

# ONDŘEJ PEJCHA

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## Research positions

since Jun 2022 : Associate Professor, Charles University, Prague, Czech Republic  
Sep 2017 – May 2022 : Assistant Professor, Charles University, Prague, Czech Republic  
Sep 2013 – Sep 2017 : Lyman Spitzer Jr. Fellow at Princeton University  
Sep 2013 – Aug 2016 : NASA Hubble Fellow at Princeton University

## Education

Aug 2013 : Ph.D., Astronomy, Ohio State University, thesis advisor: Todd A. Thompson  
Aug 2010 : Master in Astronomy, Ohio State University  
2006–2008 : Master in Theoretical Physics, Summa cum laude, Charles University, Prague, Czech Republic  
2003–2006 : Bachelor in Physics, Summa cum laude, Charles University, Prague, Czech Republic

## Research interests

Theory and observations of stellar mergers, common envelope evolution, core-collapse supernovae, stellar variability (eclipsing binaries, Cepheids, transients), neutron star and black hole formation, stellar and planetary dynamics, All-Sky Automated Survey for Supernovae, radiation hydrodynamics

## Honors and awards

2020 : Strouhal’s lecture, Faculty of Mathematics and Physics, Charles University  
2019 : Neuron Prize for Young and Promising Scientists in Physics  
2018 : European Research Council Starting Grant  
2017 : Kopal lecture of the Czech Astronomical Society for important scientific results published within the last few years  
2017 : Primus award from Charles University  
2013 : Hubble Fellowship and Lyman Spitzer Jr. Fellowship, Princeton University  
2012/2013 : Distinguished University Fellowship, Ohio State University  
2011 : First place in Mathematical and physical sciences at the 25<sup>th</sup> Annual Hayes Graduate Research Forum, Ohio State University  
2008/2009 : Distinguished University Fellowship, Ohio State University  
2002 : Jaroslav Heyrovský Endowment Fund Prize  
2002 : Grammar School Student Award, The Learned Society of the Czech Republic  
2001 : Jindřich Šilhán price “Observer of the year” (Czech Astronomical Society)

## Refereed publications

summary: 47 papers total, 16 first-author papers; other bulletins, telegrams and circulars are not shown here. Papers with my students and postdocs shown in **bold italic**. NASA ADS (Jan 2022): 2278 citations, h-index: 26.

1. **Pejcha, O., Calderón, D.**, Kurfürst, P., 2022, “Supernovae in colliding-wind binaries: observational signatures in the first year”, *MNRAS*, 510, 3276
2. **Calderón, D., Pejcha, O.**, Duffell, P. C., 2021, “Moving-mesh radiation-hydrodynamic simulations of wind-reprocessed transients”, *MNRAS*, 507, 1092
3. Hanuš, J., **Pejcha, O.**, Shappee, B. J., Kochanek, C. S., Stanek, K. Z., Holoien, T. W.-S., 2021, “The V-Band Photometry of Asteroids from ASAS-SN: Finding Asteroids With Slow Spin”, *A&A*, 654, A48
4. Blagorodnova, N., Klencki, J., **Pejcha, O.**, et al., 2021, “The luminous red nova AT 2018bwo in NGC 45 and its binary yellow supergiant progenitor”, *A&A*, 653, A134

