Curriculum Vitae Dr Sven Buder

Academic Qualifications

07/2019 **PhD in Astronomy**, *Heidelberg University*, Max-Planck-Institute for Astronomy

09/2015 **Master of Science in Physics**, *Friedrich Schiller University Jena*

09/2013 **Bachelor of Science in Physics**, Friedrich Schiller University Jena, Germany.

Academic Employment History

10/2019–present **Research Fellow**, *Research School of Astronomy and Astrophysics (RSAA)*, The Australian National University (ANU)

07/2019–09/2019 **Post-doctoral Researcher**, *Max-Planck-Institute for Astronomy (Heidelberg)*

Professional Memberships

since 2021 Astronomical Society of Australia

External Boards / Committees / Consultancies

Chair of Junior Early Career Researcher Committee and ex officio Executive Management Committee of the Australian Research Council Centre of Excellence in All Sky Astrophysics in 3 Dimensions (ASTRO 3D)

Most Significant Work/Achievements

In astrophysics, the author order (unless alphabetically) represents relative contribution to the research and writing of an article. The first named author of a published article in the field of astronomy and astrophysics is considered as the lead investigator who contributed the most to the project. Within collaborations, it is typical to have a core team of 4-5 key members listed after the main investigator who were integral to the research. A second tier then lists the collaboration builders (researchers who contributed vitally to the survey).

1. **Buder** et al. 2021, Monthly Notices of the Royal Astronomical Society (IF:5.3, Q1:2.1), 506, 150.
   Significance: Most cited article in MNRAS of 2021 thanks to its outstanding measurement quantity and quality.
   My contribution: 60%. I was leader of the data release. I chaired the spectroscopic analysis with input from my working group, and developed all spectroscopic analysis myself, with input and advice from my team. I drafted the majority of the manuscript myself.
   121 citations (Google Scholar)

2. **Buder** et al. 2018, Monthly Notices of the Royal Astronomical Society (IF:5.3, Q1:2.1), 478, 4513
   Significance: This work introduced an innovative way to estimate an unprecedented amount of measurements to deliver a hundred times more elemental abundances than was available less than a decade ago.
   My contribution: 70% to the analysis, 80% to the manuscript. I was leader of the data release, and a major contributor for data analysis. I developed the pipeline to analyse more than 342,000 stars for the measurement of a record-breaking 23 elemental abundances in each star. My programming enabled analysis of this large data set with unprecedented speed. I wrote the vast majority of the manuscript and coordinated input from experts for specific paragraphs.
   307 citations (Google Scholar).

3. **Buder** et al. 2019, Astronomy & Astrophysics (IF:5.8, Q1: 2.1), 624, 19.
   Significance: This study helped to shift our understanding of the stellar disk of our Galaxy from a

historical one (spatially overlapping populations with inaccurate selections) to a more accurate one (chemically distinct populations).
My contribution: 90%. I performed this study myself, from the extraction of abundances from spectra and estimation of ages as well as kinematics, and their combination to create a full stellar inventory. I developed the key idea to dissect the disc populations through combinations of different properties. I drafted all text for this paper myself.
93 citations (Google Scholar).

4. **Buder** et al. 2022, Monthly Notices of the Royal Astronomical Society (IF:5.3, Q1:2.1).
Significance: Bringing together two research communities (dynamicists and spectroscopists) to study the Galactic halo (one of the least understood areas of Galactic astronomy)
My contribution: 90%. I performed this study myself. I have assessed abundance differences between different stellar samples, implemented Gaussian mixture models to identify those with patterns of accreted stars and compare the found distributions with literature results and dynamical selections. I have interpreted the found differences myself and wrote all of the manuscript.
20 citations (Google Scholar)

5. Martell, **Buder** et al. 2017, Monthly Notices of the Royal Astronomical Society (IF:5.3, Q1:2.1), 465, 3203.
Significance: This work was a proof of concept to show the international community that we have created the necessary machinery to analyse millions of spectra efficiently. The work convinced especially the time allocation committee of Australia's largest optical telescope continue to grant us hundreds of highly competitive observing nights.
My contribution: 60% to the analysis, 35% to the manuscript. I was the main spectroscopic analyst and developed the spectroscopic pipeline. I contributed both the data and the description of its analysis to the paper.
175 citations (Google Scholar)

6. Wheeler, Ness, **Buder** et al. 2020, Astrophysical Journal (IF:5.9, Q1:2.4), 898, 58.
Significance: This is the first student paper that I co-supervised.
My contribution: 15%. I introduced Adam to the spectroscopic data set of GALAH and advised on the setup of the analysis code, *The Cannon* with GALAH measurements as training input. I advised Adam on the found trends when propagating GALAH information via LAMOST spectra. I also advised him with the interpretation of the abundance trends for the different nucleosynthetic channels.
28 citations (Google Scholar).

