

Dr. Sven Buder

Curriculum vitae

Research Interests

- Galactic Archaeology in the Milky Way with large stellar spectroscopic surveys (currently GALAH as builder & 4MOST as member, previously also APOGEE-2 & *Gaia*-ESO as member)
- State-of-the-art analysis of stellar spectra with 1D/<3D> Non-LTE spectrum synthesis (mainly *Spectroscopy Made Easy*) & data-driven models (mainly *The Cannon* and *The Payne*)
- Milky Way population analysis in chemical, dynamical, and temporal space, focussing on the disk populations and the transition with the (accreted) halo

Education

- 2015–2019 **Ph.D. studies**, Max-Planck-Institute for Astronomy & University of Heidelberg.
[PhD Thesis](#): Spectroscopic Analysis & Chemodynamic Exploration of the Milky Way with Million-Star Surveys. Supervisors: Dr Karin Lind & Prof Dr Melissa Ness
- 2013–2015 **Master of Science in Physics**, Friedrich Schiller University Jena, Germany.
Fall 2014 **Erasmus exchange semester**, Uppsala University, Sweden.
- 2010–2013 **Bachelor of Science in Physics**, Friedrich Schiller University Jena, Germany.
2010 **Abitur**, Saxonian state gymnasium St. Afra Meißen (boarding school).

Experience

- Since 2019 **Research Fellow**, *Research School of Astronomy and Astrophysics, The Australian National University, Canberra, Australia*.
Incl. co-supervision of PhD Student Xu Zhang
- 2017 **Teaching assistant**, *University of Heidelberg, Practical physics lab (FP30) for CCD characterisation & photometric analyses of globular clusters*.
- 2013–2015 **Teaching assistant**, *Friedrich Schiller University Jena, Practical physics lab & examination of exercises for lecture Introduction to Astronomy*.
- 2010–2013 **Student assistant**, *Deutscher Bundestag Berlin*,
Parliamentary Bureau of Federal Minister Dr Thomas de Maizière (now a.D.),
Preparation & attendance of appointments, drafts of speeches & letters.

Fellowships

- 2015–2019 Fellowship of the International Max Planck Research School for Astronomy and Cosmic Physics at the University of Heidelberg.
- 2007–2010 Fellowship of the Esther & Silviu Dornier-Foundation.

Presentations

Invited talks

- 2019 The Milky Way 2019: LAMOST and Other Leading Surveys, Yichang, China.
- 2019 Stars without Borders, Ljubljana, Slovenia.
- 2019 EWASS Special Session on Metal-poor stars in Milky Way surveys, Lyon, France.
- 2018 Machine learning in Astronomy and Medicine, Lund, Sweden.
- 2017 A Celebration of CEMP and Gala of GALAH, Melbourne, Australia.
- 2017 Southern Cross, Sydney, Australia.

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Selected lectures/colloquia/seminars

- 2019 Lecture at International School of Space Science, L'Aquila, Italy.
- 2018 Lund observatory institute seminar, Lund, Sweden.
- 2017 RSAA colloquium, Canberra, Australia.
- 2017 SIFA institute seminar, Sydney, Australia.

Selected contributed talks

- 2018 The life and times of the Milky Way, Shanghai, China.
- 2017 IAUS 334: Rediscovering our Galaxy, Potsdam, Germany.
- 2017 JINA-CEE Forging Connections, East Lansing, USA.
- 2016 Galactic Archaeology and Stellar Physics, Canberra, Australia.

Skills

Organisational

SOC, *EWASS 2019 Special Section: Science calibrations for future European stellar spectroscopic surveys*, Lyon 2019.

LOC, *Chemical Evolution and Nucleosynthesis Across the Galaxy*, Heidelberg 2018, *The Metal-Poor Galaxy*, Ringberg Castle 2018, *Gaia Sprint*, Heidelberg 2017, *Spring conference of the German Physical Society*, Jena 2013.

Observational

- 2017 **2dF-HERMES**, at Siding Spring Observatory, 3.9 m, 5 nights (as Co-I).
- 2016 **FEROS**, at La Silla Observatory, 2.2 m, 3 nights (as Co-I).
- 2013–2015 **AstraLux**, at Calar Alto Observatory, 2.2 m, 9 nights (as Co-I).
- 2013–2015 **FLECHAS, STK, CTK-II, RTK**, at University Observatory Jena, 0.2–0.9 m, more than 50 nights with spectroscopy, astrometry, & photometry (as PI & Co-I).

Programming

General Python (Jupyter), IDL, Mathematica, incl. CPU and GPU parallel computing on high-performance clusters.

Spectroscopy Spectroscopy Made Easy (incl. development of pipelines), IRAF.

