Sulfur abundances in the Galactic bulge and disk

F. Lucertini, L. Monaco, Elisabetta Caffau, Piercarlo Bonifacio, Alessio Mucciarelli

Sulfur abundances in the Galactic bulge and disk

F. Lucertini[1,2], L. Monaco[2], E. Caffau[3], P. Bonifacio[3], A. Mucciarelli[4,5]

francesca.lucertini@eso.org
@FraLucertini

1. ESO - European Southern Observatory, Alonso de Cordova 3107, Vitacura, Santiago, Chile
2. Departamento de Ciencias Fisicas, Faculdad de Ciencias Exactas, Universidad Andres Bello, Av. Fernandez Concha 700, Las Condes, Santiago, Chile
3. GEPI, Observatoire de Paris, Université PSL, CNRS, Place Jules Janssen, 92195 Meudon, France
4. Dipartimento di Fisica e Astronomia, Università degli Studi di Bologna, Via Gobetti 93/2, 40129 Bologna, Italy
5. INAF – Osservatorio di Astrofisica e Scienza dello Spazio di Bologna, Via Gobetti 93/3, 40129 Bologna, Italy

MOTIVATION

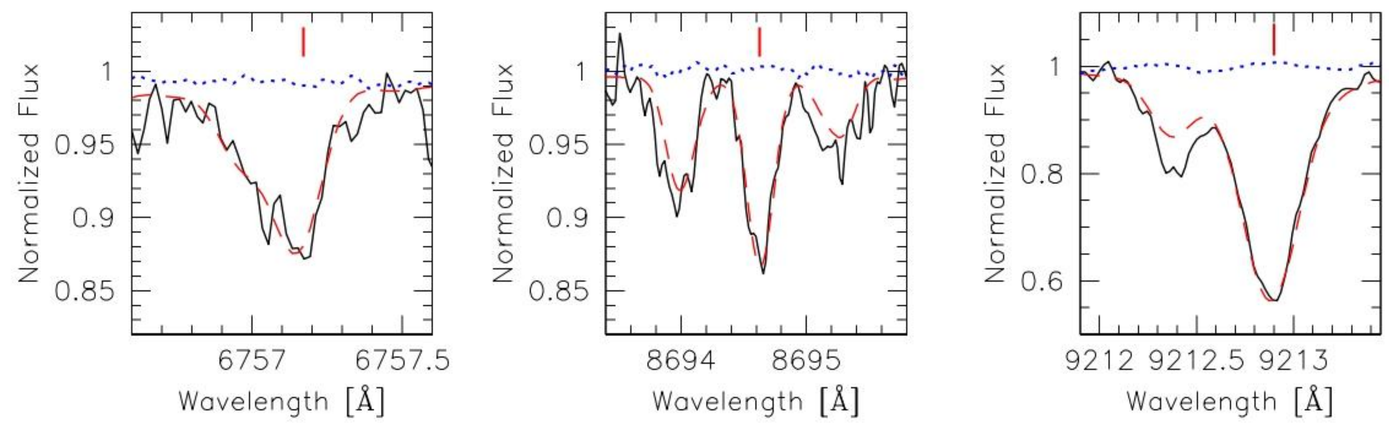
The measurement of α-element abundances provides a powerful tool for placing constraints on the chemical evolution and star formation history of galaxies. The investigation of sulfur in the Galactic bulge was recently considered for the first time (Griffith+2020). This work aims to improve our knowledge on sulfur behavior in this component of the Milky Way.

DATA

- Dwarf and sub-giant stars observed during micro-lensing events.
- FLAMES/UVES spectra of 74 Galactic bulge stars.
- FLAMES/UVES spectra of 21 thick-disk stars.
- UVES POP spectra of 30 thin-disk stars.

