

LORENZO SPINA

School Address

School of Physics and Astronomy
Monash University
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Permanent Address

9/1 Radcliff Av
Cheltenham
VIC 3192, Australia

Stellar spectroscopist with 6 years of experience in top research institutes around the globe. Expert coder (Python, R) and machine learning enthusiast. My scientific interests include: galactic archaeology, open clusters, stars, and exoplanets.

EDUCATION

PhD, Physics and Astronomy January 2014

Università degli Studi di Firenze, Florence, Italy

Thesis: “Metal abundances of star forming regions and young clusters: towards a new paradigm with the Gaia-ESO Survey”

Supervisors: Prof F. Palla, Prof S. Randich

Master degree, Physics and Astronomy June 2010

Università degli Studi di Firenze, Florence, Italy

Thesis: “Disks and jets from T Tauri stars and brown dwarfs in the stellar formation region Chamaeleon I”

Supervisor: Prof F. Palla

Bachelor degree, Physics January 2008

Università degli Studi di Firenze, Florence, Italy

Thesis: “Characterization of a liquid crystal variable retarder (LCVR) for applications in solar polarimetry”

Supervisor: Dr M. Romoli

PROFESSIONAL EXPERIENCE

Postdoctoral fellow October 2017 — present

Monash University, Clayton, Australia

- High-precision stellar spectroscopy
- Galactic chemical evolution
- Chemically anomalous stars
- Exoplanets

Postdoctoral fellow January 2015 — October 2017

Universidade de São Paulo, São Paulo, Brazil

- High-precision stellar spectroscopy
- Galactic chemical evolution
- Chemically anomalous stars
- Exoplanets

Research fellow July 2014 — November 2014

INAF - Osservatorio Astrofisico di Arcetri, Florence, Italy

- Spectroscopic analysis
- Galactic chemical evolution
- Quality control for Gaia-ESO Survey

Research fellow

Space Telescope Science Institute, Baltimore, US

September 2009 — January 2010

- Imaging of protoplanetary disks

GRANTS

- FAPESP 2014 Post-doctorate fellowship (\$106k BLR pa). Accepted.
- FONDECYT 2014 Post-doctorate fellowship (\$24,400k CLP pa). Declined.
- XXXth IAU General Assembly Grant (\$700 EUR).

GRANTED TIME AT COMPETITIVE TELESCOPES (PI ONLY)

- HARPS @ 3.6m-La Silla (9 nights; Apr-Sep 2019)
- HARPS @ 3.6m-La Silla (7 nights; Aug-Sep 2018)
- HDS @Subaru Telescope (1 night; May 2018)
- UCLES @Anglo-Australian Telescope (3 nights; January 2018)
- HIRES @Keck (1.5 nights; December 2017)
- UVES @VLT-ESO (10 hours; Nov-Dec 2017)
- Graces @Gemini-North (7.7 hours; Nov-Dec 2016)
- UVES @VLT-ESO (11.8 hours; Nov-Dec 2015)
- Graces @Gemini-North (10.5 hours; Nov-Dec 2015)

MEMBERSHIP TO LARGE COLLABORATIONS

Gaia-ESO Survey

- Duties: scientific exploitation, spectroscopic analysis, quality control and data homogenisation.

GALAH Survey

- Duties: scientific exploitation, observations.

Stellar Population Astrophysics Survey

- Duties: scientific exploitation, observations.

TEACHING EXPERIENCE

- Lecturer, course “ASP2011 - Astronomy”, 2nd year Monash University, 2020
- Co-supervision PhD student G. Casali Monash University, 2019 — present
- Supervision of undergraduate students on short-term research project Monash University, 2019 — present
- Guest lecturer, school “From Galileo to GPS: how science shapes society” Monash University, 2019
- Guest lecturer, course “Origin of the elements”, Honorus Monash University, 2018

OUTREACH EXPERIENCE

- Honorary member of the astrophile association “AstronomiAmo” 2016 — present
- Outreach activity for after-school programs in undeveloped area Brazil, 2015 — 2017
- Outreach activity and tour guide at the Astronomical Observatory of Arcetri Italy, 2012 — 2014
- Coordinator of “Student Point”, a student organisation for scientific outreach financed by the University of Florence. Italy, 2006 — 2007

ANALYTICAL SKILLS

Statistics, Machine learning techniques, Bayesian inference, Gaussian process.