Teaching

Lecture — The Milky Way in a galactic context, *ANU ASTR4006/8006 lecture Galaxies (2022).*, Nature of Contribution: 1.5 lectures and 1 tutor
I have completely developed the first lecture and tutorial myself. The second lecture, I have co-developed with the convener to show the students the increasing overlap between two research fields (galactic and extragalactic astronomy).

Lecture — The Milky Way, *ANU ASTR2013 lecture Foundations of Astrophysics (2021).*, Nature of Contribution: 1 lecture and 2 tutorials, SELT attached
I have developed the lecture and tutorials myself.

Tutorials — Field Trip to ANU's Siding Spring Observatory and Tutorial, *ANU ASTR2013 lecture Foundations of Astrophysics (2020).*, Nature of Contribution: 4 tutorials and co-supervision for 1 field trip (3 days)

Lecture — International School of Space Science, L'Aquila, Italy, 2019., *Nature of Contribution: 1 lecture on Spectroscopic surveys that complement space missions*
I have completely developed the lecture myself.

Service

Leading and organising

Leadership
Deputy Node Leader, *ANU's ASTRO 3D node for GALAH.*
Group Leader, *Analysis Working Group of the GALAH collaboration.*
Meeting convener, *GALAH Survey Management Group.*
Chair, *RSAA Colloquium and Speaker Selection Committees.*
Chair, *National Junior ECR committee of the ARC Centre of Excellence ASTRO 3D.*

SOC
Chair, *ASTRO 3D Science Meeting, Canberra 2021.*
Member, *ANITA Summer School, Sydney 2022.*
Member, *GALAH Science Meeting, virtual 2021.*
Member, *EWASS 2019 Special Session: Science calibrations for future European stellar spectroscopic surveys, Lyon 2019.*

Referee
A&A, ApJ, ApJS.

RSAA Committees
Colloquium Committee (since 2019)
International PhD Scholarship program (since 2019)
Working Group on on Inclusion and Diversity (since 2020)
IDEA Committee (since 2021)

Collegiality and Collaboration

Involvement in large research collaboration

- Management member in Galactic Archaeology with HERMES (Australian-led collaboration with international 60 members) since 2015
- Member in *Gaia-ESO* (European-led collaboration with 300 members) since 2015
- Member in 4MOST (European-led collaboration with 300 members) since 2019
- Member in ASTRO 3D (Australian Centre of Excellence with 300 members)

My work in the first years of my PhD provided an early indicator of my leadership skills, prompting GALAH to appoint me in 2019 to their management group as lead for the analysis working group and lead for data releases. These roles are typically reserved for more senior members.

Collaboration between RSAA and other ANU institutes

I aim to improve the communication with other research institutes and the general public. Together with Lilli Sung, I have initiated the joint RSAA+CGA seminars, bringing together researchers of both institutes more closely with the idea to nurture research collaborations.

Nurturing interdisciplinary collaboration

The Centre for Excellence ASTRO3D is already known for its interdisciplinary efforts, trying to bring together typically two collaborations at cross-collaboration meetings. At the last ASTRO 3D Annual Meeting, I saw a unique possibility to go one step further by pitching a members-guided sessions: We put out a call for all ASTRO 3D members to propose topics that are important to them but not yet included in the schedule. This way we managed to for example organise a session on Indigenous engagement in Science (which is not yet formally covered as a main project of ASTRO 3D) as well as topics that touch more than two projects.

Bringing the RSAA community together

As an active member in the RSAA community, I am routinely organising social events to bring together all members of our community:

- Discussion rounds during tea on how to make RSAA more inclusive (e.g. how to take the schedules of parents into account when planning events at RSAA)

- In-person and virtual social gatherings like game afternoons meant to introduce new members (like new students or postdocs) or better integrate them (like students who still lived abroad during the travel restrictions)

Outreach

- Radio interviews, for example with SBS News
- Q and A sessions on YouTube about GALAH and ASTRO 3D
- Media Releases on the Milky Way's vivid youth and GALAH
- Communication of scientific news on twitter for the GALAH Survey
- Outreach event hosting at Mount Stromlo Observatory

Research Supervision

since 2022 PhD Student Evans Owusu (UNSW), *Secondary supervisor.*
2019–2020 PhD Student Xu Zhang, *Visiting Scholar from CAS Beijing, 2020.*
2022 Master Student Colleen Feuerborn, *ANU's ASTR8001 Research Project.*
2022 PhB Student Lam Tran, *ANU's ASTR3005 Research Project.*
2022 PhB Student Ali Mort, *ANU's ASTR3005 Research Project.*
2021 PhB Student Luka Mijnarends, *ANU's ASTR3005 Research Project.*
2021 PhB Student Bailey Martin, *ANU's ASTR3005 Research Project.*
2021 PhB Student Anne Xie, *ANU's Advanced Study Cource Research Project.*

