

# Zdeněk Prudil

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<b>SCIENTIFIC CAREER</b>	<b>ESO Fellow</b> European Southern Observatory (ESO), Garching, Germany <b>from Dec 2022</b>
	<b>Postdoctoral researcher</b> Astronomisches Rechen-Institut, Heidelberg, Germany <b>Jul 2020 – Nov 2022</b> <i>Focus:</i> Chemo-dynamical mapping of the Galactic bulge
	<b>Graduate researcher</b> Astronomisches Rechen-Institut, Heidelberg, Germany <b>Sep 2016 – Jun 2020</b> <i>Focus:</i> RR Lyrae stars as tracers of substructure and Galactic archaeology
<b>EDUCATION</b>	<b>Ph.D. in Astronomy:</b> Astronomisches Rechen-Institut, Heidelberg University, Heidelberg, Germany, <i>Supervisor:</i> Prof. Dr. Eva K. Grebel <b>2016 – 2020</b>
	<b>MSc. in Theoretical Physics and Astrophysics:</b> Faculty of Science, Masaryk University, Brno, Czech Republic, <i>Supervisor:</i> Mgr. Marek Skarka, Ph.D. <b>2014 – 2016</b>
	<b>BSc. in Astrophysics:</b> Faculty of Science, Masaryk University, Brno, Czech Republic, <i>Supervisor:</i> doc. RNDr. Miloslav Zejda, Ph.D. <b>2011 – 2014</b>
<b>RESEARCH INTERESTS</b>	<ul style="list-style-type: none"><li>• Galactic archaeology in the Milky Way and its neighborhood</li><li>• The Milky Way structure and dynamics using stellar tracers</li><li>• Pulsating variable stars</li><li>• Data analysis and machine learning</li></ul>
<b>FELLOWSHIPS AND AWARDS</b>	<b>ESO postdoctoral research fellowship</b> <b>Dec 2022 - Dec 2025</b>
	<b>Hector Fellowship:</b> <a href="#">Hector Fellow Academy</a> <b>Apr 2017 - Apr 2020</b> <i>Benefits:</i> 3 years of full Ph.D. funding, including a research fund of 45 000 €
	<b>The International Max Planck Research School for Astronomy and Cosmic Physics:</b> <a href="#">Fellow of the IMPRS-HD</a> <b>Sep 2016 - Apr 2020</b>
	<b>Masaryk University: Deans' award for the best Master thesis</b> <b>Jun 2017</b> <i>Thesis:</i> <a href="#">Blazhko Effect in Galactic Bulge RR Lyrae Stars</a>
<b>PUBLICATION RECORD</b>	<ul style="list-style-type: none"><li>• 21 refereed publications (ten as a first author) and 10 proceedings</li><li>• One article recently submitted</li><li>• 296 citations, h-index= 10</li></ul>
<b>REFEREE</b>	Astrophysical Journal (ApJ, AJ), Journal of the American Association of Variable Star Observers (JAAVSO) <b>since 2021</b>
<b>SUCCESSFUL PROPOSALS as a PI and Co-I</b>	<b>MPG/ESO 2.2m telescope, FEROS, PI: Z. Prudil</b> – total time awarded: 40 hours <i>Program:</i> 0109.A-9029(A), Exploration of the Milky Way disk components with RR Lyrae stars <b>2021</b>
	<b>Gemini South, Zorro instrument, CoI: Z. Prudil</b> – total time awarded: 9.9 hours <i>Program:</i> GS-2021B-Q-315, Searching the elusive RR Lyrae companions <b>2021</b>

**Gemini North, Alopeke instrument, CoI: Z. Prudil** – total time awarded: 6.5 hours  
*Program:* GN-2021B-Q-309, Searching the elusive RR Lyrae companions **2021**

**Gemini South, Zorro instrument, CoI: Z. Prudil** – total time awarded: 8.7 hours  
*Program:* GS-2021A-Q-220, Searching the elusive RR Lyrae companions **2021**

