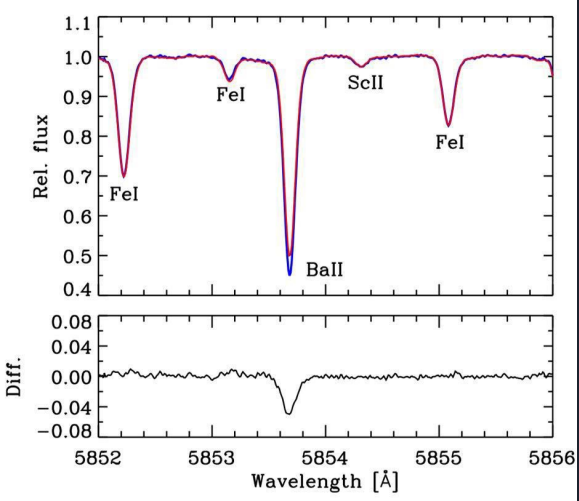
Spina et al. 2022

CHESS PIPELINE (CHEmical Survey analysis System)

The main idea is to obtain **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.**

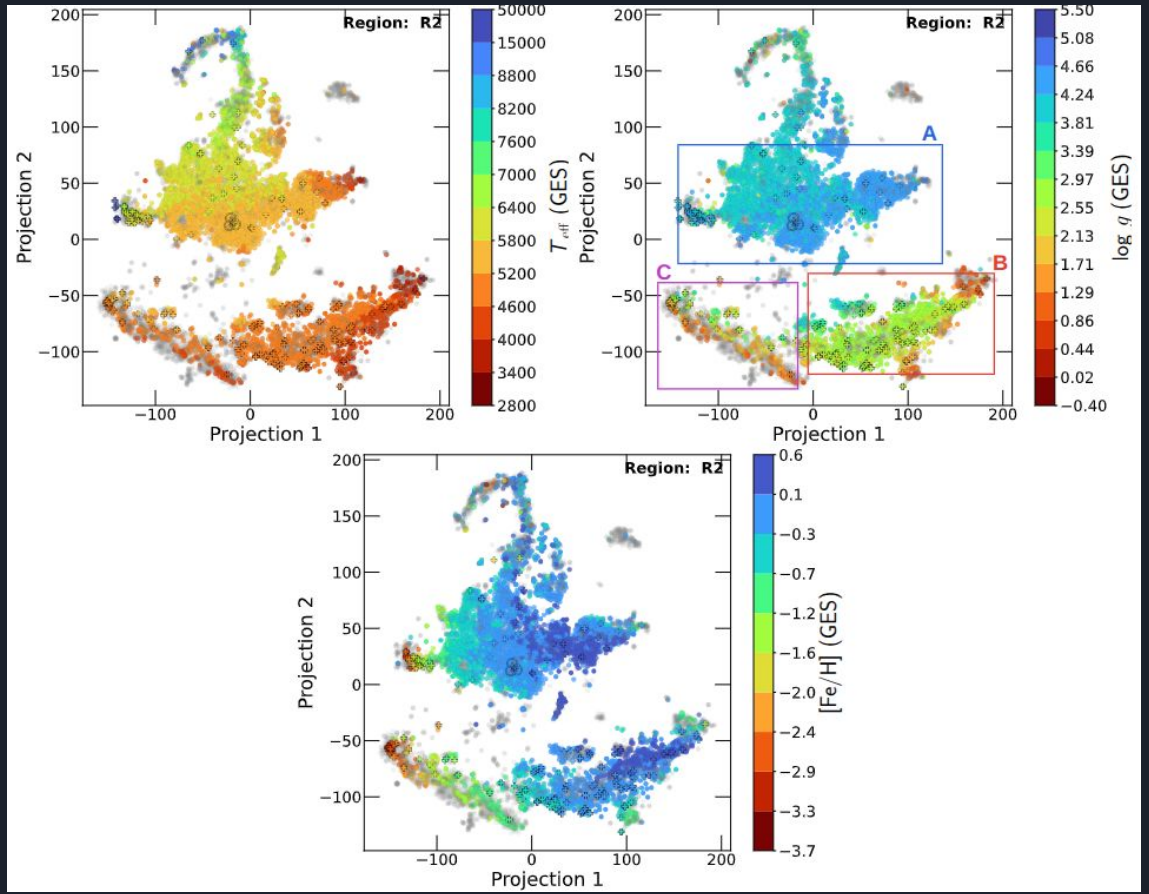
CHESS uses **high-resolution** spectra from UVES. In this work we focus on OCs stars, but the final goal is to provide chemical abundances of all **F, G, K stars found in the ESO ARCHIVE.**



Basic workflow

- Target **identification.**
- **Crossmatching** with external catalogues.
- **Homogenization** of the spectra.
- **Find similar groups of spectra** using ML techniques.
- **Perform differential analysis** with respect to 158 reference stars from the literature with accurate parameters.