Invited Talks and Seminars

Invited Talks at National and International Meetings

1. 2021: ACAMAR (Australia-China) Future of Traditional Survey Science, virtual (registration fee waived).
2. 2021: GALAH Science Meeting, virtual.
3. 2021: Reference stars for all-sky surveys, virtual.
4. 2019: The Legacy of the Gaia-ESO Survey, Firenze, Italy (registration fee waived).
5. 2019: The Milky Way 2019: LAMOST and Other Leading Surveys, Yichang, China (registration and accommodation covered).
6. 2019: Lecture at International School of Space Science, L'Aquila, Italy (Full coverage of registration, flights, and accommodation).
7. 2019: Stars without Borders, Ljubljana, Slovenia (registration fee waived).
8. 2019: EWASS Special Session on Metal-poor stars in Milky Way surveys, Lyon, France.
9. 2018: Invited science talk at 13th IMPRS Summer School, Heidelberg, Germany.
10. 2018: Machine learning in Astronomy and Medicine, Lund, Sweden (Full coverage of registration, flights, and accommodation).
11. 2017: A Celebration of CEMP and Gala of GALAH, Melbourne, Australia (registration fee waived, $500 financial support for travelling).
12. 2017: Southern Cross, Sydney, Australia (registration fee waived).

Invited Seminars at National and International Institutions

1. 2022: Monash University, Melbourne, Australia (coverage of flight and accommodation).
2. 2022: Swinburne University of Technology, Melbourne, Australia (coverage of flight and accommodation).
3. 2022: University of Melbourne, Melbourne, Australia (coverage of flight and accommodation).
4. 2021: University of Bologna Asterochronometry Seminars, virtual.
5. 2021: AIP Potsdam Milky Way and Local Volume Meeting, virtual.
6. 2019: Koenigstuhl Colloquium, Heidelberg, Germany.
7. 2018: Astrophysics Seminar, Columbia University, New York City, USA (Full coverage of registration, flights, and accommodation).
8. 2018: Lund observatory institute seminar, Lund, Sweden (Full coverage of registration, flights, and accomodation).
9. 2017: SIfA institute seminar, Sydney, Australia ($500 financial support for travelling).
10. 2017: ANU's RSAA colloquium, Canberra, Australia (Fully paid as distinguished visitor).

Publications

I have published in Monthly Notices of the Royal Astronomical Society (MNRAS, IF:5.3, Q1:2.1), Astronomy & Astrophysics (A&A, IF:5.8, Q1: 2.1), The Astrophysical Journal (ApJ, IF:5.9, Q1:2.4), The Astrophysical Journal Letters (ApJL, IF:7.4, Q1:3.6), The Astrophysical Journal Supplements (ApJS, IF:8.1, Q1:3.6), The Astronomical Journal (AJ, IF:6.3, Q1:3.6), and Astronomische Nachrichten (AN, IF:0.7, Q3:0.3).

Citation numbers are produced from the SAO/NASA Astrophysics Data System (ADS), which is the most commonly used reference system in astrophysics.

1. Horta, D., Ness, M. K., Rybizki, J., et al. (2022), Neutron-capture elements record the ordered chemical evolution of the disc over time, Monthly Notices of the Royal Astronomical Society, 513, 5477, 5 citation(s).
   In this pioneering collaboration, I contributed the observational expertise to interpret the trends that were found within GALAH data. I advised the selection of trustworthy abundances and gave insight into possible reasons of unexpected abundance trends.
2. Nandakumar, G., Hayden, M. R., Sharma, S., et al. (2022), Combined APOGEE-GALAH stellar catalogues using the Cannon, Monthly Notices of the Royal Astronomical Society, 513, 232, 2 citation(s).
   I have provided the code to perform cross-matches of the APOGEE and GALAH surveys and trained Govind to perform spectroscopic cross-calibrations with *The Cannon*. I provided key insight into the peculiarities of both surveys and advised the quantification and interpretation of spatial abundance trends.
3. Mugrauer, M., Schlagenhauf, S., Buder, S., et al. (2022), Follow-up observations of the binary system γ Cep, Astronomische Nachrichten, 343, e24014, 0 citation(s).
   I performed several observations on which this analysis is based.
4. Griffith, E. J., Weinberg, D. H., Buder, S., et al. (2022), Residual Abundances in GALAH DR3: Implications for Nucleosynthesis and Identification of Unique Stellar Populations, The Astrophysical Journal, 931, 23, 4 citation(s).
   In this pioneering collaboration, I contributed the observational expertise to the group of theoretical experts. I have advised the interpretation of abundance trends, a vital contribution to this project that aims to identify peculiar, but reliable abundances. I computed synthetic spectra with predicted abundances in order to compare with best-fit and observed spectra.