5. **Kurfürst, P., Pejcha, O.**, Krtička, J., 2020, “Supernova explosions interacting with aspherical circumstellar material: implications for light curves, spectral line profiles, and polarization”, *A&A*, 642, A214
6. Jayasinghe, T., et al. (including **Pejcha, O.**), 2020, “The ASAS-SN Catalog of Variable Stars IX: The Spectroscopic Properties of Galactic Variable Stars”, accepted to *MNRAS*
7. Aydi, E., et al. (including **Pejcha, O.**), 2020, “Direct evidence for shock-powered optical emission in a nova”, *Nature Astronomy*, 4, 776
8. Williams, S. C., et al. (including **Pejcha, O.**), 2020, “AT 2019abn: multi-wavelength observations of the first 200 days”, *A&A*, 637, A20
9. Hanuš, J., et al. (including **Pejcha, O.**), 2020, “(704) Interamnia: a transitional object between a dwarf planet and a typical irregular-shaped minor body”, *A&A*, 633, A65
10. Jayasinghe, T., et al. (including **Pejcha, O.**), 2020, “The ASAS-SN Catalog of Variable Stars VII: Contact Binaries are Different Above and Below the Kraft Break”, *MNRAS*, 493, 4045
11. Jayasinghe, T., et al. (including **Pejcha, O.**), 2020, “The ASAS-SN catalogue of variable stars VI: an all-sky sample of  $\delta$  Scuti stars”, *MNRAS*, 493, 4186
12. Jayasinghe, T., et al. (including **Pejcha, O.**), 2020, “The ASAS-SN Catalog of Variable Stars V: Variables in the Southern Hemisphere”, *MNRAS*, 491, 13
13. Jones, D., **Pejcha, O.**, Corradi, R. L. M., 2019, “On the triple-star origin of the planetary nebula Sh 2-71”, *MNRAS*, 489, 2195
14. **Hubová, D., Pejcha, O.**, 2019, “Kinematics of Mass Loss from the Outer Lagrange Point L2”, *MNRAS*, 489, 891
15. **Pawlak, M., Pejcha, O., Jakubčík, P.**, et al., 2019, “The ASAS-SN catalogue of variable stars - IV. Periodic variables in the APOGEE survey”, *MNRAS*, 487, 5932
16. Jayasinghe, T., et al. (including **Pejcha, O.**), 2019, “The ASAS-SN Catalog of Variable Stars III: Variables in the Southern TESS Continuous Viewing Zone”, *MNRAS*, 485, 961
17. Jayasinghe, T., et al. (including **Pejcha, O.**), 2019, “The ASAS-SN Catalog of Variable Stars II: Uniform Classification of 412,000 Known Variables”, *MNRAS*, 486, 1907
18. Szalai, T., et al. (including **Pejcha, O.**), 2019, “The Type II-P Supernova 2017eaw: From Explosion to the Nebular Phase”, *ApJ*, 876, 19
19. Szalai, T., Zsíros, S., Fox, O. D., **Pejcha, O.**, Müller, T., 2019, “A Comprehensive Analysis of Spitzer Supernovae”, *ApJS*, 241, 38
20. Raives, M. J., Couch, S. M., Greco, J. P., **Pejcha, O.**, Thompson, T. A., 2018, “The Antesononic Condition for the Explosion of Core-Collapse Supernovae I: Spherically Symmetric Polytopic Models: Stability & Wind Emergence”, *MNRAS*, 481, 3293
21. **Pejcha, O.**, Metzger, B. D., **Tyles, J. G.**, Tomida, K., 2017, “Pre-explosion spiral mass loss of a binary star merger”, *ApJ*, 850, 59
22. Metzger, B. D., **Pejcha, O.**, 2017, “Shock-Powered Light Curves of Luminous Red Novae as Signatures of Pre-Dynamical Mass Loss in Stellar Mergers”, *MNRAS*, 471, 3200
23. Müller, T., Prieto, J. L., **Pejcha, O.**, Clocchiatti, A., 2017, “The Nickel Mass Distribution of Normal Type II Supernovae”, *ApJ*, 841, 127
24. **Pejcha, O.**, Metzger, B. D., Tomida, K., 2016, “Binary Stellar Mergers with Marginally-Bound Ejecta: Excretion Disks, Inflated Envelopes, Outflows, and their Luminous Transients”, *MNRAS*, 461, 2527
25. **Pejcha, O.**, Metzger, B. D., Tomida, K., 2016, “Cool and Luminous Transients from Mass-Losing Binary Stars”, *MNRAS*, 455, 4351
26. Holoien, T. W.-S., Prieto, J. L., **Pejcha, O.**, et al., 2016, “Discovery and Observations of the Unusually Bright Type-Defying II-P/II-L Supernova ASASSN-13co”, *Acta Astronomica*, 66, 219
27. **Pejcha, O.**, Prieto, J. L., 2015, “On The Intrinsic Diversity of Type II-Plateau Supernovae”, *ApJ*, 806, 225
28. **Pejcha, O.**, Thompson, T. A., 2015, “The Landscape of the Neutrino Mechanism of Core-Collapse Supernovae: Neutron Star and Black Hole Mass Functions, Explosion Energies and Nickel Yields”, *ApJ*, 801, 90
29. **Pejcha, O.**, Prieto, J. L., 2015, “A Global Model of The Light Curves and Expansion Velocities of Type II-Plateau Supernovae”, *ApJ*, 799, 215