**MPG/ESO 2.2m telescope, FEROS, PI: Z. Prudil** – total time awarded: 40 hours  
*Program:* 0107.A-9029(A), Exploration of the Milky Way disk components with RR Lyrae stars (not observed due to COVID-19) **2020**

**Gemini North, Alopeke instrument, CoI: Z. Prudil** – 2.1 hours  
*Program:* GN-2020B-FT-15, A speckle search for RR Lyrae companions **2020**

**MPG/ESO 2.2m telescope, FEROS, PI: Z. Prudil** – DDT 10 hours  
*Program:* 0103.A-9029(A), Spectroscopic study of shock waves in RR Lyrae stars **2019**

**VLT/ESPRESSO, PI: Z. Prudil** – total time awarded: 1 hour  
*Program:* 60.A-9511(A), Spectroscopic study of shock waves in RR Lyrae stars **2019**

## RESEARCH VISITS

- Faculty of Science, Masaryk University, Brno **Oct 2018**
- Nicolaus Copernicus Astronomical Center of the Polish Academy of Sciences, Warsaw **Mar 2018**
- Nicolaus Copernicus Astronomical Center of the Polish Academy of Sciences, Warsaw **Feb 2016**

## TECHNICAL SKILLS

**Programming languages:** Python (numpy, scipy, matplotlib, scikit-learn, emcee), and working knowledge of SQL and ADQL. Basic knowledge of C and HTML.

**Software:** galpy, iSpec, Period04, L<sup>A</sup>T<sub>E</sub>X, CERES, GALA

## TEACHING & STUDENT SUPERVISION

### Teaching experience:

- GALAXY EVOLUTION at Heidelberg University  
Convener in winter and summer semester 2018, 2019 (weekly seminar)
- GALACTIC AND EXTRAGALACTIC ASTRONOMY at Heidelberg University  
Teaching assistant in summer semester 2017, 2018 (weekly exercises for master and graduate students)
- ASTRO-LAB at Heidelberg University (block course)  
Teaching assistant in winter semester 2017 (lab course for undergraduate and graduate students)

## CONFERENCES TALKS

**Streams 21: Constraints on Dark Matter**, New York – online, *Talk:* The Orphan stream in 7D using RR Lyrae stars **Feb 2021**

**RRL/Cep 2019 - Frontiers of Classical Pulsators: Theory and Observations**, Cloudcroft, *Talk:* Main and early shocks in RR Lyrae photometric light curves (contributed talk) **Oct 2019**

**A Synoptic View of the Magellanic Clouds - VMC, Gaia and Beyond**, ESO Garching, *Poster:* Photometric study of the stellar overdensity north from the Small Magellanic Cloud **Sep 2019**

**RRL2017 Revival of the classical pulsators: from galactic structure to stellar interior diagnostics**, Niepołomice, *Talk:* The Oosterhoff Dichotomy in the Galactic Bulge (contributed talk) **Sep 2017**

**The 48th Conference on Variable Stars Research**, Prague, *Talk:* Multiple variability in RR Lyrae stars (contributed talk) **Nov 2016**

**Meeting of Young CAMK**, Centrum Astronomiczne im. Mikołaja Kopernika, Warsaw, *Talk:* Blazhko effect in Galactic bulge RR Lyrae stars **Feb 2016**