5. Hughes, A. C. N., Spitler, L. R., Zucker, D. B., et al. (2022), The GALAH Survey: A New Sample of Extremely Metal-poor Stars Using a Machine-learning Classification Algorithm, The Astrophysical Journal, 930, 47, 0 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

6. Buder, S., Lind, K., Ness, M. K., et al. (2022), The GALAH Survey: chemical tagging and chrono-chemodynamics of accreted halo stars with GALAH+ DR3 and Gaia eDR3, Monthly Notices of the Royal Astronomical Society, 510, 2407, 21 citation(s).
I performed this study myself. I have assessed abundance differences between different stellar samples, implemented Gaussian mixture models to identify those with patterns of accreted stars and compare the found distributions with literature results and dynamical selections. I have interpreted the found differences myself and wrote all of the manuscript.

7. Clark, J. T., Wright, D. J., Wittenmyer, R. A., et al. (2022), The GALAH Survey: improving our understanding of confirmed and candidate planetary systems with large stellar surveys, Monthly Notices of the Royal Astronomical Society, 510, 2041, 0 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

8. Sharma, S., Hayden, M. R., Bland-Hawthorn, J., et al. (2022), The GALAH Survey: dependence of elemental abundances on age and metallicity for stars in the Galactic disc, Monthly Notices of the Royal Astronomical Society, 510, 734, 21 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

9. Zinn, J. C., Stello, D., Elsworth, Y., et al. (2022), The K2 Galactic Archaeology Program Data Release 3: Age-abundance Patterns in C1-C8 and C10-C18, The Astrophysical Journal, 926, 191, 14 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

10. Huang, Y., Yuan, H., Li, C., et al. (2022), Erratum "Milky Way Tomography with the SkyMapper Southern Survey. II. Photometric Recalibration of SMSS DR2" (2021, ApJ, 907, 68), The Astrophysical Journal, 924, 141, 0 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

11. Kos, J., Bland-Hawthorn, J., Buder, S., et al. (2021), Erratum: The GALAH survey: Chemical homogeneity of the Orion complex, Monthly Notices of the Royal Astronomical Society, 508, 4969, 0 citation(s).
I advised the setup of the spectroscopic analysis routine, which is an adjusted version of my GALAH pipeline.

12. Zwitter, T., Kos, J., Buder, S., et al. (2021), The GALAH+ survey: a new library of observed stellar spectra improves radial velocities and hints at motions within M67, Monthly Notices of the Royal Astronomical Society, 508, 4202, 5 citation(s).
I contributed the preliminary spectroscopic data and advised on the validation of found trends. I also advised on the use of specific absorption lines in order to improve the precision.

13. Buck, T., Rybizki, J., Buder, S., et al. (2021), The challenge of simultaneously matching the observed diversity of chemical abundance patterns in cosmological hydrodynamical simulations, Monthly Notices of the Royal Astronomical Society, 508, 3365, 19 citation(s).
In this pioneering study, I contributed the observational expertise to complement the theoretical expertise in the team. I also contributed the comparisons with observations and the conclusions drawn from these.

14. Zhang, X., Buder, S., Wu, Y.-Q., et al. (2021), Estimation of ages and masses via carbon and nitrogen abundances for 556 007 giants from LAMOST, Research in Astronomy and Astrophysics, 21, 216, 0 citation(s).
I advised Xu on the application of quality cuts for this study in order to estimate reliable ages and stimulated his critical thinking during the editing of the manuscript. I guided Xu through discussions of possibly significant and new trends between trends with ages. Under my tutorage, Xu performed an age-resolved study of the thin and thick disk populations and quantified the drastic change of their scale-heights with stellar age.

15. Casagrande, L., Lin, J., Rains, A. D., et al. (2021), The GALAH survey: effective temperature calibration from the InfraRed Flux Method in the Gaia system, Monthly Notices of the Royal Astronomical Society, 507, 2684, 25 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

16. Simpson, J. D., Martell, S. L., Buder, S., et al. (2021), The GALAH survey: accreted stars also inhabit the Spite plateau, Monthly Notices of the Royal Astronomical Society, 507, 43, 13 citation(s).

I contributed the preliminary spectroscopic data and advised the validation of found trends. I performed the detailed inspection of metal-poor stars and contributed the description of the data.