30. Peterson, B. M., et al. (including **Pejcha, O.**), 2014, “Reverberation Mapping of the Seyfert 1 Galaxy NGC 7469”, *ApJ*, 795, 145
31. **Pejcha, O.**, 2014, “Burying a Binary: Dynamical Mass Loss and an Optically-Thick Wind Explain the Candidate Stellar Merger V1309 Scorpii”, *ApJ*, 788, 22
32. **Pejcha, O.**, Antognini, J. M., Shappee, B. J., Thompson, T. A., 2013, “Greatly enhanced eccentricity oscillations in quadruple systems composed of two binaries: implications for stars, planets and transients”, *MNRAS*, 435, 943
33. Grier, C. J., et al. (including **Pejcha, O.**), 2013, “The Structure of the Broad Line Region in AGN: I. Reconstructed Velocity-Delay Maps”, *ApJ*, 764, 47
34. **Pejcha, O.**, Dasgupta, B., Thompson, T. A., 2012, “Effect of Collective Neutrino Oscillations on the Neutrino Mechanism of Core-Collapse Supernovae”, *MNRAS*, 425, 1083
35. **Pejcha, O.**, Thompson, T. A., Kochanek, C. S., 2012, “The observed neutron star mass distribution as a probe of the supernova explosion mechanism”, *MNRAS*, 424, 1570
36. Grier, C. J., et al. (including **Pejcha, O.**), 2012, “Reverberation Mapping Results for Five Seyfert 1 Galaxies”, *ApJ*, 755, 60
37. Cagaš, P., **Pejcha, O.**, 2012, “Discovery of a double eclipsing binary with periods near a 3:2 ratio”, *A&A*, 744, L3
38. **Pejcha, O.**, Kochanek, C. S., 2012, “A Global Physical Model for Cepheids”, *ApJ*, 748, 107
39. **Pejcha, O.**, Thompson, T. A., 2012, “The Physics of the Neutrino Mechanism of Core-collapse Supernovae”, *ApJ*, 746, 106
40. Grier, C. J., et al. (including **Pejcha, O.**), 2012, “A Reverberation Lag for the High-ionization Component of the Broad-line Region in the Narrow-line Seyfert 1 Mrk 335”, *ApJ*, 744, L4
41. Henderson, C. B., Stanek, K. Z., **Pejcha, O.**, Prieto, J. L., 2011, “An R- and I-band Photometric Variability Survey of the Cygnus OB2 Association”, *ApJS*, 194, 27
42. Poddaný, S., Brát, L., **Pejcha, O.**, 2010, “Exoplanet Transit Database. Reduction and processing of the photometric data of exoplanet transits”, *New Astronomy*, 15, 297
43. Sumi, T., et al. (including **Pejcha, O.**), 2010, “A Cold Neptune-Mass Planet OGLE-2007-BLG-368Lb: Cold Neptunes Are Common”, *ApJ*, 710, 1641
44. **Pejcha, O.**, Stanek, K. Z., 2009, “The Structure of the Large Magellanic Cloud Stellar Halo Derived using OGLE-III RR Lyr Stars”, *ApJ*, 704, 1730
45. **Pejcha, O.**, 2009, “Time-Dependent Rebrightenings in Classical Nova Outbursts: A Late-Time Episodic Fuel Burning?”, *ApJ*, 701, L119
46. **Pejcha, O.**, Heyrovský, D., 2009, “Extended-Source Effect and Chromaticity in Two-Point-Mass Microlensing”, *ApJ*, 690, 1772
47. Uemura, M., et al. (including **Pejcha, O.**), “Deep Fading of the New Herbig Be Star MisV1147”, *PASP*, 56, 183