COMPUTING SKILLS

Python, R, IDL, iraf, LaTeX, html.

LANGUAGES

English (proficient), Portuguese (proficient), Spanish (basic), Italian (mother tongue).

ASTRONOMY TOOLS

All the astronomy tools are written in python and are publicly available on my GitHub page
<https://github.com/spinastro>

- **Aussieq2**. A code for the calculation of stellar ages and masses based on the isochrone method.
- **Exovis**. Given an observational strategy (i.e., number of observations over a specific range of time and RV precision ensured by the spectrograph), the code performs a Monte Carlo simulation to calculate the visibility of exoplanets as a function of $M_p \sin i$, M_{star} and period.
- **Allegro**. It is a pipeline for the fast and fully automatic reduction of HARPS spectra.

PROFESSIONAL ACTIVITIES

- Responsible for astrophysics seminar organization at the School of Physics and Astronomy, Monash University (January 2020 - present).
- Member of the Science Organisation Committee for Stars in Melbourne workshop (Melbourne - Australia, 2-4 December 2019).
- Member of the Local Organisation Committee for Precision Spectroscopy workshop (Sao Paulo - Brazil, 1-4 August 2017).
- Member of the Science Organisation Committee for Precision Spectroscopy workshop (Porto Alegre - Brazil, 19-21 September 2016).
- Member of the Local Organisation Committee for WG10-11 workshop (Florence - Italy, 12- 13 November 2014).
- Referee for Monthly Notices of the Royal Astronomical Society, Astronomy & Astrophysics and Astrophysical Journal.
- Assessor of proposals for observations at the Canary Islands telescopes (2019).
- Student representative in the regional company for student financial aid (2005 — 2009).

OBSERVING RUNS

- DEIMOS at the Keck telescope (Mauna Kea, Hawaii). Nights: 2;
- HARPS at the 3.6m telescope (La Silla, Chile). Nights: 18;
- HDS at the Subaru telescope (Mauna Kea, Hawaii). Nights: 2.
- HIRES at the Keck telescope (Mauna Kea, Hawaii). Nights: 3;
- Goodman at the SOAR Telescope (Cerro Pachon, Chile). Nights: 1;
- MUSICOS at the 1.6m Perkin-ELMER Telescope (Observatorio Pico dos Dias, Brazil). Nights: 2;
- SARG at the Telescopio Nazionale Galileo (Las Palmas, Spain). Nights: 2;
- UCLES at the Anglo-Australian Telescope (Siding Spring Observatory, Australia). Nights: 3;

PUBLICATIONS

My works have been cited 1000+ times. My *Hirsch* index (*h*-index) is 20. Source ADS, July 2020.

Refereed journal articles

1. Carleo, I.; [...] **Spina, L.**; et al., “*The multi-planet system TOI-421 – A warm Neptune and a super puffy mini-Neptune transiting a G9 V star in a visual binary*”, 2020, ApJ, in press, eprint arXiv:2004.10095
2. Casali, G.; **Spina, L.**; et al., “*The Gaia-ESO survey: the non-universality of the age-chemical-clocks-metallicity relations in the Galactic disc*”, 2020, A&A, in press
3. Liu, F.; Yong, D.; Asplund, M.; Wang, H.S.; **Spina, L.**; et al., “*Detailed chemical compositions of planet hosting stars: I. Exploration of possible planet signatures*”, 2020, MNRAS, in press, eprint arXiv:2005.09846
4. Wittenmyer, G.; [...] **Spina, L.**; et al., “*K2-HERMES II. Planet-candidate properties from K2 Campaigns 1-13*”, 2020, MNRAS, 496, 851
5. **Spina, L.**; Nordlander, T.; et al., “*How magnetic activity alters what we learn from stellar spectra*”, 2020, ApJL, 895, 52