17. Kos, J., Bland-Hawthorn, J., Buder, S., et al. (2021), The GALAH survey: Chemical homogeneity of the Orion complex, Monthly Notices of the Royal Astronomical Society, 506, 4232, 4 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

18. Sharma, S., Hayden, M. R., Bland-Hawthorn, J., et al. (2021), Fundamental relations for the velocity dispersion of stars in the Milky Way, Monthly Notices of the Royal Astronomical Society, 506, 1761, 28 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

19. Buder, S., Sharma, S., Kos, J., et al. (2021), The GALAH+ survey: Third data release, Monthly Notices of the Royal Astronomical Society, 506, 150, 146 citation(s).
I was leader of the data release. I chaired the spectroscopic analysis with input from my working group, and developed all spectroscopic analysis myself, with input and advice from my team. I drafted the majority of the manuscript myself.

20. Martell, S. L., Simpson, J. D., Balasubramaniam, A. G., et al. (2021), The GALAH survey: a census of lithium-rich giant stars, Monthly Notices of the Royal Astronomical Society, 505, 5340, 28 citation(s).
I contributed the spectroscopic data and its description in the manuscript. I advised on its analysis in order to validate trends of the highly peculiar lithium-rich giant stars.

21. Arentsen, A., Starkenburg, E., Aguado, D. S., et al. (2021), The Pristine Inner Galaxy Survey (PIGS) III: carbon-enhanced metal-poor stars in the bulge, Monthly Notices of the Royal Astronomical Society, 505, 1239, 4 citation(s).
I performed multiple observations on which this work is based.

22. Clark, J. T., Clerté, M., Hinkel, N. R., et al. (2021), The GALAH Survey: using galactic archaeology to refine our knowledge of TESS target stars, Monthly Notices of the Royal Astronomical Society, 504, 4968, 8 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

23. Spina, L., Ting, Y.-S., De Silva, G. M., et al. (2021), The GALAH survey: tracing the Galactic disc with open clusters, Monthly Notices of the Royal Astronomical Society, 503, 3279, 39 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

24. Zucker, D. B., Simpson, J. D., Martell, S. L., et al. (2021), The GALAH Survey: No Chemical Evidence of an Extragalactic Origin for the Nyx Stream, The Astrophysical Journal, 912, L30, 4 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

25. Huang, Y., Yuan, H., Li, C., et al. (2021), Milky Way Tomography with the SkyMapper Southern Survey. II. Photometric Recalibration of SMSS DR2, The Astrophysical Journal, 907, 68, 18 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

26. Čotar, K., Zwitter, T., Traven, G., et al. (2021), The GALAH survey: characterization of emission-line stars with spectral modelling using autoencoders, Monthly Notices of the Royal Astronomical Society, 500, 4849, 5 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

27. Amarsi, A. M., Lind, K., Osorio, Y., et al. (2020), The GALAH Survey: non-LTE departure coefficients for large spectroscopic surveys, Astronomy and Astrophysics, 642, A62, 33 citation(s).
I performed the spectroscopic analysis assuming either 1D LTE or 1D non-LTE with the departure coefficients provided by the co-authors. I contributed the description of the spectroscopic analysis and advised on the interpretation of abundance trends.

28. Gao, X., Lind, K., Amarsi, A. M., et al. (2020), The GALAH survey: a new constraint on cosmological lithium and Galactic lithium evolution from warm dwarf stars, Monthly Notices of the Royal Astronomical Society, 497, L30, 15 citation(s).
I contributed the preliminary hundreds of thousands of measurements of Li abundances, that made it possible to perform this study. I contributed text on the spectroscopic analysis and advised on the reliability of certain measurement. I also performed detailed validations of individual spectra and measurements.

29. Wittenmyer, R. A., Clark, J. T., Sharma, S., et al. (2020), K2-HERMES II. Planet-candidate properties from K2 Campaigns 1-13, Monthly Notices of the Royal Astronomical Society, 496, 851, 6 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

30. Wheeler, A., Ness, M., Buder, S., et al. (2020), Abundances in the Milky Way across Five Nucleosynthetic Channels from 4 Million LAMOST Stars, The Astrophysical Journal, 898, 58, 23 citation(s).
I introduced Adam to the spectroscopic data set of GALAH and advised on the setup of the analysis code, *The Cannon* with GALAH measurements as training input. I advised Adam on the found trends when propagating GALAH information via LAMOST spectra. I also advised him with the interpretation of the abundance trends for the different nucleosynthetic channels.

31. Xiang, M.-S., Rix, H.-W., Ting, Y.-S., et al. (2020), Chemically Peculiar A and F Stars with Enhanced s-process and Iron-peak Elements: Stellar Radiative Acceleration at Work, The Astrophysical Journal, 898, 28, 8 citation(s).
I contributed to this work with my expertise on the reliability of peculiar chemical abundance patterns in spectroscopic surveys, which motivated this work.