Language

German Mother tongue	Swedish Good (B2)	French School level (A2)
English Fluent (C2)	Norwegian Good (B1)	Latin School level (A2)

Qualifications

- 2009 Advanced emergency medical services, *Johanniter-Unfall-Hilfe e.V.*
- 2008 Moderator & mediator, *Peer Training Sachsen e.V.*

Community service

- Since 2019 **RSAA colloquium committee**.
- Since 2019 **RSAA committee for International PhD Scholarship program**.
- Since 2018 **Referee**, *The Astrophysical Journal*.
- Since 2017 **Co-founder**, *Astronomy on Tap Heidelberg*.
- 2014 **Hiring committee member**, for professor of solid state theory (W3), Uni Jena.
- 2012–2015 **Student & tuitional councils**, Faculty of Physics & Astronomy, Uni Jena.

Heidelberg, December 20, 2019

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Publications

(Co-)authored 44 publications (34 refereed), including 2 first-author papers with ORCID ID [0000-0002-4031-8553](#). In total, the refereed publications have attracted 519 citations as tracked by [ADS](#).

Publications in preparation

- 2019 **Buder, S.**, et al.: The GALAH Survey: Chemodynamic decomposition of the Galaxy, A&A, see [latest draft](#).
- 2019 **Buder, S.**, et al.: The GALAH Survey: DR3, MNRAS, see [latest draft](#).

Submitted publications

- 2019 Gao, X., Lind, K., Amarsia, M. A., **Buder, S.**, et al.: Cosmological lithium preserved in the atmospheres of warm dwarf stars, Nature, submitted.
- 2018 Hayden, M., Bland-Hawthorn, J., Sharma, S., **et al.**: The GALAH Survey: Chemodynamics of the Solar Neighbourhood, MNRAS, [arXiv:1901.07565](#).
- 2018 Kos, J., Bland-Hawthorn, J., Asplund, M., **Buder, S.**, et al.: Discovery of a 21 Myr old stellar population in the Orion complex, A&A, [arXiv:1811.11762](#).
- 2018 Simpson, J. D., Stello, D., Sharma, D., **et al.**: The GALAH and TESS-HERMES surveys: high-resolution spectroscopy of luminous supergiants in the Magellanic Clouds and Bridge, MNRAS, [arXiv:1804.05900](#).

Selected peer-reviewed publications

- 2019 **Buder, S.**, Lind, K., Ness, M., Asplund, M., et al.: The GALAH survey: An abundance, age, and kinematic inventory of the solar neighbourhood made with TGAS, [A&A](#), **624**, 19.
- 2018 **Buder, S.**, Asplund, M., Duong, L. et al.: The GALAH Survey: Second Data Release, [MNRAS](#), **478**, 4513.
- 2019 Simpson, J. D., Martell, S. L., Da Costa, G., Horner, J., **et al.**: The GALAH Survey: Chemically tagging the Fimbulthul stream to the globular cluster ω Centauri, [MNRAS](#), *accepted*.
- 2019 Casey, A. R., Lattanzio, J. C., Aletti, A., Dowe, D. L., **et al.**: A Data-driven Model of Nucleosynthesis with Chemical Tagging in a Lower-dimensional Latent Space, [ApJ](#), **887**, 73.
- 2019 Lin, J., Asplund, M., Ting, Y.-S., Casagrande, L., **et al.**: The GALAH Survey: Temporal Chemical Enrichment of the Galactic Disk, [MNRAS](#), *accepted*.
- 2019 Xiang, M., Ting, Y.-S., Rix, H.-W., **et al.**: Abundance Estimates for 16 Elements in 6 Million Stars from LAMOST DR5 Low-Resolution Spectra, [ApJ](#), *accepted*, [ApJS](#), **245**, 34.
- 2019 Sharma, S., Stello, D., Bland-Hawthorn, J., Hayden, M.R., **et al.**: The K2-HERMES Survey: age and metallicity of the thick disc, [MNRAS](#), **490**, 5335.
- 2019 Khanna, S., Sharma, S., Tepper-Garcia, T., **et al.**: The GALAH survey and Gaia DR2: Linking ridges, arches and vertical waves in the kinematics of the Milky Way, [MNRAS](#), **489**, 4962.
- 2019 Čotar, K., Zwitter, T., Traven, G., **et al.**: The GALAH survey: unresolved triple Sun-like stars discovered by the Gaia mission, [MNRAS](#), **487**, 2474.
- 2019 Bland-Hawthorn, J., Sharma, S., Tepper-Garcia, T., **et al.**: The GALAH survey and Gaia DR2: dissecting the stellar disc's phase space by age, action, chemistry and location, [MNRAS](#), [MNRAS](#), **486**, 1167.
- 2019 Žerjal, M., Ireland, M. J., Nordlander, T., **et al.**: The GALAH Survey: Lithium-strong KM dwarfs, [MNRAS](#), [MNRAS](#), **484**, 4591.