	<b>RRL2015 High-Precision Studies of RR Lyrae Stars</b> , Visegrád, <i>Poster</i> : Analysis of light curve of LP Camelopardalis	<b>Oct 2015</b>
<b>DEPARTMENTAL SEMINARS AND COLLOQUIA</b>	<b>ESO Informal Discussion</b> , Garching – online, <i>Seminar</i> : Chemo-dynamical mapping of the Galactic bulge with RR Lyrae stars	<b>Sep 2021</b>
	<b>Galaxy Coffee MPIA</b> , Heidelberg – online, <i>Seminar</i> : The Orphan stream in 7D using RR Lyrae stars	<b>Mar 2021</b>
	<b>Gemini-South &amp; CTIO Science coffee</b> , La Serena – online, <i>Seminar</i> : RR Lyrae stars in the Galactic disk	<b>Oct 2020</b>
	<b>ARI Institute Colloquium</b> , Astronomisches Rechen-Institut, Heidelberg University, <i>Seminar</i> : RR Lyrae stars as tracers of substructure and Galactic archaeology	<b>Jan 2020</b>
	<b>Hector Fellow Symposium</b> , Heidelberg, <i>Talk</i> : Final Ph.D. presentation	<b>Jul 2019</b>
	<b>Astronomical seminar</b> , Faculty of Science, Masaryk University, Brno, <i>Seminar</i> : Research and studies at the Heidelberg University	<b>Oct 2018</b>
	<b>IMPRS seminar workshop 12th generation</b> , Trifels, <i>Talk</i> : RR Lyrae stars as tracers of substructure and Galactic archaeology	<b>Apr 2018</b>
	<b>ARI Institute Colloquium</b> , Astronomisches Rechen-Institut, Heidelberg University, <i>Seminar</i> : The Blazhko effect and additional periodicity among RR Lyrae stars in the Galactic bulge	<b>Jan 2017</b>
<b>PARTICIPATED WORKSHOPS</b>	<b>2019 MESA Summer School</b> , University of California, Santa Barbara	<b>Aug 2019</b>
	<b>IMPRS Summer school: Gaia Data &amp; Science</b> , Heidelberg University	<b>Sep 2018</b>
	<b>Workshop: Near-Field Cosmology with the Dark Energy survey’s DR1 and beyond</b> , Chicago	<b>Jun 2018</b>
	<b>Gaia Data Workshop</b> , Heidelberg	<b>Nov 2016</b>
	<b>MBA courses</b> : Three courses as a part of the Hector Fellow Academy, focused on the soft skills and project management: PROJECTS, PEOPLE, VALUES at the Karlsruhe Institute of Technology	<b>2018 – 2019</b>
<b>CONFERENCE ORGANIZATION</b>	<ul style="list-style-type: none"> <li>• <b>LOC AT THE MOSAIC 2019 MEETING</b> at Heidelberg University,</li> </ul>	<b>Mar 2019</b>
<b>PUBLIC OUTREACH</b>	<ul style="list-style-type: none"> <li>• <b>VYSKOV OBSERVATORY</b> at Vyskov – Astronomer: public observations of the night sky and Sun using the telescopes</li> <li>• <b>BRNO OBSERVATORY AND PLANETARIUM</b> at Brno – Night Sky Guide: public observations of the night sky using the telescopes</li> </ul>	<b>Summer 2013, 2014</b> <b>Full year 2015</b>
<b>Refereed Publications</b>	<ol style="list-style-type: none"> <li>21. <b>Prudil, Z.</b> et al.,: Milky Way archaeology using RR Lyrae and type II Cepheids II. Unbound RR Lyrae stars, and mass of the Milky Way, 2022, <a href="#">Accepted for publication in A&amp;A</a></li> <li>20. Molnár, L. et al., including <b>Prudil, Z.</b>: First results on RR Lyrae stars with the TESS space telescope: untangling the connections between mode content, colors and distances, 2021, <a href="#">ApJS, 258, 8</a></li> <li>19. Braga, V. F. et al., including <b>Prudil, Z.</b>: On the Use of Field RR Lyrae as Galactic Probes. V. Optical and radial velocity curve templates, 2021, <a href="#">ApJ, 919, 85</a></li> <li>18. Fabrizio, M. et al., including <b>Prudil, Z.</b>: On the use of field RR Lyrae as Galactic probes: IV. New insights into and around the Oosterhoff dichotomy, 2021, <a href="#">ApJ, 919, 118</a></li> </ol>	