32. Traven, G., Feltzing, S., Merle, T., et al. (2020), The GALAH survey: multiple stars and our Galaxy. I. A comprehensive method for deriving properties of FGK binary stars, Astronomy and Astrophysics, 638, A145, 23 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

33. Hayden, M. R., Bland-Hawthorn, J., Sharma, S., et al. (2020), The GALAH survey: chemodynamics of the solar neighbourhood, Monthly Notices of the Royal Astronomical Society, 493, 2952, 33 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

34. Simpson, J. D., Martell, S. L., Da Costa, G., et al. (2020), The GALAH Survey: Chemically tagging the Fimbulthul stream to the globular cluster ω Centauri, Monthly Notices of the Royal Astronomical Society, 491, 3374, 14 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

35. Lin, J., Asplund, M., Ting, Y.-S., et al. (2020), The GALAH survey: temporal chemical enrichment of the galactic disc, Monthly Notices of the Royal Astronomical Society, 491, 2043, 19 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

36. Sharma, S., Stello, D., Bland-Hawthorn, J., et al. (2019), The K2-HERMES Survey: age and metallicity of the thick disc, Monthly Notices of the Royal Astronomical Society, 490, 5335, 47 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

37. Xiang, M., Ting, Y.-S., Rix, H.-W., et al. (2019), Abundance Estimates for 16 Elements in 6 Million Stars from LAMOST DR5 Low-Resolution Spectra, The Astrophysical Journal Supplement Series, 245, 34, 93 citation(s).
I contributed expertise on training the spectroscopic algorithm of *The Payne* on measured GALAH properties. I contributed the explanation of all GALAH-related text and advised the optimisation of abundance measurements and their reliability.

38. Casey, A. R., Lattanzio, J. C., Aleti, A., et al. (2019), A Data-driven Model of Nucleosynthesis with Chemical Tagging in a Lower-dimensional Latent Space, The Astrophysical Journal, 887, 73, 8 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

39. Khanna, S., Sharma, S., Tepper-Garcia, T., et al. (2019), The GALAH survey and Gaia DR2: Linking ridges, arches, and vertical waves in the kinematics of the Milky Way, Monthly Notices of the Royal Astronomical Society, 489, 4962, 54 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

40. Kos, J., Bland-Hawthorn, J., Asplund, M., et al. (2019), Discovery of a 21 Myr old stellar population in the Orion complex$\star$, Astronomy and Astrophysics, 631, A166, 21 citation(s).
I was co-investigator on the observing proposal, performed several observations, and advised on the membership classification.

41. Čotar, K., Zwitter, T., Traven, G., et al. (2019), The GALAH survey: unresolved triple Sun-like stars discovered by the Gaia mission, Monthly Notices of the Royal Astronomical Society, 487, 2474, 4 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

42. Bland-Hawthorn, J., Sharma, S., Tepper-Garcia, T., et al. (2019), The GALAH survey and Gaia DR2: dissecting the stellar disc's phase space by age, action, chemistry, and location, Monthly Notices of the Royal Astronomical Society, 486, 1167, 129 citation(s).

I contributed the preliminary spectroscopic data for this data and was a major contributor in terms of advice on the interpretation of GALAH data in combination with ages.

43. Žerjal, M., Ireland, M. J., Nordlander, T., et al. (2019), The GALAH Survey: lithium-strong KM dwarfs, Monthly Notices of the Royal Astronomical Society, 484, 4591, 12 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

44. Buder, S., Lind, K., Ness, M. K., et al. (2019), The GALAH survey: An abundance, age, and kinematic inventory of the solar neighbourhood made with TGAS, Astronomy and Astrophysics, 624, A19, 83 citation(s).
I performed this study myself, from the extraction of abundances from spectra and estimation of ages as well as kinematics, and their combination to create a full stellar inventory. I developed the key idea to dissect the disc populations through combinations of different properties. I drafted all text for this paper myself.

45. Čotar, K., Zwitter, T., Kos, J., et al. (2019), The GALAH survey: a catalogue of carbon-enhanced stars and CEMP candidates, Monthly Notices of the Royal Astronomical Society, 483, 3196, 5 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

46. Simpson, J. D., Martell, S. L., Da Costa, G., et al. (2019), The GALAH survey: co-orbiting stars and chemical tagging, Monthly Notices of the Royal Astronomical Society, 482, 5302, 15 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

47. Khanna, S., Sharma, S., Bland-Hawthorn, J., et al. (2019), The GALAH survey: velocity fluctuations in the Milky Way using Red Clump giants, Monthly Notices of the Royal Astronomical Society, 482, 4215, 7 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

48. Gao, X., Lind, K., Amarsi, A. M., et al. (2018), The GALAH survey: verifying abundance trends in the open cluster M67 using non-LTE modelling, Monthly Notices of the Royal Astronomical Society, 481, 2666, 38 citation(s).
I have provided the analysis pipeline and helped to adjust it to handle spectra of the HERMES spectrograph in the higher resolution mode (50k instead of 28k). I contributed to all steps of the spectroscopic analysis and contributed parts of the manuscript.