## Students and Postdocs Supervised in Research

- Postdocs: **Damien Gagnier** (since May 2021), **Diego Calderón** (since Oct 2019), **Petr Kurfürst** (2017 – 2020, now at Masaryk University), **Michał Pawlak** (2017 – 2020, now at Jagiellonian University)
- PhD: **Jakub Cehula**, (since Oct 2021, “Theory of binary star interactions”), **Anthony Kirilov** (since Oct 2021, “Radiation hydrodynamics of transients associated with binary star interactions”), **Camille Landri** (since Oct 2020, “Theory and observations of two stars undergoing strong interaction or merger”), **Milan Pešta** (since Oct 2020, “Illuminating binary star evolution with observed populations and theoretical modeling”)
- Master: **David Vokrouhlický** (since Nov 2020, “Structure and evolution of stars deformed by a nearby companion”), **Jakub Cehula** (2019 – 2021, “Stability of stars undergoing rapid mass loss”), **Dominika Hubová** (2019 – 2021, “Angular momentum loss from binary stars due to stellar winds”)
- Bachelor: **Matěj Mezera** (2019 – 2020, “Dynamical perturbations of triple stellar and planetary systems seen in gravitational waves with LISA”), **Dominika Hubová** (2017 – 2019, “Mass loss from binary stars”, paper published in MNRAS)
- Other: **Petr Jakubčík** (2018, summer project on “Damped random walk modeling of light curves”, co-author on paper in MNRAS), **Jacob Tyles** (2016 – 2017, “Dynamical response of stars to mass loss: applications to transients”, co-author on paper in ApJ), **Adam Vrátný** (2018), **Semyeong Oh** (2015 – 2017), **Arjun Raghavan** (2015)

## Teaching experience

- since 2020 : “Fundamentals of Plasma Theory”, mandatory class for Master students of Theoretical Physics
- spring 2019 : created and taught new class “Astrophysics of Gravitational Wave Sources”
- since 2017 : founded and leading discussions at bi-weekly “Science coffee” discussion, also class “New Developments in Theoretical Physics and Astrophysics”
- 2017 : guest lectures at Problems of Contemporary Physics, Philosophical Problems of Physics, Relativistic Seminar
- 2009/2010 : teaching assistant for undergraduate astronomy classes, Ohio State University

## Invited Conference Talks

- September 2020 : Plenary lecture at 20th Conference of Czech and Slovak Physicists, Prague, Czechia
- January 2020 : Three-kings conference of young physicists, Slovakia, Bratislava
- May 2019 : Common Envelope Workshop, Flatiron Institute, NY, USA
- June 2018 : Plenary lecture at Week of Doctoral Students, Prague, Czech Republic
- December 2017 : International Workshop on Astronomical X-ray Optics, Prague, Czech Republic
- September 2017 : The Dynamic Infrared Sky, Caltech, Pasadena, USA
- March 2017 : Phenomena, Physics, and Puzzles Of Massive Stars and their Explosive Outcomes, KITP, Santa Barbara, CA
- September 2016 : Fellows at the Frontiers 2016, Northwestern University, Evanston, IL
- June 2016 : Many Riddles About Core-Collapse Supernovae: 1 Bethe and Beyond, Tokyo, Japan (declined)
- June 2016 : Shocks and Particle Acceleration in Novae and Supernovae, New York, NY
- April 2015 : American Physical Society April Meeting, Baltimore, MD

## Invited Talks at Research Institutions

(at least part of the travel costs covered by the receiving institution)

- March 2021 : Seminar, Nicolaus Copernicus Astronomical Center, Toruń, Poland
- November 2019 : Colloquium, Radboud University, Netherlands
- February 2019 : Seminar, Instituto Astrofisica de Canarias, Spain
- November 2018 : Colloquium, University of Amsterdam, Netherlands
- March 2018 : Seminar, DESY Zeuthen, Germany
- February 2018 : Seminar, University of Delaware, Newark, DE
- February 2017 : Colloquium, Department of Astronomy, University of Maryland, College Park, MD
- February 2017 : Colloquium, Department of Astronomy, University of Arizona, Tucson, AZ
- January 2017 : Colloquium and Seminar, Institute of Astronomy, University of Hawaii, Honolulu, HI
- November 2016 : CIERA Special Seminar, Northwestern University, IL