6. Hidalgo, D.; Pallé, E.; [...] **Spina, L.**; et al., “Three planets transiting the evolved star EPIC 249893012: a hot 8.8 M_{\oplus} super-Earth and two warm 14.7 and 10.2 M_{\oplus} sub-Neptunes”, 2020, A&A, 636, 89
7. Baratella, M.; D’Orazi, V.; [...] **Spina, L.**; et al., “The Gaia-ESO Survey: a new approach to chemically characterising young open clusters”, 2020, A&A, 634, 34
8. Nagar, T.; **Spina, L.**; Karakas, I. A., “The chemical signatures of planetary engulfment events in binary systems”, 2020, ApJL, 888, L9
9. Massari, D.; Helmi, A.; Mucciarelli, A.; Sales, L. V.; **Spina, L.**; Tolstoy E., “Stellar 3-D kinematics in the Draco dwarf spheroidal galaxy”, 2020, A&A, 633, 36
10. Kos, J.; Bland-Hawthorn, J.; Asplund, M.; [...] **Spina, L.**, “Discovery of a 21 Myr old stellar population in the Orion complex”, 2019, A&A, 631, 166
11. Yana Galarza, J.; Meléndez, J.; [...] **Spina, L.**; Haywood R.; Gandolfi D., “The effect of stellar activity on the spectroscopic stellar parameters of the young solar twin HIP 36515”, 2019, MNRAS, 490, 86
12. Casali, G.; Magrini, L.; [...] **Spina, L.**; et al., “The Gaia-ESO survey: Calibrating a relationship between Age and the [C/N] abundance ratio with open clusters”, 2019, A&A, 629, 62
13. Tucci Maia, M.; Meléndez, J.; Lorenzo-Oliveira, D.; **Spina, L.**; Jofré, P., “Revisiting the 16 Cygni planet host at unprecedented precision and exploring automated tools for precise abundances”, 2019, A&A, 628, 126
14. Reggiani, H.; Amarsi, A.M.; Lind, K.; [...] **Spina, L.**; Meléndez, J., “Non-LTE analysis of K I in late-type stars”, 2019, A&A, 627, A177
15. Lorenzo-Oliveira, D.; Meléndez, J.; Yana Galarza, J.; Ponte, G.; dos Santos, L.; **Spina, L.**; et al., “Constraining the evolution of stellar rotation using solar twins”, 2019, MNRAS, 485, L68
16. Carlos, M.; Meléndez, J.; **Spina, L.**; et al., “The Li-age correlation: the Sun is unusually Li deficient for its age”, 2019, MNRAS, 485, 4052
17. Botelho, R. B.; Milone, A. de C.; Meléndez, J.; Bedell, M.; **Spina, L.**; et al., “Thorium in solar twins: implications for habitability in rocky planets”, 2019, MNRAS, 482, 1690
18. **Spina, L.**; Meléndez, J.; et al., “Chemical Inhomogeneities in the Pleiades: Signatures of Rocky-forming Material in Stellar Atmospheres”, 2018, ApJ, 863, 179
19. Bedell, M.; Bean, J. L.; Meléndez, J.; **Spina, L.**; et al., “The Chemical Homogeneity of Sun-like Stars in the Solar Neighborhood”, 2018, ApJ, 865, 68
20. Lorenzo-Oliveira, D.; Freitas, F. C.; Meléndez, J.; [...] **Spina, L.**; et al., “The Solar Twin Planet Search: The age - chromospheric activity relation”, 2018, A&A, 619, 73
21. Manara, C. F.; Prusti, T.; [...] **Spina, L.**, “Gaia DR2 view of the Lupus V-VI clouds: the candidate diskless young stellar objects are mainly background contaminants”, 2018, A&A, 615L, 1
22. Magrini, L.; **Spina, L.**; Randich, S.; et al., “The Gaia-ESO Survey: the origin and evolution of s-process elements”, 2018, A&A, 617, 106
23. Bravi, L.; Zari, E.; Sacco, G. G.; Randich, S.; [...] **Spina, L.**; et al., “The Gaia-ESO Survey: kinematical and dynamical study of four young open clusters”, 2018, A&A, 615, 37
24. **Spina, L.**; Meléndez, J.; Karakas, A.; et al., “The temporal evolution of neutron-capture elements in the Galactic discs”, 2018, MNRAS, 474, 2580
25. dos Santos, L. A.; Meléndez, J.; Bedell, M.; Bean, J. L.; **Spina, L.**; et al., “Spectroscopic binaries in the Solar Twin Planet Search program: from substellar-mass to M dwarf companions”, 2017, MNRAS, 472, 3425
26. Duffau, S.; Caffau, E.; Sbordone, L.; [...] **Spina, L.**; et al., “The Gaia-ESO Survey: Galactic evolution of sulphur and zinc”, 2017, A&A, 604, 128
27. Magrini, L.; Randich, S.; Kordopatis, G.; [...] **Spina, L.**; et al., “The Gaia-ESO Survey: radial distribution of abundances in the Galactic disc from open clusters and young-field stars”, 2017, A&A, 603, 2