49. Zwitter, T., Kos, J., Chiavassa, A., et al. (2018), The GALAH survey: accurate radial velocities and library of observed stellar template spectra, Monthly Notices of the Royal Astronomical Society, 481, 645, 25 citation(s).
I contributed the preliminary spectroscopic data and advised on the selection of parameter ranges for the creation stellar templates.

50. Kos, J., Bland-Hawthorn, J., Betters, C. H., et al. (2018), Holistic spectroscopy: complete reconstruction of a wide-field, multiobject spectroscopic image using a photonic comb, Monthly Notices of the Royal Astronomical Society, 480, 5475, 10 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

51. Kos, J., de Silva, G., Buder, S., et al. (2018), The GALAH survey and Gaia DR2: (non-)existence of five sparse high-latitude open clusters, Monthly Notices of the Royal Astronomical Society, 480, 5242, 24 citation(s).
I contributed the preliminary spectroscopic data and aided the setup of the membership estimation.

52. Buder, S., Asplund, M., Duong, L., et al. (2018), The GALAH Survey: second data release, Monthly Notices of the Royal Astronomical Society, 478, 4513, 242 citation(s).
I was leader of the data release, and a major contributor for data analysis. I developed the pipeline to analyse more than 342,000 stars for the measurement of a record-breaking 23 elemental abundances in each star. My programming enabled analysis of this large data set with unprecedented speed. I wrote the vast majority of the manuscript and coordinated input from experts for specific paragraphs.

53. Quillen, A. C., De Silva, G., Sharma, S., et al. (2018), The GALAH survey: stellar streams and how stellar velocity distributions vary with Galactic longitude, hemisphere, and metallicity, Monthly Notices of the Royal Astronomical Society, 478, 228, 29 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

54. Duong, L., Freeman, K. C., Asplund, M., et al. (2018), The GALAH survey: properties of the Galactic disc(s) in the solar neighbourhood, Monthly Notices of the Royal Astronomical Society, 476, 5216, 33 citation(s).
I contributed to this work as builder of the GALAH survey and gave feedback on the manuscript.

55. Kos, J., Bland-Hawthorn, J., Freeman, K., et al. (2018), The GALAH survey: chemical tagging of star clusters and new members in the Pleiades, Monthly Notices of the Royal Astronomical Society, 473, 4612, 31 citation(s).

I provided the spectroscopic data for this project. Chemical tagging could only be performed based on my abundance measurements and my expertise on their reliability. I contributed the description of this analysis in the manuscript.

56. Wittenmyer, R. A., Sharma, S., Stello, D., et al. (2018), The K2-HERMES Survey. I. Planet-candidate Properties from K2 Campaigns 1-3, The Astronomical Journal, 155, 84, 39 citation(s).
I was the main spectroscopic analyst and developed the spectroscopic pipeline. I contributed both the data and the description of its analysis in the paper.

57. Sharma, S., Stello, D., Buder, S., et al. (2018), The TESS-HERMES survey data release 1: high-resolution spectroscopy of the TESS southern continuous viewing zone, Monthly Notices of the Royal Astronomical Society, 473, 2004, 73 citation(s).
I was the main spectroscopic analyst and developed the spectroscopic pipeline. I contributed both the data and the description of its analysis in the paper.

58. Przybilla, N., Aschenbrenner, P., & Buder, S. (2017), Candidate exoplanet host HD 131399A: a nascent Am star, Astronomy and Astrophysics, 604, L9, 4 citation(s).
I performed the observations and reductions during an observation run at La Silla Observatory (Chile).

59. Jofré, P., Heiter, U., Worley, C. C., et al. (2017), Gaia FGK benchmark stars: opening the black box of stellar element abundance determination, Astronomy and Astrophysics, 601, A38, 42 citation(s).
I contributed to this vital study of influences on abundance measurements through my expertise on one of the six methods used for comparison. I contributed all text related to this method. I also contributed to the explanation of different influences, in particular those found between my method and others.

60. Martell, S. L., Sharma, S., Buder, S., et al. (2017), The GALAH survey: observational overview and Gaia DR1 companion, Monthly Notices of the Royal Astronomical Society, 465, 3203, 140 citation(s).
I was the main spectroscopic analyst and developed the spectroscopic pipeline. I contributed both the data and the description of its analysis to the paper.