November 2016 : Colloquium, Department of Astronomy, Caltech, Pasadena, CA  
 October 2016 : Seminar, Astronomical Observatory, University of Warsaw, Poland  
 September 2016 : Seminar, Astrophysics Research Centre, Queen's University, Belfast, UK  
 March 2016 : Seminars, Astronomical Institute of the Czech Academy of Sciences, Czech Republic  
 December 2015 : Colloquium, Kavli Institute for Astronomy and Astrophysics, Beijing, China  
 October 2015 : Lars Bildsten's group meeting, Kavli Institute for Theoretical Physics, Santa Barbara, CA  
 October 2015 : Supernova light curves group meeting, California Institute of Technology, Pasadena, CA  
 October 2015 : Adam Riess's group meeting, John Hopkins University, Baltimore, MD  
 March 2015 : Astronomy Seminar, Dartmouth University, Hanover, NH  
 March 2015 : ITC Seminar, Center for Astrophysics, Harvard University, Cambridge, MA  
 January 2015 : Astrophysics Seminar, Rutgers University, NJ  
 November 2014 : CIERA Special Seminar, Northwestern University, IL  
 November 2012 : Informal Seminar, Institute for Advanced Study, Princeton, USA  
 October 2012 : Seminar, Theoretical Astrophysics Center, University of California, Berkeley, CA

### **Other talks outside of Czechia**

2021 : IAU Symposium 366 The origin of outflows in evolved stars (Belgium, online), Common Envelope Physics and Outcomes (Israel, online)  
 2019 : Center for Computational Astrophysics (USA), Stony Brook University (USA), 233<sup>rd</sup> Meeting of AAS (USA)  
 2017 : conference FOE2017 (USA), Thunch at Princeton University (USA)  
 2016 : workshop Preparing for SN science in the LSST era (USA), conference 8<sup>th</sup> Huntsville GRB Symposium (USA), conference The Supernovae Through the Ages Conference (Chile), University of California, Berkeley (USA), University of Arizona (USA), Hubble Fellows Symposium (USA), 227<sup>th</sup> Meeting of AAS (USA)  
 2015 : Carnegie Observatories (USA), University of California, Santa Cruz (USA), Hubble Fellows Symposium (USA)  
 2014 : Columbia University (USA), Princeton University (USA), Hubble Fellows Symposium (USA)  
 2013 : Conference on Supernovae (Japan), 221<sup>th</sup> Meeting of AAS (USA)  
 2012 : workshop on Outstanding Problems in Massive Star Research (USA)  
 2009 : MDM Science Meeting (USA)  
 2008 : Manchester Microlensing Conference (UK)  
 2007 : Stellar astrophysics conference (Slovakia)  
 2002 : A.F.O.E.V. international conference on Variable Stars (France)

### **Outreach Efforts**

February 2021 : talk at Science cafe Nove Straseci  
 August 2019 : talks at Astronomical Expedition and Camp for Variable Star Observers  
 March 2019 : talk at "Science to go"  
 2018 & 2019 : several interviews for feature documentary film on proposed future stellar merger, director Samuel Smartt (Calvin College)  
 Summer 2018 : interviews for Czech national newspapers about ERC Starting Grant award  
 November 2017 : talk, Cafe Academia  
 January 2017 : lecture, Amateur Astronomers Association of Princeton  
 August 2015 : talk, Undergraduate Summer Research Program, Princeton, NJ  
 September 2012 : developed engine for online fits of eclipsing binary minima timings for Section of Variable Stars and Exoplanets: more than 9000 timings uploaded so far  
 May 2012 : talk, Astronomical Society Pardubice, Czech Republic  
 May 2011 : talk, Astronomical Society Pardubice, Czech Republic  
 June 2009 : talk, Astronomical Society Pardubice, Czech Republic  
 summer 2008 : developed engine for online fits of exoplanet transit timings for Exoplanet Transit Database: more than 8000 transits uploaded so far

March 2008 : talk, Astronomical Society Pardubice, Czech Republic  
since 2006 : frequent talks at annual Conference on Variable Star Research and other events organized by Section of Variable Stars and Exoplanets, Czech Astronomical Society