SIMILARITY ANALYSIS. Projection maps



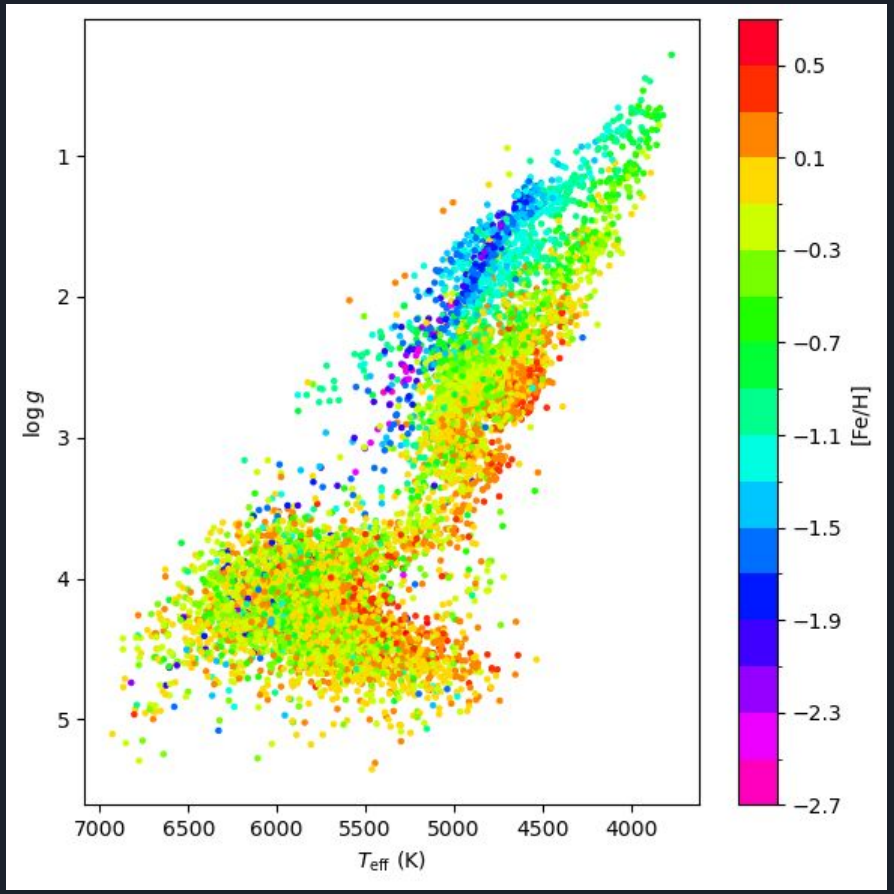
Different regions show the same patterns.

SECTIONS:

- **A.** Dwarf stars (log g > 3.0). Distributed with a temperature gradient.
- **B.** Giants with [Fe/H] > -1.0. With an apartment gradient in metallicity.
- **C.** Low metallicity giants with [Fe/H] < -1.0.

Description of the method used to find similar stars in:
J.E. Martínez-Fernández et al. 2025