61. Mugrauer, M., Buder, S., Reum, F., et al. (2017), The Großschwabhausen binary survey, Astronomische Nachrichten, 338, 61, 2 citation(s).
I performed the vast majority of measurements, reduced all data, and performed all astrometric calibrations and measurements. I contributed to the description of the relevant sections in the manuscript.

62. Fritzewski, D. J., Kitze, M., Mugrauer, M., et al. (2016), Long-term photometry of IC 348 with the Young Exoplanet Transit Initiative network, Monthly Notices of the Royal Astronomical Society, 462, 2396, 9 citation(s).
I multiple observations on which this work is based.

63. Schmidt, T. O. B., Neuhäuser, R., Briceño, C., et al. (2016), Direct Imaging discovery of a second planet candidate around the possibly transiting planet host CVSO 30, Astronomy and Astrophysics, 593, A75, 17 citation(s).
I multiple observations on which this work is based.

64. Raetz, S., Schmidt, T. O. B., Czesla, S., et al. (2016), YETI observations of the young transiting planet candidate CVSO 30 b, Monthly Notices of the Royal Astronomical Society, 460, 2834, 18 citation(s).
I multiple observations on which this work is based.

65. Ginski, C., Mugrauer, M., Seeliger, M., et al. (2016), A lucky imaging multiplicity study of exoplanet host stars - II, Monthly Notices of the Royal Astronomical Society, 457, 2173, 26 citation(s).
I performed multiple observations for this project at Calar Alto Observatory (Spain) and performed the data reduction.

66. Garai, Z., Pribulla, T., Hambálek, L., et al. (2016), Search for transiting exoplanets and variable stars in the open cluster NGC 7243, Astronomische Nachrichten, 337, 261, 9 citation(s).
I multiple observations on which this work is based.

67. Seeliger, M., Kitze, M., Errmann, R., et al. (2015), Ground-based transit observations of the HAT-P-18, HAT-P-19, HAT-P-27/WASP40 and WASP-21 systems, Monthly Notices of the Royal Astronomical Society, 451, 4060, 14 citation(s).
I multiple observations on which this work is based.

Bibliometrics

h-index **24 (ADS) and 23 (Google Scholar)**
Citations **2016 (Google Scholar) or 1889 (ADS)**
ORCID **0000-0002-4031-8553**

Other Elements of Research Practice

Technology and software development and database production

In my role as working group leader of the GALAH survey, I am coordinating and contributing the analysis of stellar spectra. In this role, I am developing significant new technologies and software. A critical part of this development is the testing and validating of software as well as the documentation. I have contributed majorly to the stand of our survey as a well documented and easy to use/access survey throughout each of its data releases. All our code and the raw data are public for everyone to use, develop further:

https://github.com/svenbuder/GALAH_DR4

https://github.com/svenbuder/GALAH_DR3

https://github.com/svenbuder/GALAH_DR2

Beyond that, I am also helping to maintain the collaboration website (https://www.galah-survey.org) and communicate with our database hosts at other institutions like the Australian DataCentral (https://docs.datacentral.org.au/galah/) or the international centre CDS which provides catalogs for the astronomical research community (https://cdsarc.cds.unistra.fr/viz-bin/cat/J/MNRAS/506/150).

Competing for Telescope Time Allocation

Competing for time to observe astronomical objects is an integral part of our research. I have been part of many successful large (50+ nights) and small proposals and contributed critically to both the initial proposals (describing observing and analysis setups as well as motivating science cases) and fast turn-around answers to referee reports:

AAT 3.9m 155 nights 2020-2021, *for GALAH Phase 2 (Co-I).*
175.5 nights since 2017-2020, *for GALAH Phase 1 (Co-I).*
54.5 nights since 2017, *for K2 follow-up spectroscopy (Co-I).*
9.5 nights 2019-2020, *for spectroscopy of young stars (Co-I).*
22 nights 2017-2019, *for spectroscopy of open clusters (Co-I).*
19 nights 2017-2018, *for TESS follow-up spectroscopy (Co-I).*
ESO 2.2m 3 nights 2016, *to follow-up globular cluster escapees (Co-I).*
CAHA 2.2m 16 nights 2013-2015, to observe exoplanet host star binaries (Co-I).

Observing

After being allocated time at telescopes, astronomers also have to spend time with the actual observations for several nights. Each night has a typical shift length of 10 to 15 hours and we spend this time in addition to our usual work time.

since 2017 **2dF-HERMES**, *Spectrograph at AAT, Siding Spring Observatory*, 13 nights.
2016 **FEROS**, *Spectrograph at ESO 2.2m telecope, La Silla Observatory*, 3 nights.
2013–2015 **AstraLux**, *Lucky-Imager, Calar Alto Observatory*, 9 nights.
2013–2015 **FLECHAS, STK, CTK-II, RTK**, *Spectrograph/Imagers, Jena*, 55 nights.