Carl Andrew Ziegler

Dunlap Fellow
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Research Interests

Characterization of exoplanets; formation and evolution of planetary systems in multiple star systems; large adaptive optics surveys; stellar multiplicity of nearby stars

Education

May 2018 **University of North Carolina**, Chapel Hill, NC
PHD, Physics and Astronomy
Thesis: "Characterization of Exoplanets and Stellar Systems with New Robots"
Research: exoplanets, multi-star systems and robotic adaptive optics
Advisor: Prof. Nicholas Law

August 2013 **Southern Illinois University**, Carbondale, IL
M.S., Physics
Thesis: "Adsorption of Neon on Open Carbon Nanohorn Aggregates"
Advisor: Prof. Aldo Migone

May 2009 **William Jewell College**, Liberty, MO
B.A., Physics and Mathematics
Research: variable stars, globular clusters
Advisor: Prof. Maggie Sherer

Highlighted Publications

- *Robo-AO Kepler Planetary Candidate Survey IV: The effect of nearby stars on 3857 planetary candidate systems*
  C. Ziegler, et al., The Astronomical Journal, 2018 **155** 161
- *Robo-AO Kepler Planetary Candidate Survey III: Adaptive Optics Imaging of 1629 Kepler Exoplanet Candidate Host Stars*
  C. Ziegler, et al., The Astronomical Journal, 2017 **153** 66
- *SRAO: optical design and the dual-knife-edge WFS*
  C. Ziegler, et al., Proc. SPIE 9909, Adaptive Optics Systems V, 99093Z, 2016
- *Robo-AO Kepler Planetary Candidate Survey II: Adaptive Optics Imaging of 969 Kepler Exoplanet Candidate Host Stars*
  C. Baranec, C. Ziegler, et al., The Astronomical Journal, 2016 **152** 18
- *Multiplicity of the Galactic Senior Citizens: A High-resolution Search for Cool Subdwarf Companions*
  C. Ziegler, et al., The Astrophysical Journal, 2015 **804** 30

All Publications

17. *Robo-AO Kepler Survey V: The effect of physically associated stellar companions on planetary systems*
C. Ziegler, et al., *Submitted to AAS Journals*

16. *Robo-AO Kepler Survey IV: the effect of nearby stars on 3857 planetary candidate systems*
C. Ziegler, et al., The Astronomical Journal, 2018 **155** 161

15. *Full Sky Coverage Laser-only Adaptive Optics Achieves Significant Image Quality Gains Compared to Seeing-limited Observations*
W. Howard, N. Law, C. Ziegler, et al., The Astronomical Journal, *In press*

14. *Robo-AO Discovery and Basic Characterization of Wide Multiple Star Systems in the Pleiades, Praesepe, and NGC 2264 Clusters*
L. Hillenbrand, ..., C. Ziegler, et al., The Astronomical Journal, *In press*

13. *Robo-AO Kepler Asteroseismic Survey. I. Adaptive optics imaging of 99 asteroseismic Kepler dwarfs and subgiants*
J. Schonhut-Stasik, C. Baranec, ..., C. Ziegler, et al., Astrophysical Journal, 2017 **847** 97

12. *Ultra Short Period Planets in K2 with companions: a double transiting system for EPIC 220674823*
E. R. Adams, ..., C. Ziegler, et al., The Astronomical Journal, 2017 **153** 82

11. *Robo-AO Kepler Planetary Candidate Survey III: Adaptive Optics Imaging of 1629 Kepler Exoplanet Candidate Host Stars*
C. Ziegler, et al., The Astronomical Journal, 2017 **153** 66

10. *197 Candidates and 104 Validated Plantes in K2's First Five Fields*
I. Crossfield, ..., C. Ziegler, et al., The Astrophysical Journal Supplement, 2016 **226** 7

9. *Probability of physical association of 104 blended companions to Kepler objects of interest using visible and near-infrared adaptive optics photometry*
D. Atkinson, C. Baranec, C. Ziegler, et al., The Astronomical Journal, 2017 **153** 25

8. *Robo-AO Kepler Planetary Candidate Survey II: Adaptive Optics Imaging of 969 Kepler Exoplanet Candidate Host Stars*
C. Baranec, C. Ziegler, et al., The Astronomical Journal, 2016 **152** 18

7. *The strange case of WR2*
A.-N. Chené, ..., C. Ziegler, et al., *Submitted MNRAS*, 2016

6. *Two Small Temperate Planets Transiting Nearby M Dwarfs in K2 Campaigns 0 and 1*
J. Schlieder, ..., C. Ziegler, et al., The Astrophysical Journal, 2016 **818** 87

5. *HII 2407: An Eclipsing Binary Revealed By K2 Observations of the Pleiades*
T. David, ..., C. Ziegler, et al., The Astrophysical Journal, 2015 **814** 62

4. *KELT-8b: A Highly Inflated Transiting Hot Jupiter and a New Technique for Extracting High-precision Radial Velocities from Noisy Spectra*
B. Fulton, ..., C. Ziegler, et al., The Astrophysical Journal, 2015 **810** 30

