

Tobias Buck

Curriculum Vitæ

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Research Interests

- Numerical Cosmology and cosmological simulations of galaxy formation
- Galactic Archeology, the structure and build-up of Milky Way's stellar disc
- Λ CDM problems at small scales, specifically the role of baryonic feedback
- Improving modelling techniques for galaxy formation simulations
- Machine learning and innovative analysis methods

Academic Background

- Since Dec. 2018 **Postdoc**, *Leibniz-Institut für Astrophysik*, Potsdam, Cosmology and High-energy Astrophysics group, Christoph Pfrommer.
- Nov. 2018 **Postdoc**, *Max-Planck Institut for Astronomy*, Heidelberg, Milky Way group, Hans-Walter Rix.
- June 2015 - **Ph.D.**, *Max-Planck Institut for Astronomy*, Heidelberg,
Oct. 2018 *On the formation of the MW system in cosmological context*
Supv.: Prof. Dr. Hans-Walter Rix (MPIA), Prof. Dr. Andrea V. Macciò (NYUAD), 'grade: *summa cum laude*'.
- Oct. 2013 - **Master of Science (Physics)**, *Ruprecht-Karls University*, Heidelberg,
June 2015 *The Emergence of spatially and kinematically coherent Planes of Satellite Galaxies in high-resolution Dark Matter only simulations* (Supv.: Prof. Dr. Andrea V. Macciò), 'grade: A'.
- Oct. 2010 - **Bachelor of Science (Physics)**, *Ruprecht-Karls University*, Heidelberg,
July 2013 *Dynamical analysis of the Hyades star cluster using direct N-body simulations* (Supv.: Prof. Dr. Andreas Just) 'grade: A'.

Scholarships and Grants

- Jan. 2019 **Nominee for Wilhelm und Else Heraeus-Dissertationspreis für Physik and Astronomie**, *University Heidelberg*.
- 2017-2019 **15M CPUh computing time**, *Leibniz SuperComputing Centre*, SuperMUC, co-I.
- 2010 - 2015 **Scholarship of the German National Academic Foundation**.
- Nov. 2014 **Grant for DWIH Indo-German Winter School for Astrophysics**, *India, Mumbai*.

Teaching Experience

- since March 2020 **Master student supervision**, *Univ. Potsdam*, The impact of stellar winds in hydrodynamical simulations.
- Jan. 2019 **2 Invited Lectures**, *12th Winter School of the Heidelberg Graduate School for Fundamental Physics (HGSFP)*, Galaxy Formation and Cosmology.
- Sep.-Dec. 2017 **Summer Student Supervision**, *Diane Salim*, MPIA Heidelberg.
- Sep. 2016 **Teaching assistant**, *Univ. Heidelberg*, Tutor physics block course 'Cosmology'.

- Oct. 2015 - Feb. 2016 **Teaching assistant**, *Univ. Heidelberg*, Tutor physics course 'Introduction to Astronomy'.
- Feb.-Jul. 2015 **Teaching assistant**, *Univ. Heidelberg*, Tutor physics lab course I+II.
- Oct. 2014 - Feb. 2015 **Teaching assistant**, *Univ. Heidelberg*, Tutor theoretical physics course 'Electrodynamics'.
- Apr.-Jul. 2014 **Teaching assistant**, *Univ. Heidelberg*, Tutor theoretical physics course 'Classical Mechanics'.

Organizational experience

Refereeing experience, *Nature Astronomy*, *ApJ*, *MNRAS*, *A&A*.

- 2018 **Organization Committee**, *11th Winter School of the Heidelberg Graduate School for Fundamental Physics (HGSFP)*, Obergurgl, Austria.
- 2016, 2017 **Organization Committee**, *Max-Planck Institute for Astronomy*, *Patzner's Student Retreat*.
- 2015 - 2018 **Student representative**, *International Max-Planck Research School*, Heidelberg, Germany.

Invited Talks

24. Jan. 2020 Price Colloquium Wilhelm und Else Heraeus-Dissertationspreis für Physik and Astronomie, Heidelberg, Germany, **High resolution cosmological simulations of Milky Way mass galaxies**.
24. July 2018 Columbia University, New York, USA, **High resolution cosmological simulations of Milky Way mass galaxies**.
10. Jan. 2018 Max-Planck Institute for Astrophysics, Munich, Germany, **Cosmological simulations of Milky Way mass galaxies**.
13. April 2018 Max-Planck Institute for Astronomy, Heidelberg, Germany, **High-resolution cosmological simulations of Milky Way mass galaxies**.

