

# Curriculum Vitae — Zachary P. Vanderbosch

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## Research Interests

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Time-domain astronomy ∙ Pulsating white dwarf stars ∙ Evolved planetary systems around white dwarf stars ∙ Data mining large surveys ∙ Asteroseismology ∙ Astronomical pipeline development ∙ Binary and single star evolution ∙ Laboratory astrophysics ∙ Type-Ia supernovae

## Education

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**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

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As of 2020 December 3<sup>rd</sup>, I have been involved in 10 peer-reviewed publications with 94 citations in high-impact journals, 2 of which are first and second author publications with 33 citations.

### First/Second Author Publications:

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\* 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:

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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  $\alpha$  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 Ceti 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

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### 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*, 21<sup>st</sup> 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*, 20<sup>th</sup> European White Dwarf Workshop, University of Warwick, UK, 2016 July 25–29, [PDF](#)

## Awarded Telescope Time

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\* 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-I — 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

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<b>Research Advisor:</b> <i>Joseph Guidry, UT Undergraduate</i> Co-advised an undergraduate student in two research projects, one leading to a poster presented at the TASC5/KASC12 workshop, and another leading to a recently submitted publication (Guidry et al. 2020), <i>UT Austin</i>	<i>Spring 2019 – present</i>
<b>Research Mentor:</b> <i>Freshman Research Initiative</i> TA and mentor engaging undergraduate students in genuine research experiences, <i>UT Austin</i>	<i>Spring 2018 – present</i>
<b>PDP Participant:</b> <i>ISEE Professional Development Program</i> Actively developed inquiry-based learning activities through the Institute for Scientist & Engineer Educators (ISEE) Professional Development Program, culminating in the design and execution of a 3-class inquiry activity for a 30-student undergraduate research methods course, <i>UT Austin, UC Santa Cruz</i>	<i>Spring – Fall 2018</i>
<b>Teaching Assistant:</b> <i>AST-309N, Lives and Deaths of Stars</i> TA for an introductory Astronomy class for non-STEM majors, <i>UT Austin</i>	<i>Fall 2017</i>
<b>Teaching Assistant:</b> <i>AST-321, The Future of Humanity</i> TA for a discussion and writing intensive course for both STEM/non-STEM majors, <i>UT Austin</i>	<i>Fall 2016</i>
<b>Undergraduate Teaching Assistant:</b> <i>ASTR-101L, Intro Astronomy Lab</i> Assistant to graduate TA in interactive Astronomy labs, <i>UNC Chapel Hill</i>	<i>Spring 2011, 2012, 2013</i>

## Instrumentation

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- 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*
- 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

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**Computer Languages:** Python, JavaScript, SQL/ADQL, bash/shell,  $\LaTeX$ , C#, R, git, markdown, reStructuredText, HTML

**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