28. **Spina, L.**; Randich, S.; Magrini, L.; et al., “*The Gaia-ESO Survey: the present-day radial metallicity distribution of the Galactic disc probed by pre-main-sequence clusters*”, 2017, A&A, 601, 70
29. Sacco, G. G.; **Spina, L.**; Randich, S.; Palla, F.; et al., “*The Gaia-ESO Survey: Structural and dynamical properties of the young cluster Chamaeleon I*”, 2017, A&A, 601, 97
30. Meléndez, J.; Bedell, M.; Bean, J. L.; Ramírez, I.; Asplund, M.; Dreizler, S.; Yan H. L.; Shi J. R.; Lind K.; Ferraz-Mello S.; Galarza J. Y.; dos Santos L.; **Spina, L.**; Tucci Maia, M.; Alves Brito, A.; Monroe, T. W.; & Casagrande, L. “*The Solar Twin Planet Search. V. Close-in, low-mass planets candidates and evidence of planet accretion in the solar twin HIP 68468*”, 2016, A&A, 597, 34
31. **Spina, L.**; Meléndez, J.; Karakas, A. I.; Ramírez, I.; Monroe, T. R.; Asplund, M.; & Yong, D., “*The nucleosynthetic history of elements in the Galactic disk: $[X/Fe]$ - age relations from high-precision spectroscopy*”, 2016, A&A, 593, 125
32. dos Santos, L. A.; Meléndez, J.; do Nascimento, J. D.; Bedell, M.; Ramírez, I.; Bean, J. L.; Asplund, M.; **Spina, L.**; Dreizler, S.; Alves-Brito, A.; & Casagrande, L., “*The Solar Twin Planet Search. IV. The Sun as a typical rotator and evidence for a new rotational braking law for Sun-like stars*”, 2016, A&A, 592, 156
33. **Spina, L.**; Meléndez, J.; & Ramírez, I., “*Planet signatures and impact of chemical evolution of the Galactic thin-disk*”, 2016, A&A, 585, 152
34. **Spina, L.**; Palla, F.; Randich, S.; Sacco, G.; Jeffries, R.; Magrini, L.; Franciosini, E.; Meyer, M. R.; et al., “*The Gaia-ESO Survey: chemical signatures of rocky accretion in a young solar-type star*”, 2015, A&A, 582, L6
35. Bedell, M.; Meléndez, J.; Bean, J. L.; Ramírez, I.; Asplund, M.; Alves-Brito, A.; Casagrande, L.; Dreizler, S.; Monroe, T.; **Spina, L.**; & Tucci Maia, M., “*The Solar Twin Planet Search. II. A Jupiter twin around a solar twin*”, 2015, A&A, 581, 34
36. Lanzafame, A. C.; Frasca, A.; Damiani, F.; Franciosini, E.; Cottaar, M.; Sousa, S. G.; Tabernero, H. M.; Klutsch, A.; **Spina, L.**; et al., “*Gaia-ESO Survey: Analysis of pre-main sequence stellar spectra*”, 2015, A&A, 576, 80
37. Frasca, A.; Biazzo, K.; Lanzafame, A. C.; Alcal, J. M.; Brugaletta, E.; Klutsch, A.; Stelzer, B.; Sacco, G. G.; **Spina, L.**; et al., “*The Gaia-ESO Survey: Chromospheric emission, accretion properties, and rotation in γ Velorum and Chamaeleon I*”, 2015, A&A, 575, 4
38. Sacco, G. G.; Jeffries, R. D.; Randich, S.; Franciosini, E.; Jackson, R. J.; Cottaar, M.; **Spina, L.**; et al., “*The Gaia-ESO survey: Discovery of a spatially extended low-mass population in the Vela OB2 association*”, 2015, A&A, 574, L7
39. Smiljanic, R.; Korn, A.J.; Bergemann, M.; [...] **Spina, L.**; et al., “*The Gaia-ESO Survey: The analysis of high-resolution UVES spectra of FGK-type stars*”, 2014, A&A, 570, 122
40. **Spina, L.**; Randich, S.; Palla, F.; Magrini, L.; Franciosini, E.; Sacco, G.G.; Alfaro, E.; Biazzo, K.; Gonzalez Hernandez, J.I.; Montes, D.; et al., “*The Gaia-ESO Survey: metallicity of the Chamaeleon I star forming region*”, 2014, A&A, 568, 2
41. **Spina, L.**; Randich, S.; Palla, F.; Magrini, L.; Franciosini, E.; Sacco, G.G.; Alfaro, E.; Biazzo, K.; Gonzalez Hernandez, J.I.; Montes, D.; et al., “*The Gaia-ESO Survey: the first abundance determination of the pre-main-sequence cluster Gamma Velorum*”, 2014, A&A, 567, 55
42. Magrini, L.; Randich, S.; Romano, D.; Friel, E.; Bragaglia, A.; Smilyanic, R.; Jacobson, H.; Vallenari, A.; Tosi, M.; **Spina, L.**; et al., “*The Gaia-ESO Survey: abundance ratios in the inner-disk open clusters Trumpler 20, NGC 4815, NGC 6705*”, 2014, A&A, 563, 44
43. Magrini, L.; Randich, S.; Friel, E.; **Spina, L.**; Jacobson, H.; Cantat-Gaudin, T.; Donati, P.; Baglioni, R.; Maiorca, E.; Bragaglia, A.; Sordo, R.; & Vallenari, A. “*FAMA: An automatic code for stellar parameter and abundance determination*”, 2013, A&A, 558, 38
44. Robberto, M.; **Spina, L.**; Da Rio, N.; Apai, D.; Pascucci, I.; Ricci, L.; Goddi, C.; Testi, L.; Palla, F.; & Bacciotti, F. “*An HST Imaging Survey of Low-mass Stars in the Chamaeleon I Star-forming Region*”, 2012, AJ, 144, 83