17. Crestani, J. et al., including **Prudil, Z.**: On the Use of Field RR Lyrae as Galactic Probes. III. The  $\alpha$ -element abundances, 2021, [ApJ, 914, 10](#)
16. **Prudil, Z.** et al.,: Milky Way archaeology using RR Lyrae and type II Cepheids I. The Orphan stream in 7D using RR Lyrae stars, 2021, [A&A, 648, A78](#)
15. Crestani, J. et al., including **Prudil, Z.**: On the Use of Field RR Lyrae as Galactic Probes. II. A New  $\Delta S$  Calibration to Estimate Their Metallicity, 2021, [ApJ, 908, 20](#)
14. Savino, A., Koch, A., **Prudil, Z.**, Kunder, A., Smolec, R.: The age of the Milky Way inner stellar spheroid from RR Lyrae population synthesis, 2020, [A&A, 641, A96](#)
13. Bono, G. et al., including **Prudil, Z.**: On the Metamorphosis of the Bailey diagram for RR Lyrae stars, 2020, [ApJL, 896, L15](#)
12. Skarka, M., **Prudil, Z.**, Jurcsik, J.: Blazhko effect in the Galactic bulge fundamental mode RR Lyrae stars II: Modulation shapes, amplitudes and periods, 2020, [MNRAS, 494, 1237](#)
11. Hanke, M., Koch, A., **Prudil, Z.**, Grebel, E. K., Bastian, U.: Purveyors of fine halos. II. Chemodynamical association of halo stars with Milky Way globular clusters, 2020, [A&A, 637, A98](#)
10. **Prudil, Z.**, Dékány, I., Grebel, E. K., Kunder, A.: Evidence for Galactic disk RR Lyrae stars in the Solar neighborhood, 2020, [MNRAS, 492, 3408](#)
9. **Prudil, Z.**, Dékány, I., Smolec, R., Catelan, M., Grebel, E. K., Kunder, A.: Humps and bumps: The effects of shocks on the optical light curves of fundamental-mode RR Lyrae stars, 2020, [A&A, 635, A66](#)
8. **Prudil, Z.**, Dékány, I., Grebel, E. K., Catelan, M., Skarka, M., Smolec, R.: On the Oosterhoff dichotomy in the Galactic bulge: II. kinematical distribution, 2019, [MNRAS, 487, 3270](#)
7. **Prudil, Z.**, Skarka, M., Liška, J., Grebel, E. K., Lee, C.-U.: Candidates for RR Lyrae in binary systems from the OGLE Galactic bulge survey, 2019, [MNRAS, 487, L1](#)
6. **Prudil, Z.**, Dékány, I., Catelan, M., Smolec, R., Grebel, E. K., Skarka, M.: On the Oosterhoff dichotomy in the Galactic bulge: I. Spatial distribution, 2019, [MNRAS, 484, 4833](#)
5. **Prudil, Z.**, Grebel, E. K., Dékány, I., Smolec, R.: Photometric study of the SMC-NOD using variable stars from the OGLE-IV survey, 2018, [MNRAS, 480, 669](#)
4. **Prudil, Z.**, Skarka, M.: Blazhko effect in the Galactic bulge fundamental mode RR Lyrae stars I: Incidence rate and differences between modulated and non-modulated stars, 2017, [MNRAS, 466, 2602](#)
3. **Prudil, Z.**, Smolec, R., Skarka, M., Netzel, H.: Peculiar double-periodic pulsation in RR Lyrae stars of the OGLE collection - II. Short-period stars with a dominant radial fundamental mode, 2017, [MNRAS, 465, 4074](#)
2. Smolec, R., **Prudil, Z.**, Skarka, M., Bakowska, K.: Peculiar double-periodic pulsation in RR Lyrae stars of the OGLE collection - I. Long-period stars with dominant radial fundamental mode, 2016, [MNRAS, 461, 2934](#)
1. Skarka, M., Liška, J., Auer, R. F., **Prudil, Z.**, Juránová, A. Sódor, Á.: The SERMON project: 48 new field Blazhko stars and an investigation of modulation-period distribution, 2016, [A&A, 592, A144](#)

