Dr Sven Buder

Curriculum vitae

Research Interests

- Galactic Archaeology in the Milky Way with large stellar spectroscopic surveys
- Milky Way population analysis in chemical, dynamical, and temporal space, focussing on the disk populations and the transition with the (accreted) halo
- Member of survey management and builder of the GALAH survey, lead of WG4: Analysis
- Member of 4MOST as well as previous member of SDSS-IV / APOGEE-2 & *Gaia*-ESO
- 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*)

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. primary supervision of visiting 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 & Silvius Dornier-Foundation.

Presentations

Invited talks

2019 The Legacy of the *Gaia*-ESO Survey, Firenze, Italy.

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 (of 9)

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 Session: 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
English Fluent (C2)
Swedish Good (B2)
Norwegian Good (B1)
French School level (A2)
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

Referee, *Astronomy & Astrophysics, The Astrophysical Journal.*
Since 2019 **RSAA colloquium committee**.
Since 2019 **RSAA committee for International PhD Scholarship program**.
2017–2019 **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, May 4, 2020

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Publications

(Co-)authored 44 publications (36 refereed), including 2 first-author papers with ORCID ID 0000-0002-4031-8553. In total, the refereed publications have attracted 603 citations as tracked by ADS.

Publications in preparation

2020 **Buder, S.**, et al.: The GALAH+ Survey: Third Data Release, MNRAS, see latest draft.

2020 **Buder, S.**, et al.: The GALAH Survey: Chemodynamic decomposition of the Galaxy, A&A, see latest draft.

Submitted publications

2020 Sharma, S., Hayden, M., Bland-Hawthorn, J., Stello, D., **et al.**: Fundamental relations for the velocity dispersion of stars in the Milky Way, MNRAS, arXiv:2004.06556.

2020 Wittenmyer, R., Clarke, J., Sharma, S., Stello, D., **et al.**: K2-HERMES II. Planet-candidate properties from K2 Campaigns 1-13, MNRAS, submitted.

2020 Xiang, M.-S., Rix, H.-W. , Ting, Y.-S., Ludwig, H.-G., **et al.**: Chemical peculiar A and F stars with prominent s-process and iron-peak elements enhancement: stellar radiative acceleration at work, ApJ, arXiv:2001.08227.

2020 Wheeler, A., Ness, M., **Buder, S.**, et al.: Abundances in the Milky Way across five nucleosynthetic channels from 4 million LAMOST stars, ApJ, arXiv:2001.08227.

2019 Gao, X., Lind, K., Amarsi, M. A., **Buder, S.**, et al.: The GALAH Survey: Primordial lithium abundances measured in the atmospheres of warm dwarf stars, MNRAS, submitted.

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.

2020 Traven, G., Feltzing, S., Merle, T., Van der Swaelmen, M., **et al.**: The GALAH survey: Multiple stars and our Galaxy. I. A comprehensive method for deriving properties of FGK binary stars, A&A, accepted, arXiv:2005.00014.

2020 Hayden, M., Bland-Hawthorn, J., Sharma, S., **et al.**: The GALAH Survey: Chemodynamics of the Solar Neighbourhood, MNRAS, 493, 2952.

2020 Lin, J., Asplund, M., Ting, Y.-S., Casagrande, L., **et al.**: The GALAH Survey: Temporal Chemical Enrichment of the Galactic Disk, MNRAS, 491, 2043.

2019 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, 631, 166.

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, 491, 3374.

2019 Casey, A. R., Lattenzio, J. C., Aleti, 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 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 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.

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 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 neigbourhood, 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.

References

Group leader at RSAA/ANU & ASTRO 3D chief investigator 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.

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