Fully refereed conference proceedings

45. Adibekyan, V.; Delgado-Mena, E.; [...] **Spina, L.**, “*Sun-like stars unlike the Sun: Clues for chemical anomalies of cool stars*”, 2017, *Astronomische Nachrichten*, 338, 442

Conference proceedings

46. **Spina, L.**, “*The metal content of pre-main sequence clusters*”, 2018, *Memorie della Societa' Astronomica Italiana*, 88, 663
47. Biazzo, K.; Frasca, A.; [...] **Spina, L.**, “*Elemental abundances in star-forming regions: results in Lupus and future analysis in Orion*”, 2018, *Memorie della Societa' Astronomica Italiana*, 88, 828

TALKS AND SEMINARS

Invited conference presentations

1. “Unveiling chemical signatures of planets in solar-twin stars”, Stars in Canberra Workshop 2018, New South Wales University, Canberra (Australia), November 2018
2. “The Connection between Planets and the Stellar Chemical Composition”, Precision Spectroscopy 2017, Universidade de Sao Paulo, Sao Paulo (Brazil), August 2017
3. “On the metal content of Star Forming Regions and Young Open Clusters”, Francesco’s Legacy, Ospedale degl’Innocenti, Florence (Italy), June 2017
4. “The Gaia-Eso Survey: chemical signatures of rocky accretion in a young solar- type star”, Ciclo de Seminarios de Astrobiologia e Exoplanetas, Universidade de Sao Paulo - IAG, Sao Paulo (Brazil), June 2015
5. “Probing the chemical composition of the young populations of the Solar neighbourhood”, Young clusters in the Gaia-ESO Survey, Palermo (Italy), May 2014