METHODS

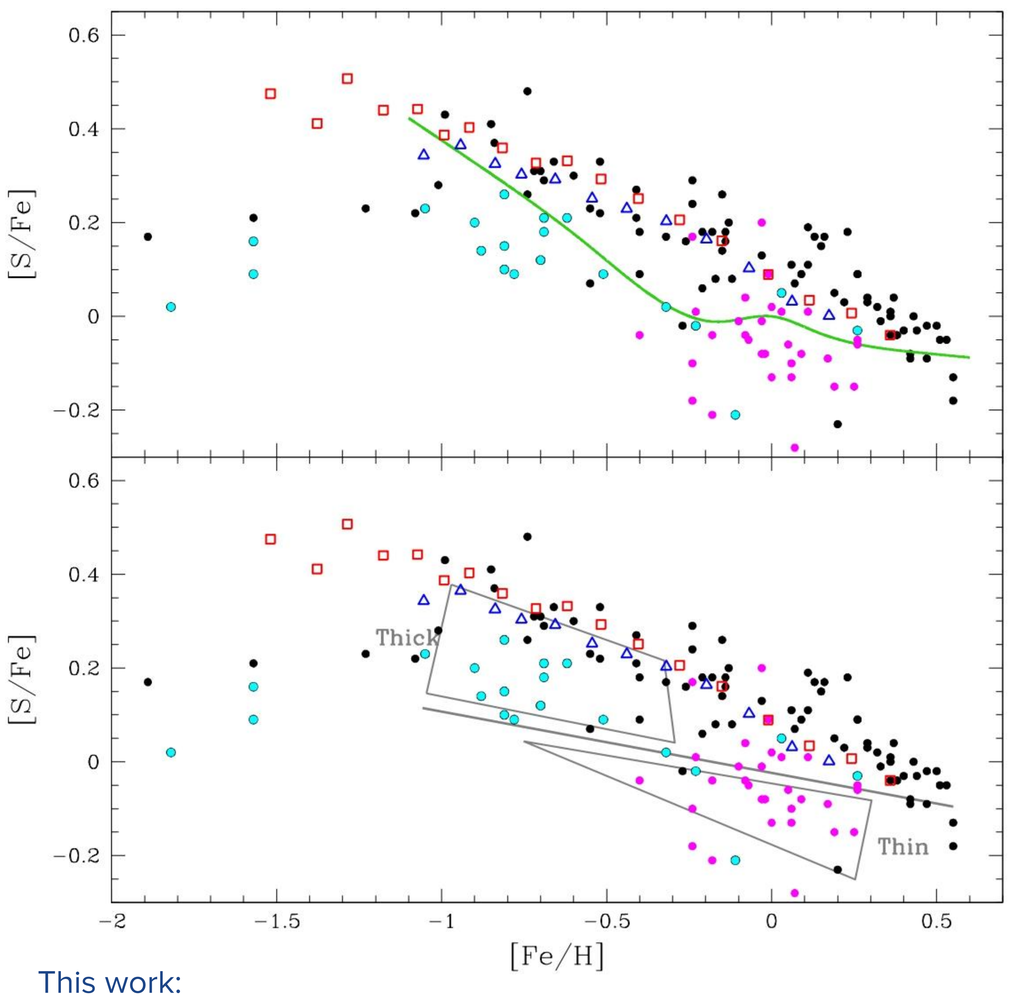
Sulfur abundances were derived from multiplets 8 (675 nm, left panel), 6 (869 nm, middle panel) and 1 (920 nm, right panel) by spectrosynthesis or line equivalent widths.



Observed spectrum of the bulge star OGLE-2014-BLG-1418
Synthetic spectrum best fit
Telluric spectrum

RESULTS

$[S/Fe]_{NLTE}$ versus [Fe/H] diagram



This work:
- Galactic bulge stars
- thick-disk stars
- thin-disk stars

Literature:
- median trend for bulge stars from Griffith+2020
- median trend for thick-disk stars from Griffith+2020
- Duffau+2017 mean trend for thick- and thin-disk stars
- Perdigon+2021

CONCLUSIONS

- Sulfur behaves like an α-element in the Galactic bulge.
- Our results for bulge, thick- and thin-disk stars are in agreement within errors with those in the literature.
- We found that the Galactic bulge is sulfur-rich with respect to both the thick- and thin-disks, supporting a more rapid formation and chemical evolution of the Galactic bulge than the disk. On the contrary, Griffith+2020 found similar sulfur behavior for the Galactic bulge and the thick-disk.

Acknowledgements.
Support for the author F.L. is provided by CONICYT-PFCHA/Doctorado Nacional año 2020-folio 21200677. E.C. and P.B. acknowledge support from the French National Research Agency (ANR) funded project “Pristine” (ANR-18- CE31-0017).

References.
Griffith, E., Weinberg, D. H., Johnson, J. A., et al. 2021, ApJ, 909, 77
Duffau, S., Caffau, E., Sbordone, L., et al. 2017, A&A, 604, A128
Perdigon, J., de Laverny, P., Recio-Blanco, A., et al. 2021, A&A 647, A162

Download the paper from the QR code