### **Observing Experience**

1. Large Binocular Telescope, 5 nights in March 2009, optical photometry
2. MDM 2.4m, 7 nights in November 2009, optical long-slit spectroscopy and photometry
3. MDM 1.3m, three weeks total in 2009 and 2010, optical long-slit spectroscopy and photometry
4. SAAO 1.0m, two weeks in 2007, optical photometry of microlensing events
5. Brno Observatory and Planetarium 0.4m, Czech Republic, 120 nights in 2002–2005, optical photometry
6. Visual estimates, 6500 magnitude estimates and 120 eclipsing binaries minima timings between 1998 and 2002

### **Funding Received**

2019 – 2023 : European Research Council Starting Grant, EUR 1,243,219  
2019 – 2022 : Czech–American Collaboration grant from Czech Ministry of Education, Sports and Youth, approx. EUR 256,000  
2019 – 2021 : Czech Science Foundation, approx. EUR 143,000 (declined)  
2018 – 2019 : US Embassy in Prague Small Grants Programme, USD 3,000  
2017 – 2020 : Primus Research Programme, approx. EUR 376,000  
2017 – 2018 : co-Investigator on Cycle 25 HST Theory grant #15041 (PI B. Metzger, Columbia).  
No funding received due to moving to Czech Republic  
2016 – 2017 : Lyman Spitzer Jr. Fellowship, approx. USD 90,000  
2013 – 2016 : NASA Hubble Fellowship, USD 310,421  
2008–2009 & 2012–2013 : Distinguished University Fellowship, Ohio State University, approx. USD 26,000 + tuition

### **Professional Activities**

1. SOC member of European Astronomical Society Annual Meeting 2020 symposium “Common-envelope systems: progenitors, mergers and survivors”, Leiden, Netherlands
2. scientific coordinator of physicsphd.cz
3. co-investigator on successful GTC DDT and regular proposals in 2019 (PI D. Jones)
4. co-organizer of Common-envelope evolution and post-common-envelope systems, RAS Specialist Discussion meeting (October 2019)
5. in charge of Facebook page of Institute of Theoretical Physics (since February 2018).
6. panelist for discussion “Next 10 years of Czech astronomy”
7. organized visits of US Women astronomers in Prague to serve as role models for female students (with the support of US Embassy in Prague Small Grant, 2018–2019)
8. established “science coffee” discussion for Institute of Theoretical Physics and Astronomical Institute at Charles University to discuss new preprints and to foster interactions in the department (since 2017)
9. mentoring and career advice to interested students in theoretical physics and astronomy at Charles University (since 2018)
10. member of SOC for Common Envelope Evolution Workshop at Center for Computational Astrophysics, NY (May 2017)
11. co-investigator on ESO DDT proposal, allocated 1 hour on XSHOOTER on VLT (PI M. Pawlak, postdoc in my group)
12. panelist for NASA Hubble Space Telescope proposal review
13. panelist for National Science Foundation Stellar Astronomy panel
14. panelist for the NASA Astrophysics Theory Program
15. reviewer for the NASA Earth and Space Science Fellowship Program, Canadian Time Allocation Committee, Czech Ministry of Education, Youth, and Sports, Polish National Science Centre

16. referee for Nature Astronomy, The Astrophysical Journal, The Astrophysical Journal Letters, The Astronomical Journal, Monthly Notices of the Royal Astronomical Society, Astronomy & Astrophysics, Astrophysics & Space Science
17. member of the Executive committee of the Variable Star and Exoplanet Section of the Czech Astronomical Society (since 2008)

### **Foreign visitors to my group in Prague**

Prof. Jim Fuller (Caltech, March 2018), Tomas Muller (University of Southampton, July 2018), Dr. Jessica McIver (Caltech, October 2018), Prof. Bernhard Muller (Monash University, December 2018), Prof. Nadia Zakamska (Johns Hopkins University, April 2019), Prof. Hans-Thomas Janka (MPA Garching, April 2019), Dr. Molly Peeples (Space Telescope Science Institute, May 2019), Kareem El-Badry (University of California Berkeley, September 2019), Dr. Nadia Blagorodnova (Radboud University, November 2019), Yuan-Sen Ting (Australian National University, May 2022).