Invited seminars

6. “Understanding our Galaxy: charting a path forward”, Department seminar, Observatorio Nacional (Rio de Janeiro, Brazil), July 2020
7. “Understanding our Galaxy: charting a path forward”, Department seminar, Swinburne University (Victoria, Australia), June 2020
8. “The Galactic disk that we have never observed”, Department seminar, University of Sydney (NSW, Australia), October 2019
9. “The Galactic disk that we have never observed”, Department seminar, Macquarie University (NSW, Australia), October 2019
10. “Searching for Kronos stars, the devourers of planets”, Department seminar, University of Southern Queensland (Queensland, Australia), September 2019
11. “Searching for Kronos stars, the devourers of planets”, Department seminar, Vatican Observatory, Castel Gandolfo (Italy), May 2019
12. “Rediscovering our Galaxy: Large Spectroscopic Surveys and High Precision Spectroscopy”, Department seminar, Universidade de Sao Paulo - IAG, Sao Paulo (Brazil), October 2016
13. “Tracing the recent evolution of the solar neighbourhood with stellar abundances”, Department seminar, Arcetri Astrophysical Observatory (Italy), November 2014

Talks

14. “Stellar spectroscopy and the horrors of active stars”, Stars in Melbourne 2019, Monash University, Melbourne (Australia), December 2019

15. “Are open clusters chemically homogeneous?”, Astronomical Society of Australia Meeting 2019, University of Queensland, Brisbane (Australia), July 2019
16. “Do stars swallow their planets?”, Precision Spectroscopy 2018, Universidade de São Paulo Paulo - IAG, São Paulo Paulo (Brazil), September 2018
17. “Are open clusters chemically homogeneous?”, ESO Workshop: A revolution in stellar physics with Gaia and large surveys, Warsaw (Poland), September 2018
18. “The outer disk: a distinct component in our Galaxy?”, Precision Spectroscopy 2018, Universidade de São Paulo Paulo - IAG, São Paulo Paulo (Brazil), September 2018
19. “Are open clusters chemically homogeneous?”, A revolution in stellar physics with Gaia and large surveys, Warsaw (Poland), September 2018
20. “The Temporal Evolution of Neutron-Capture Elements in the Galactic Disk”, A celebration of CEMP and Gala of GALAH, Melbourne (Australia), November 2017
21. “Probing the evolution of the Galactic disk through high-precision abundances”, Precision Spectroscopy 2016, Universidade Federal do Rio Grande do Sul, Porto Alegre (Brazil), September 2016
22. “The nucleosynthetic history of elements in the Galactic disk: $[X/Fe]$ - age relations from high-precision spectroscopy”, Cool Stars 19, Uppsala (Sweden), July 2016
23. “Exploring the galactic metallicity gradient using star forming regions and young open clusters”, Cool Stars 19, Uppsala (Sweden), July 2016
24. “Probing the chemical composition of the young stellar population in the Solar neighbourhood”, Reunião anual da Sociedade Astronômica Brasileira, Ouro Preto (Brazil), September 2015
25. Galactic chemical evolution using solar twin stars”, Planet signatures from precision spectroscopy, Universidade de São Paulo Paulo - IAG, São Paulo Paulo (Brazil), August 2015
26. “Chemical signatures of rocky accretion in a young solar-type star”, Planet signatures from precision spectroscopy, Universidade de São Paulo Paulo - IAG, São Paulo Paulo (Brazil), August 2015
27. “Probing the chemical composition of the young populations of the Solar neighbourhood”, European Week of Astronomy and Space Science, Geneva (Switzerland), July 2014
28. “L’evoluzione chimica della galassia e lo strano caso delle regioni di formazione stellare”, PhD4 Day, Florence (Italy), May 2013
29. “Elemental abundances in pre-main-sequence clusters: Gamma Velorum and Chamaeleon I”, The Gaia-ESO Survey First Science, Nice (France), April 2013
30. “Abundance determination in SFRs/Young Clusters: Rho Ophiuchi, Upper Scorpius and Centaurus-Lupus”, European Week of Astronomy and Space Science, Rome (Italy), July 2012

MEDIA EXPOSURE

- Interviewed by The New Scientist on the results published in Spina et al. (2015). [Link](#)
- Highlight by Media INAF on the results published in Spina et al. (2015). [Link](#)
- Highlight by the Arcetri Astrophysical Observatory on the results published in Spina et al. (2015). [Link](#)
- Interviewed by AstronomiAmo (an Italian association of amateur astronomers) about the chemical evolution of the Galactic disk. [Link](#)
- Interviewed by AstronomiAmo about the chemical signatures of rocky accretion found on a young solar type star. [Link](#)