**Non-refereed  
Publications**

14. Molnár, L. et al., including **Prudil, Z.**: A comprehensive look at RR Lyrae stars through high-precision photometry and astrometry, 2021, in TESS Science Conference II, [Zenodo](#)
13. **Prudil, Z.**, Dékány, I., Catelan, M., Grebel, E. K., Smolec, R., Skarka, M.: Spatial and Kinematical Study of the Oosterhoff Dichotomy in the Galactic Bulge, 2021, in RR Lyrae/Cepheid 2019: Frontiers of Classical Pulsators, ed. Karen Kinemuchi, Catherine Lovekin, Hilding Neilson, and Kathy Vivas, [ASPC, Vol. 529, 340](#)
12. Jurcsik, J., Szabó, P., **Prudil, Z.**, Skarka, M., Hajdu, G.: On the Phase-Modulation Properties of Galactic Bulge RRab Stars, 2021, in RR Lyrae/Cepheid 2019: Frontiers of Classical Pulsators, ed. Karen Kinemuchi, Catherine Lovekin, Hilding Neilson, and Kathy Vivas, [ASPC, Vol. 529, 329](#)
11. Skarka M., **Prudil, Z.**, Jurcsik J.: The Blazhko Effect in Galactic Bulge Fundamental Mode RR Lyrae Stars, 2021, in RR Lyrae/Cepheid 2019: Frontiers of Classical Pulsators, ed. Karen Kinemuchi, Catherine Lovekin, Hilding Neilson, and Kathy Vivas, [ASPC, Vol. 529, 130](#)
10. **Prudil, Z.**, Smolec, R., Catelan, M., Dékány, I., Grebel, E. K., Kunder, A.: Main and Early Shocks in RR Lyrae Photometric Light Curves, 2021, in RR Lyrae/Cepheid 2019: Frontiers of Classical Pulsators, ed. Karen Kinemuchi, Catherine Lovekin, Hilding Neilson, and Kathy Vivas, [ASPC, Vol. 529, 93](#)
9. Salinas, R., Hajdu, G., **Prudil, Z.**, Howell, S., Catelan, M.: A Speckle Interferometric Search for a Companion to the RR Lyrae Star UV Oct, 2020, [RNAAS, 4, 143](#)
8. Skarka, M., **Prudil, Z.**, Liška, J.: Binary stars with RR Lyrae components - new candidates in the Galactic bulge, 2020, in Contributions of the Astronomical Observatory Skalnaté Pleso, [Vol. 50, 442-445](#)
7. Skarka, M., **Prudil, Z.**: Photometric Differences Between Modulated and Non-Blazhko ab-type RR Lyrae Stars in the Galactic Bulge, 2018, in The RR Lyrae 2017 Conference. Revival of the Classical Pulsators: from Galactic Structure to Stellar Interior Diagnostics, ed. R. Smolec, K. Kinemuchi, & R. I. Anderson, [Vol. 6, 319-320](#)
6. **Prudil, Z.**, Grebel, E. K., Dékány, I. Smolec, R., Skarka, M.: The Oosterhoff Dichotomy in the Galactic Bulge, 2018, in The RR Lyrae 2017 Conference. Revival of the Classical Pulsators: from Galactic Structure to Stellar Interior Diagnostics, ed. R. Smolec, K. Kinemuchi, & R. I. Anderson, [Vol. 6, 37-41](#)
5. Skarka M., et al., including **Prudil, Z.**: CzeV - The Czech Variable Star Catalogue, 2017, [OEJV, 185, 1](#)
4. Smolec, R. et al., including **Prudil, Z.**: Petersen diagram revolution, 2017, in Wide-Field Variability Surveys: A 21st Century Perspective - 22nd Los Alamos Stellar Pulsation - Conference Series Meeting, San Pedro de Atacama, Chile, Edited by Catelan, M.; Gieren, W.; [EPJ Web of Conferences, Volume 152, id.06003](#)
3. **Prudil, Z.**: Multiple variability in RR Lyrae stars, 2017, in proceedings of the 48th conference on Variable Stars Research, [Open European Journal on Variable Stars, 180, 47](#)
2. **Prudil, Z.**, Skarka, M., Zejda, M.: Analysis of light curve of LP Camelopardalis, 2016, [Communications of the Konkoly Observatory Hungary, 105, 213](#)
1. Liška, J., Skarka, M., Auer, R. F., **Prudil, Z.** & Juránová, A.: Possible candidates for multiple occurrence of variable stars in the VSX catalogue, 2015, [OEJV, 170, 1](#)