

Kyle W. Willett

Sr. Applied Scientist
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<https://willett.github.io/pages/research.html>

Research Interests

- Galaxy morphology
- Active galactic nuclei
- Astrophysical masers
- Galaxy evolution
- Crowdsourced citizen science
- Data science
- Synthetic control
- Large-scale ML classification
- Multi-modal inference

Education

PH.D., ASTROPHYSICAL AND PLANETARY SCIENCES, 2011

University of Colorado, Boulder, CO, USA

Thesis: “OH Masers from Andromeda to the Peak of Cosmic Star Formation”

M.S., ASTROPHYSICAL, PLANETARY, AND ATMOSPHERIC SCIENCES, 2007

University of Colorado

B.A., PHYSICS, 2005
(*magna cum laude*)

Carleton College, Northfield, MN, USA

Professional Experience

SR. APPLIED SCIENTIST, **Amazon.com** (2016–present). ML and data scientist working for Amazon Marketplace, Seller Partner Services, and Fees Science organizations. Major projects include applications to pricing estimates, search ranking, high-cardinality multi-modal classification, causal inference estimates, and developing LLM agentic tools.

FELLOW, **Insight Data Science** (2016). Three-month competitive fellowship for transitioning PhDs to non-academic and industry applied science positions.

Research Experience

RESEARCH ASSOCIATE, **University of Minnesota** (2011–2016). Postdoctoral researcher with Prof. Lucy Fortson. Led reduction and analysis of the Galaxy Zoo 2 project, focusing on detailed structural morphology of galaxies from crowdsourced annotations. Worked as lead data scientist for Galaxy Zoo collaboration from 2015–2016. Lead author for two major catalog releases and author/co-author on 48 project publications. Developed new research tools for citizen science projects at the Zooniverse. Other research centered on environmental properties of blazars/BL Lacs and the evolutionary blazar sequence.

GRADUATE RESEARCH ASSISTANT, **University of Colorado** (2006–2011). Ph.D. thesis research on extragalactic OH masers, including both single-dish and interferometric searches for masers as well as ground- and space-based infrared studies of maser host galaxies with Prof. Jeremy Darling. Additional research on infrared properties of young radio galaxies with Prof. John Stocke.

JUNIOR RESEARCH ASSOCIATE, **National Radio Astronomy Observatory** (Jun–Aug 2006).
Reduction and analysis of a high-frequency radio survey for molecular absorbers at redshift $z \sim 1$, with Drs. Chris Carilli and Nissim Kanekar.

RESEARCH EXPERIENCE UNDERGRADUATE, **Lowell Observatory** (Jun–Aug 2004). Analyzed stellar and spatial structures in high-resolution imaging of irregular galaxies, working with Dr. Deidre Hunter.

Teaching Experience

LECTURER IN PHYSICS, **University of Minnesota** (Jan–May 2014). Instructor for PHYS 1101 course, “Introductory College Physics I” (classical mechanics for non-major undergraduates). Created and supervised lectures, assignments, exams, and lab activities for a 200-student course.

LECTURER IN ASTRONOMY, **University of Colorado** (June–July 2009). Instructor of record for the ASTR 1110 course “The Solar System”. Created all lectures, assignments, exams, and observing activities for a 30-student course.

TEACHING ASSISTANT, **University of Colorado** (2005–2006). Instructor for two laboratory sections of “Introductory Astronomy” and for two laboratory sections of “Accelerated Introductory Astronomy”. Designed a new lab activity for the accelerated course and rewrote the solution set for the coursewide lab manual.

GRADUATE TEACHER PROGRAM, **University of Colorado** (2005–2011). Participated in over 30 hours of educational workshops and seminars through the Graduate Teacher Program, including both astronomy-specific and general pedagogy. Included faculty observation and feedback, video recording, and one-on-one evaluations of teaching performance.

Observational Experience

- Principal investigator on Green Bank Telescope proposal 10B-035 (70 hrs.)
- Principal investigator on Arecibo Observatory proposal A2505 (3 hrs.)
- Co-investigator on Green Bank Telescope proposals 08A-043 (25 hrs.), 08B-035 (71 hrs.), 10C-039 (30 hrs.)
- Co-investigator on VLA proposal AD583 (25 hrs.)
- Co-investigator on Spitzer Space Telescope proposals 50591, 80070
- Near-infrared observing at Apache Point 3.5m ARC telescope (3 half-nights).
- On-site observing runs for radio pulsars at Parkes Observatory, NSW, Australia (2 weeks).

