Curriculum Vitae — Zachary P. Vanderbosch

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Research Interests

Time-domain astronomy ••• Pulsating white dwarf stars ••• Evolved planetary systems around white dwarf stars ••• Data mining large surveys ••• Asteroseismology ••• Astronomical pipeline development ••• Stellar evolution ••• Laboratory Astrophysics

Education

The University of Texas at Austin *August 2015 – present (expected August 2021)*
Ph.D. Astronomy Candidate
Advisors: Don Winget & Mike Montgomery
Thesis: Pulsations and Planetary Debris: Variable White Dwarfs in Time-Domain Surveys

The University of North Carolina at Chapel Hill *2009–2013*
B.S. Astrophysics, *cum laude*

Publications

As of 2020 December 3rd, I have been involved in 10 peer-reviewed publications with 96 citations in high-impact journals, 2 of which are first and second author papers with 33 citations.

First/Second Author Publications:

* *indicates paper written with an undergraduate student I supervised*

1. **Vanderbosch, Z.**, Hermes, J. J., Dennihy, E., et al., *A White Dwarf with Transiting Circumstellar Material Far outside the Roche Limit*, ApJ, 897, 171
2. *Guidry, J., **Vanderbosch, Z.**, Hermes, J. J., et al., *I Spy Transits and Pulsations: Empirical Variability in White Dwarfs Using Gaia and the Zwicky Transient Facility*, ApJ, submitted, arXiv:2012.00035

Co-Author Publications:

3. Kepler, S. O., Winget, D., **Vanderbosch, Z.**, et al., *The pulsating white dwarf G117-B15A: still the most stable optical clock known*, ApJ, accepted, arXiv:2010.16062
4. Casewell, S., Belardi, C., Parsons, S., ..., **Vanderbosch, Z.**, et al., *WD1032 + 011, an inflated brown dwarf in an old eclipsing binary with a white dwarf*, MNRAS, 497, 3571
5. Reding, J., Hermes, J. J., **Vanderbosch, Z.**, et al., *An Isolated White Dwarf with 317 s Rotation and Magnetic Emission*, ApJ, 894, 19
6. Kilic, M., Rolland, B., Bergeron, P., **Vanderbosch, Z.**, et al., *A magnetic white dwarf with five H α components*, MNRAS, 489, 3648

7. Bell, K., Pelisoli, I., Kepler, S. O., ..., **Vanderbosch, Z.**, et al., *The McDonald Observatory search for pulsating sdA stars. Asteroseismic support for multiple populations*, A&A, 617, 6

8. Bell, K., Hermes, J. J., **Vanderbosch, Z.**, et al., *Destroying Aliases from the Ground and Space: Super-Nyquist ZZ Cetis in K2 Long Cadence Data*, ApJ, 851, 24

9. Bell, K., Gianninas, A., Hermes, J. J., ..., **Vanderbosch, Z.**, et al., *Pruning The ELM Survey: Characterizing Candidate Low-mass White Dwarfs through Photometric Variability*, ApJ, 835, 180

10. Greiss, S., Hermes, J. J., Gänsicke, B., ..., **Vanderbosch, Z.**, et al., *The search for ZZ Ceti stars in the original Kepler mission*, ApJ, 457, 2855

Professional Presentations

Talks:

1. *The Zwicky Transient Facility as a Variable White Dwarf Discovery Tool*, UT Austin Department of Astronomy, *2020 November 11*

2. *Planetary Debris around White Dwarfs in the Zwicky Transient Facility*, Celebrating ZTF-I & Soft Launch of ZTF-II, Caltech, USA, *2020 October 23*, **invited talk**, link to recording

3. *A ground-based detection of a DBV outburst*, IAU Symposium 357: White Dwarfs as probes of fundamental physics and tracers of planetary, stellar, & galactic evolution, Hilo, Hawaii, USA, *2019 October 21–25*

4. *Variable Stars in ZTF and a Second Case of Transiting Debris around a White Dwarf*, UT Austin Department of Astronomy, *2019 October 3*

5. *Observing Outbursting White Dwarfs in the post-Kepler Era*, TASC5/KASC12 Workshop, MIT/Cambridge, USA, *2019 July 22–26*

6. *A Ground-based Detection of an Outbursting White Dwarf*, UT Austin Department of Astronomy, *2019 April 17*

7. *The Empirical Limits of the DB(A) Instability Strip*, 21st European White Dwarf Workshop, UT Austin, *2018 July 23–27*, link to recording

8. *Redefining the Helium White Dwarf Pulsation Instability Strip with High-Speed Photometry, Uniform Spectroscopy, and Sandia Experiments*, UT Austin Department of Astronomy, *2018 March 21*