Contributed Conference Talks and Poster

- 23.4.2020 AIP Workshop on Machine Learnig, Potsdam, Germany, **PICASSSO: Painting Intrinsic Attributes onto SDSS Objects**.
- 17.2-21.2.2019 Dynamical Reconstruction of Galaxies, Leiden, Netherlands, **Dynamical components of the Milky Way in cosmological hydrodynamical simulations**.
- 9.12.-13.12.2019 Machine Learning Tools for Research in Astronomy, Ringberg, Germany, **PICASSSO: Painting Intrinsic Attributes onto SDSS Objects**.
- 2.9.-6.9.2019 CLUES collaboration meeting, Lyon, France, **The effects of Cosmic Rays on the formation of Milky Way-like galaxies**.
- 25.6.-29.6.2019 Feedback and its Role in Galaxy Formation, Spetses, Greece, **The effects of Cosmic Rays on the formation of Milky Way-like galaxies**.
- Sept. 2018 15th Potsdam Thinkshop: The role of feedback in galaxy formation, *AIP Potsdam*, Potsdam, Germany, **The importance of feedback in forming realistic dwarf galaxies**.
- July 2018 The physics of galaxy scaling relations, Kingston, Canada, **Scaling relations for Milky Way satellites**.
- June 2018 CLUES collaboration meeting, Puerto de la Cruz, Teneriffe, **High resolution simulations of the Milky Way system**.
- Oct. 2017 Piercing the Galactic Darkness, Heidelberg, Germany, **The Milky Way Bulge/Bar in a high-resolution cosmological simulation**.

- Oct. 2017 The Role of Gas in galaxy dynamics, Valetta, Malta, **Clumpy galaxies at high-redshift: Insights from the NIHAO simulations.**
- Aug. 2017 Challenges in Galaxy Evolution: from black holes to the cosmic web, Florence, Italy, (Fast Talk), **Insights into high-redshift clumpy galaxies from the NIHAO simulations.**
- July 2017 Rediscovering our Galaxy, *IAU Symposium 334*, Potsdam, Germany, **NIHAO-UHD: High-resolution simulations of Milky Way mass galaxies.**
- Sept. 2016 The Milky Way and its Environment, Paris, France, **Poster: The clumpy nature of star formation in NIHAO.**
- March 2016 13th Potsdam Thinkshop: Near field cosmology, *AIP Potsdam*, Obergurgl, Austria, **Simulated thin planes of satellites in Λ CDM are not kinematically coherent.**
- March 2016 Formation and Evolution of Galaxy Outskirts, *IAU Symposium 321*, Toledo, Spain, **Poster: Thin planes of satellites in Λ CDM are not kinematically coherent.**

Conferences, Workshops and Schools

- 23.9.-27.9.2019 **IWR Summer School on Machine Learning**, Heidelberg, Germany.
- Sept. 2018 **12th IMPRS Summer School**, *Gaia Data & Science*, Heidelberg, Germany.
- Jan. 2018 **11th HGSFP Winter School**, Obergurgl, Austria.
- May. 2017 **3rd OBSPM/LAM Galaxy Formation School**, Spetses, Greece.
- Jan. 2017 **10th HGSFP Winter School**, Obergurgl, Austria.
- Sept. 2016 **IMPRS Summer School**, *Astrostatistics & Data Mining*, Heidelberg, Germany.
- July 2016 **Discs in Galaxies**, *Munich Joint Conference*, Munich, Germany.
- Sept. 2015 **Astro Hack Week**, *New York University*, New York, USA.
- 17.4.-22.4.2014 **String Steilkurs - Part I**, *DESY Hamburg*.
- 2015-2018 **Visiting Ph.D. Student**, *New York University Abu Dhabi*, Abu Dhabi, Supervisor: Prof. Dr. Andrea V. Macciò (Nov. 2015, Febr. 2016, Nov. 2016, March 2017, Dez. 2017).
- since 2018 **Regular Visiting Research Scholar**, *New York University Abu Dhabi*, Abu Dhabi.

Skills

- Languages German, English, Spanish, Latin
- IT skills GASOLINE2, C (with OPENMP, MPI), PYTHON, \LaTeX , Matlab/Mathematica, HTML, Gnuplot