Awards and Recognition

- Ph.D. candidacy exam high pass, University of Colorado (2007)
- **Phi Beta Kappa**, Carleton College (2005)
- **Lawrence Gould Prize in Natural Science**, Carleton College (2005)

- **Mike Ewers Award in Astronomy**, Carleton College (2004)

Service and Membership

- **Referee** for *ApJ*, *MNRAS*, *PASP*, *Astronomy and Computing* (2010–2022)
- **Full Member**, American Astronomical Society (2005–2016)
- Graduate student committee member, Dept. of Astrophysics and Planetary Science, Univ. of Colorado: colloquium (2005–06), graduate exams (2007), graduate admissions (2008), faculty representative (2009–2010)
- Sommers-Bausch Observatory open house volunteer (2005–2011)
- Astronomy Day volunteer, University of Colorado (2005–2011)

Invited talks

- **Bell Museum, University of Minnesota**, Feb 2015
- **Minnesota State University, Mankato**, Feb 2014
- **Royal Astronomical Society**, May 2013
- **University of Oxford**, May 2013
- **University of Portsmouth**, May 2013
- **Yale University**, April 2013
- **University of Minnesota**, November 2011
- **Augsburg College**, October 2011
- **Minnesota Astronomical Society**, August 2011
- **University of Colorado**, March 2008

Professional references

Prof. Jeremy Darling

University of Colorado
 Dept. of Astrophysics and Planetary Science
 UCB 391
 Boulder, CO 80309
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Prof. Chris Lintott

University of Oxford
 Dept. of Physics
 Denys Wilkinson Building, Keble Road
 Oxford OX1 3RH, UK
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Prof. Lucy Fortson

School of Physics & Astronomy
 University of Minnesota
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 Minneapolis, MN 55455
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Selected publications

Please see NASA ADS or Google Scholar for a full list of my publications. As of Oct 2025: 5444 citations, h-index=26.

- Walmsley, M. et al. “Zoobot: Deep learning galaxy morphology classifier.” Astrophysics Source Code Library, ascl:2203.027 (2022)
- Walmsley, M. et al. “Galaxy Zoo DECaLS: Detailed visual morphology measurements from volunteers and deep learning for 314 000 galaxies.” MNRAS 509:3966 (2022)
- Beck, M.R. et al. “Integrating human and machine intelligence in galaxy morphology classification tasks.” MNRAS 476:5516 (2018)
- **K.W. Willett**, M.A. Galloway, S.P. Bamford, et al. “Galaxy Zoo: morphological classifications for 120,000 galaxies in HST legacy imaging.” MNRAS 464:4176 (2017)
- S. Dieleman, **K.W. Willett**, & J. Dambre. “Rotation-invariant convolutional neural networks for galaxy morphology prediction.” MNRAS 450:1441 (2015)
- J.K. Banfield, O.I. Wong, **K.W. Willett**, et al. “Radio Galaxy Zoo: host galaxies and radio morphologies derived from visual inspection.” MNRAS 453:2026 (2015)
- **K.W. Willett**, K. Schawinski, B.D. Simmons, et al. “Galaxy Zoo: the dependence of the star formation-stellar mass relation on spiral disc morphology.” MNRAS 449:820 (2015)
- M.A. Galloway, **K.W. Willett**, L.F. Fortson, et al. “Galaxy Zoo: the effect of bar-driven fuelling on the presence of an active galactic nucleus in disc galaxies.” MNRAS 448:3442 (2015)
- N. Kanekar, A. Gupta, C.L. Carilli, J.T. Stocke, & **K.W. Willett**. “A Blind Green Bank Telescope Millimeter-wave Survey for Redshifted Molecular Absorption.” ApJ 782:56 (2014)
- **K.W. Willett**, C.J. Lintott, S.P. Bamford, et al. “Galaxy Zoo 2: detailed morphological classifications for 304 122 galaxies from the Sloan Digital Sky Survey.” MNRAS 435:2835 (2013)
- **K.W. Willett**, J. Darling, H.W.W. Spoon, V. Charmandaris, & L. Armus. “Mid-Infrared Properties of OH Megamaser Host Galaxies. I. Spitzer IRS Low- and High-Resolution Spectroscopy.” ApJS 193:18 (2011)
- **K.W. Willett**, J. Darling, H.W.W. Spoon, V. Charmandaris, & L. Armus. “Mid-infrared Properties of OH Megamaser Host Galaxies. II. Analysis and Modeling of the Maser Environment.” ApJ 730:56 (2011)
- **K.W. Willett**, J.T. Stocke, J. Darling, & E.S. Perlman. “Spitzer Mid-Infrared Spectroscopy of Compact Symmetric Objects: What Powers Radio-Loud Active Galactic Nuclei?” ApJ 713:1393 (2010)
- S. Johnston, A. Karastergiou, & **K. Willett**. “High-frequency observations of southern pulsars.” MNRAS 369:1916 (2006)
- **K.W. Willett**, B.G. Elmegreen, & D.A. Hunter. “Power Spectra in V band and H α of Nine Irregular Galaxies.” AJ 129:2186 (2006)