Posters:

9. *ZTF J0139+5245: A Second Case of Transiting Circumstellar Debris around a White Dwarf*, IAU Symposium 357: White Dwarfs as probes of fundamental physics and tracers of planetary, stellar, & galactic evolution, Hilo, Hawaii, USA, *2019 October 21–25*, PDF

10. *Empirical Constraints on the DB White Dwarf Instability Strip*, Sandia National Labs: Z Fundamental Science Workshop, Albuquerque, New Mexico, USA, 2019 August 11–14, PDF

11. *The First Ground-Based Detection of an Outburst in a K2 Pulsating Helium Atmosphere White Dwarf*, Kepler and K2 SciCon V, Glendale, California, USA, *2019 March 4–8*, PDF

12. *Asteroseismology of Pulsating Helium Atmosphere White Dwarfs using K2*, TASC4/KASC11 Workshop: First Light in a New Era of Astrophysics, Aarhus University, Denmark, *2018 July 8–13*, PDF

13. *V471 Tauri: Examining Eclipse Timing Variations with Two Independent Clocks*, 20th European White Dwarf Workshop, University of Warwick, UK, *2016 July 25–29*, PDF

Awarded Telescope Time

* *indicates time that includes currently active allocations*

McDonald 2.1-m, ProEM Photometer	**241/128 nights as PI/Co-PI — Observed 216 Nights*
McDonald 2.7-m, Tull Spectrograph	*23 nights as PI — Observed 21 Nights*
McDonald 2.7-m, Coude Guide Photometer	*4 nights as PI — Observed 4 Nights*
HET 10-m, LRS2 Spectrograph	**79/10 hours as PI/Co-PI — Used 49/6 hours*
LCOGT 1.0-m Network, Sinistro Imager	**110 hours as PI — Used 91.6 hours*
LCOGT 0.4-m Network, SBIG Imager	*5 hours as PI — Used 4.6 hours*
Gemini North 8.1-m, GMOS Spectrograph	**3.2 hours Fast Turnaround Time as PI*

Teaching and Advising

Research Advisor: *Joseph Guidry, UT Undergraduate* *Spring 2019 – present*
Co-advised an undergraduate student in two research projects, one leading to a poster presented at the TASC4/KASC12 workshop, and another leading to a recently submitted publication (Guidry et al. 2020), *UT Austin*

Research Mentor: *Freshman Research Initiative (FRI)* *Spring 2018 – present*
TA and mentor engaging undergraduate students in genuine research experiences, *UT Austin*

PDP Participant: *ISEE Professional Development Program* *Spring – Fall 2018*
Actively developed inquiry-based learning activities through the Institute for Scientist & Engineer Educators (ISEE) Professional Development Program (PDP), culminating in the design and execution of a 3-class workshop for an undergraduate research methods course, *UT Austin, UC Santa Cruz*

Teaching Assistant: *AST-309N, Lives and Deaths of Stars* *Fall 2017*
TA for an introductory Astronomy class for non-STEM majors, *UT Austin*

Teaching Assistant: *AST-321, The Future of Humanity* *Fall 2016*
TA for a discussion and writing intensive course for both STEM/non-STEM majors, *UT Austin*

Undergraduate Teaching Assistant: *ASTR-101L, Intro Astronomy Lab* *Spring 2011, 2012, 2013*
Assistant to graduate TA in interactive Astronomy labs, *UNC Chapel Hill*

Instrumentation

1. **ProEM Filter Wheel Upgrade**: Designed, assembled, and commissioned a new software-integrated filter wheel, allowing for multi-color photometry with the ProEM photometer on the McDonald 2.1-m telescope. *UT Austin, Spring 2016 – Fall 2017*
2. **Syzygy Optics VPH Gratings**: Lab assistant manufacturing and developing production methods for volume phase holographic (VPH) diffraction gratings, primarily for astronomical and medical purposes. *UNC Chapel Hill, Summer 2014 - Spring 2015*

3. **Goodman Spectrograph Camera Shutter Upgrade**: Designed a new camera shutter incorporating a GPS-linked Hall-effect sensor to provide accurate shutter open and close times for astronomical imaging. Traveled to the SOAR telescope in Chile to install the new shutter on the Goodman Spectrograph. *UNC Chapel Hill, Fall 2011 – Fall 2012*

Skills

Computer Languages:	Python, Java Script, bash/shell, git, LaTeX, C#, R
Software:	IRAF, TOPCAT, Period04, WQED, MOOG, iSpec, MS Office, Autodesk Inventor & Fusion 360, Zemax
Instrumentation:	Precision mill and lathe operation, soldering, PCB design, ray tracing & optics manufacturing