3. *Multiplicity of the Galactic Senior Citizens: A High-resolution Search for Cool Subdwarf Companions*
C. Ziegler, et al., The Astrophysical Journal, 2015 **804** 30

2. *Robotic Laser Adaptive Optics Imaging of 715 Kepler Exoplanet Candidates with Robo-AO*
N. Law, ..., C. Ziegler, et al., The Astrophysical Journal, 2014 **791** 35

1. *Neon and CO_2 Adsorption on Open Carbon Nanohorns*
V. Krungleviciute, C. Ziegler, et al., Langmuir, 2013 **29** (30), pp 9388–9397

SPIE Instrumentation Papers

3. *SRAO: the southern robotic speckle + adaptive optics system*
   N. Law, C. Ziegler, A. Tokovinin, Proc. SPIE 9907, Optical and Infrared Interferometry and Imaging V, 99070K, 2016
2. *SRAO: optical design and the dual-knife-edge WFS*
   C. Ziegler, et al., Proc. SPIE 9909, Adaptive Optics Systems V, 99093Z, 2016
1. *The Robo-AO KOI survey: laser adaptive optics imaging of every Kepler exoplanet candidate*
   C. Ziegler, et al., Proc. SPIE 9909, Adaptive Optics Systems V, 99095U, 2016

Talks

Conference Talks

- *Robo-AO KOI Survey: LGS-AO imaging of every Kepler planetary candidate host star*
  AAS 231, January 9-12, National Harbor, MD (2018)
- *High resolution imaging of 4000 Kepler planetary candidate host stars*
  Know Thy Star, Know Thy Planet, October 11, Pasadena, CA (2017)
- *Robo-AO KOI Survey: LGS-AO imaging of every Kepler planetary candidate host star*
  Transiting Exoplanets, July 17, Keele, UK (2017)
- *Adaptive Optics Imaging of Kepler Planetary Candidates*
  North Carolina Astronomers Meeting, September 24, Jamestown, NC (2016)
- *The Robo-AO KOI Survey: Laser Adaptive Optics Imaging of Every Kepler Exoplanet Candidate*
  AAS 227, January 4-8, Kissimmee, FL (2016)
- *Study of Carbon Dioxide adsorption on Purified HiPco Nanotubes*
  American Physical Society Meeting, March 18–22, Baltimore, MD (2013)

Invited Talks

- *The Robo-AO KOI survey and the development of a Southern robotic AO system*
  Institute for Astronomy, September 14, Hilo, Hawaii (2016)

Conference Posters

- *Robo-AO KOI Survey: Robotic LGS-AO Imaging of Every Kepler Planetary Candidate*
  C. Ziegler, et al., Kepler SciCon IV, NASA Ames (2017)
- *SRAO: the first southern robotic AO system*
  C. Ziegler, et al., SPIE Astronomical Telescopes + Instrumentation, Edinburgh, UK (2016)
- *The Robo-AO KOI survey: laser adaptive optics imaging of every Kepler exoplanet candidate*
  C. Ziegler, et al., SPIE Astronomical Telescopes + Instrumentation, Edinburgh, UK (2016)
- *Multiplicity of the Galactic Senior Citizens: A high-resolution search for cool subdwarf companions*
  C. Ziegler & N. Law, AAS 225, Seattle, WA (2015)

Teaching Experience

Spring 2017	**University of North Carolina**, Chapel Hill, NC *Undergraduate Research Mentor* Advised UNC undergraduate with novel methods to reduce adaptive optics images of bright stars
Summer 2015	**University of North Carolina**, Chapel Hill, NC *Summer Research Mentor* Advised high school student with *Kepler* host star multiplicity research
Fall 2013- Spring 2014	**University of North Carolina**, Chapel Hill, NC *Astronomy 101L Lab Teaching Assistant* Led five lab sections using robotic "Skynet" telescopes
Fall 2010- Spring 2013	**Southern Illinois University**, Carbondale, IL *Astronomy 101 Lab Teaching Assistant* Taught twenty lab sections in astronomy
Spring 2012- Fall 2012	**Southern Illinois University**, Carbondale, IL *Physics Lab Instructor* Taught three calculus-based physics lab courses

Professional Service and Public Outreach

- Referee of two papers for Monthly Notices of the Royal Astronomical Society (MNRAS)
- Assisted in twenty public observing nights for Chapel Hill Astronomical and Observational Society
- Two public talks for Raleigh Astronomy Club
- Organized and led astronomy booth for UNC Science Expo (2 years)

Sofware Skills

Computer Programming:	- Python (primary language for astronomical data analysis) - C++ (control software for Andor EMCCD camera, WFS reconstruction) - IRAF (astronomical data analysis, primarily for SOAR spectroscopy) - HTML (designed Robo-AO Kepler website, `roboaokepler.org`) - LabVIEW (wrote control GUI for gas adsorption instrumentation) - Mathematica (hydrodymical simulations for graduate ISM class)

Instrumentation

Instrumentation Design:	- Zemax (optical design for Robo-SOAR) - SolidWorks (modeling for fabrication of custom mounts and packaging used in Robo-SOAR)
Robo-SOAR construction:	- built optical testbed of NGS-AO system - designed and constructed prototype of reflective pyramid WFS