RESULTS

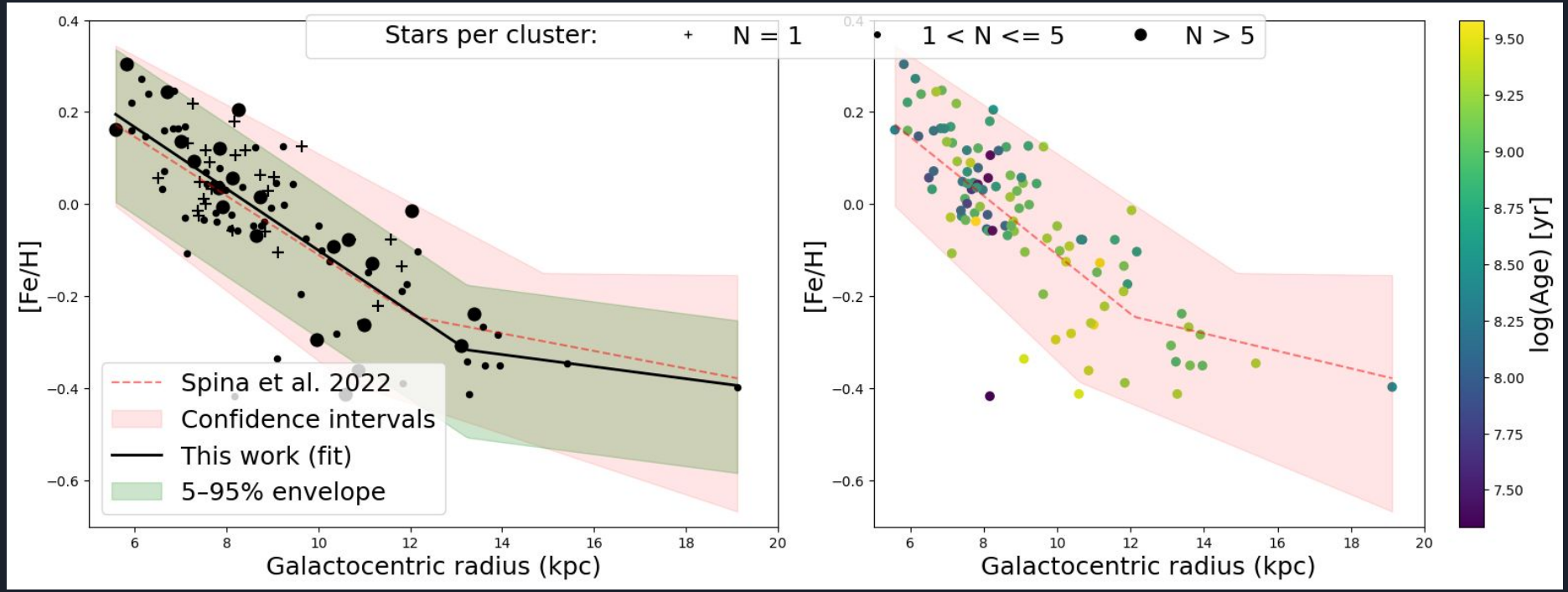


- We managed to analyze 36.883 spectra of 8.511 stars.
- For these 8.511 stars we apply bias corrections based on the reference stars
- 4912 stars could be matched to, at least, one reference and have valid results from differential analysis.

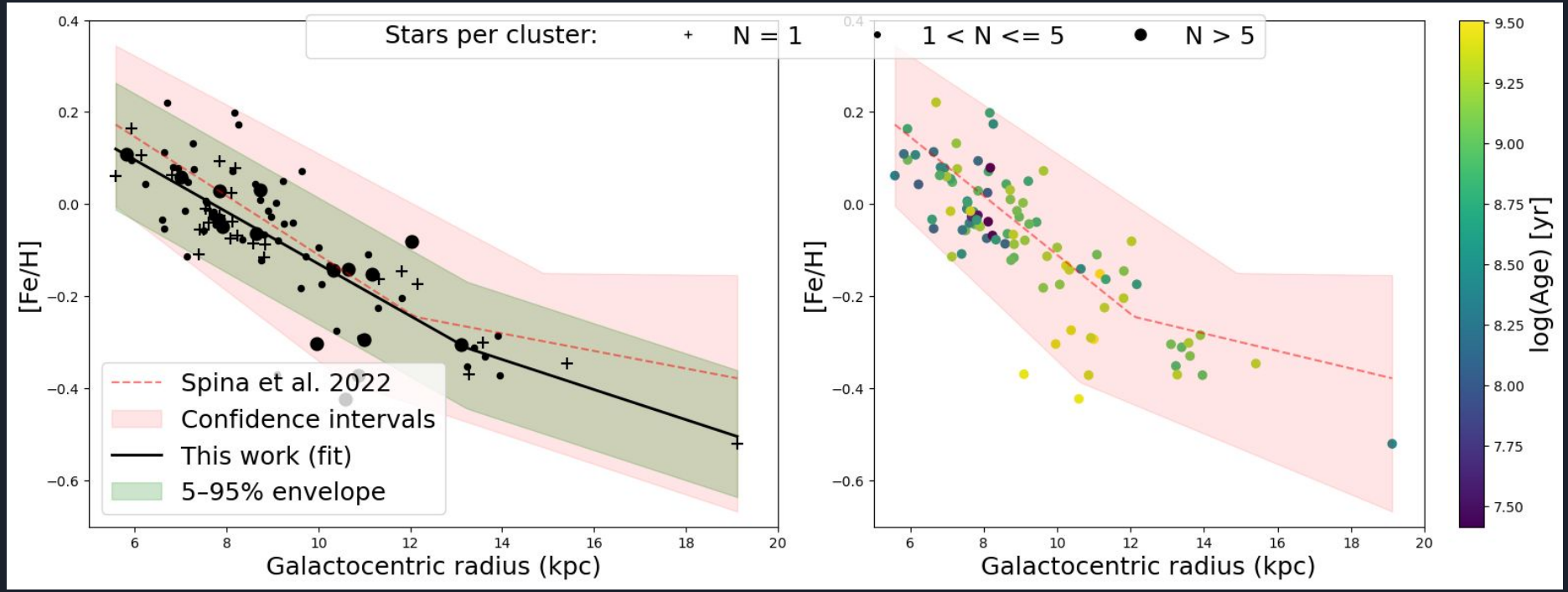
For the metallicity gradient:

- With standard Fe equilibrium, there are 416 stars members of 105 open clusters with results.
- Using differential analysis, there are 322 stars members of 95 open clusters with results.

BIAS-CORRECTED RESULTS. Metallicity gradient



DIFFERENTIAL RESULTS. Metallicity gradient



Other activities

- Published CHESS I paper in the A&A journal (J.E. Martínez-Fernández et al. 2025).
- Contributed talk at the 42nd Meeting of the Polish Astronomical Society.
- Research visit at the INAF - Osservatorio Astrofisico di Arcetri.
- Participated in two workshops:
  I-HOW JWST Hands-On Workshop
  Spectroscopic data analysis with iSpec
- Contribution to the proceedings of:
  XVI Scientific Meeting of the Spanish Astronomical Society
  42nd Meeting of the Polish Astronomical Society

THANK YOU
FOR YOUR ATTENTION!