- 2019 Simpson, J. D., Martell, S. L., Da Costa, G., **et al.**: The GALAH survey: Co-orbiting stars and chemical tagging, [MNRAS](#), **482**, 5302.
- 2019 Khanna, S., Sharma, S. Bland-Hawthorn, J., **et al.**: The GALAH Survey: Velocity fluctuations in the Milky Way using red clump giants, [MNRAS](#), **482**, 4215.
- 2018 Gao, X., Lind, K., Amarsi, A. M., **Buder, S.**, et al.: The GALAH Survey: Verifying abundance trends in the open cluster M67 using non-LTE spectroscopy, [MNRAS](#), **481**, 2666.
- 2018 Zwitter, T., Kos, J., Chiavassa, A., **Buder, S.**, et al.: The GALAH Survey: Accurate Radial Velocities and Library of Observed Stellar Template Spectra, [MNRAS](#), **481**, 645.
- 2018 Kos, J., Bland-Hawthorn, J. Betters, C. H., **et al.**: Holistic spectroscopy: Complete reconstruction of a wide-field, multi-object spectroscopic image using a photonic comb, [MNRAS](#), **480**, 5475.
- 2018 Kos, J., de Silva, G., **Buder, S.**, et al.: The GALAH Survey and *Gaia* DR2: (Non)existence of five sparse high-latitude open clusters, *MNRAS*, accepted, [MNRAS](#), **480**, 5242.
- 2018 Quillen, A. C., De Silva, G. M., Sharma, S., **et al.**: The GALAH Survey: Stellar streams and how stellar velocity distributions vary with Galactic longitude, hemisphere and metallicity, [MNRAS](#), **478**, 228.
- 2018 Duong, L., Freeman, K. C., Asplund, M., **et al.**: The GALAH survey: properties of the Galactic disk(s) in the solar neighbourhood, [MNRAS](#), **476**, 5216.
- 2018 Kos, J., Bland-Hawthorn, J., Freeman, K., **Buder, S.**, et al.: The GALAH Survey: Chemical Tagging of Star Clusters and New Members in the Pleiades, [MNRAS](#), **473**, 4612.
- 2018 Wittenmyer, R. A., Sharma, S., Stello, D., **Buder, S.**, et al.: The K2-HERMES Survey. I. Planet Candidate Properties from K2 Campaigns 1-3, [AJ](#), **155**, 84.
- 2018 Sharma, S., Stello, D., **Buder, S.**, et al.: The TESS-HERMES survey Data Release 1: high-resolution spectroscopy of the TESS southern continuous viewing zone, [MNRAS](#), **473**, 2004.
- 2017 Przybilla, N., Aschenbrenner, P., **Buder, S.**: Candidate exoplanet host HD131399A: a nascent Am star, [A&A](#), **604**, 9.
- 2017 Jofré, P., Heiter, U., Worley, C. C.; **et al.**: *Gaia* FGK Benchmark stars: Opening the black box of stellar element abundance determination, [A&A](#), **601**, 38.
- 2017 Martell, S. L., Sharma, S., **Buder, S.**, et al.: The GALAH survey: observational overview and *Gaia* DR1 companion, [MNRAS](#), **465**, 3203.
- 2017 Mugrauer, M., **Buder, S.**, Reum, F., Birth, A.: The Großschwabhausen binary survey, [AN](#), **338**, 61.
- 2016 Ginski, C., Mugrauer, M., Seeliger, M., **Buder, S.**, et al.: A lucky imaging multiplicity study of exoplanet host stars - II, [MNRAS](#), **457**, 2173.
- 2016 Schmidt, T. O. B., Neuhäuser, R., Briceño, C, **et al.**: Direct Imaging discovery of a second planet candidate around the possibly transiting planet host CVSO 30, [A&A](#), **593**, 75.
- 2016 Fritzewski, D. J., Kitze, M., Mugrauer, M., **et al.**: Long-term photometry of IC 348 with the Young Exoplanet Transit Initiative network, [MNRAS](#), **462**, 2396.
- 2015 Seeliger, M., Kitze, M., Errmann, R., **et al.**: Ground-based transit observations of the HAT-P-18, HAT-P-19, HAT-P-27/WASP40 and WASP-21 systems, [MNRAS](#), **451**, 4060.

References

Working group head of GALAH survey and chief investigator of ASTRO 3D at ANU, *Prof Dr Martin Asplund*, ANU Canberra, martin.asplund@anu.edu.au.

PhD Supervisor, *Dr Karin Lind*, Stockholm University, karin.lind@astro.su.se.

PhD Supervisor, *Prof Dr Melissa Ness*, Columbia University & Center for Computational Astrophysics, Flatiron Institute New York City, melissa.ness@columbia.edu.

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Principal Investigator of GALAH survey, *Prof Dr Joss Bland-Hawthorn*, University of Sydney, jbh@physics.usyd.edu.au.

Director of institute department, *Prof Dr Hans-Walter Rix*, MPA Heidelberg, rix@mpia.de.