

## Dr. Douglas L. Tucker, Ph. D.

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CONTACT INFORMATION	Fermi National Accelerator Laboratory MS 127, PO Box 500, Batavia, IL 60510, USA <a href="https://douglasleetucker.github.io/">https://douglasleetucker.github.io/</a>	<i>Work:</i> +1-630-840-2267 <i>Fax:</i> +1-630-840-8274 <i>Mobile:</i> +1-630-650-0240 <i>E-mail:</i> dtucker@fnal.gov
EMPLOYMENT	<b>Applications Physicist III</b> Fermi National Accelerator Laboratory <b>Applications Physicist II</b> Fermi National Accelerator Laboratory <b>Applications Physicist I</b> Fermi National Accelerator Laboratory <b>Postdoctoral Researcher</b> Leibniz-Institut für Astrophysik Potsdam, Germany (formerly Astrophysikalisches Institut Potsdam (AIP)) <b>Research Assistant</b> Department of Astronomy, Yale University <b>Teaching Assistant</b> Department of Astronomy, Yale University <b>Research Assistant</b> New College of Florida (formerly New College of USF)	2021 – present 2007 – 2021 1996 – 2007 1994 – 1996 1987 – 1994 1988 – 1993 1987 – 1987
EDUCATION	<b>Ph.D., Astronomy, Yale University</b> • Title: An Observational Study of Galaxies and their Environment on Large Scales • Adviser: Professor Augustus Oemler, Jr. <b>M.Phil., Astronomy, Yale University</b> <b>M.S., Astronomy, Yale University</b> <b>B.A., Physics, New College of Florida</b> (formerly New College of USF)	1994 1989 1988 1988
PROJECTS	<b>Las Campanas Redshift Survey (LCRS)</b> team member <b>Sloan Digital Sky Survey (SDSS) I &amp; II</b> Member and Builder <b>SuperNova Acceleration Probe (SNAP)</b> team member <b>Blanco Cosmology Survey (BCS)</b> team member <b>Dark Energy Survey (DES)</b> Member and Builder <b>Magellanic Satellites Survey (MagLiteS)</b> team member <b>DECam Local Volume Exploration Survey (DELVE)</b> Member and Builder <b>Vera C. Rubin Dark Energy Science Collaboration (DESC)</b> Full Member <b>Vera C. Rubin Observatory Pre-Operations Team</b> team member	
RESEARCH INTERESTS	Photometric Calibration of Large Surveys, Strong Gravitational Lensing, Groups of Galaxies, Observational Cosmology, Star Cluster Photometry, Dwarf Galaxies, Kilonovae, Trans-Neptunian Objects	
COMPUTING SKILLS	<b>Operating Systems:</b> Linux/UNIX, Apple OS X, VAX VMS <b>Computer Programming:</b> Python, UNIX shell scripting, awk, SQL, Java, Tcl, FORTRAN See also <a href="https://github.com/DouglasLeeTucker">https://github.com/DouglasLeeTucker</a> . <b>Astronomical Software:</b> Rubin Science Platform (RSP), TOPCAT, IRAF/pyraf, SExtractor, ASTROTOOLS, MTPIPE, GalFit, GAIA, and others.	

SOCIETIES &  
ORGANIZATIONS

American Astronomical Society Member  
International Astronomical Union Member

LEADERSHIP &  
MANAGEMENT  
ACTIVITIES

**Current:**

1. DES Calibrations Scientist (2007–present).
2. Member of the DES Executive Committee (2012–present).
3. Co-Convener of Vera C. Rubin Dark Energy Science Collaboration Photometric Corrections Working Group (DESC-PCWG) (December 2021–present)

**Completed:**

1. SDSS MTPICE Coordinator (1997–2009).
2. Organizer of the SNAP Calibration Working Group meeting held at Fermilab, July 8-9, 2004.
3. Leader of Stripe 82 Tertiary Standards Project (SDSS Project #290) (2005–2007).
4. Fermilab Representative on the SDSS Collaboration Council (2005–2008).
5. Co-leader of SEGUE Open Cluster Project (SDSS Project #287) (2005–2008).
6. Secretary for the Fermilab SNAP/DES group meetings (2006–2007).
7. Secretary for the DES Working Group Meetings (2006–2007).
8. Co-leader of 8 O’Clock Arc Follow-up Project (SDSS Project #356) (2006–2013).
9. Secretary for DES Management Committee Telecons (2007–2013).
10. Co-Chair of the Organizing Committee for the workshop, “Searching for Strong Lenses in Large Imaging Surveys,” held at Fermilab, June 14–15, 2007.
11. Chair of the Organizing Committee for the Fall 2007 SDSS Collaboration Meeting, held at Fermilab, November 1–4, 2007.
12. Chair of the Fermilab Center for Particle Astrophysics (FCPA) Visitors’ Committee (2008–2009).
13. Organizer of the DES RASICAM review held at Fermilab, March 24, 2010.
14. Organizer of DES PreCam Survey<sup>1</sup> observing and data processing (2010–2014).
15. Co-chair of the Local Organizing Committee and member of the Scientific Organizing Committee for the conference, “Calibration & Standardization of Large Surveys & Missions in Astronomy & Astrophysics,” which was held at Fermilab, April 16-19, 2012.
16. Leader of the DES Gravitational Wave Spectroscopic (DESGW-Spectro) group (2018-2023).

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<sup>1</sup>The PreCam Survey was a bright imaging survey in the DES footprint using DES CCDs and 100mm x 100mm DES filters on a 0.6-m telescope at CTIO in order to establish a rigid grid of calibration stars for DES. Observations for 100-night PreCam Survey occurred between August 2010 and January 2011.

**Rubin Pre-Operations Data Production & System Performance (2020–present)**

1. Helped with bulk data transfer of Data Preview 0.1 from IN2P3 to NCSA and with organizing of the Fermilab Rubin team as Computation Facility Scientist for the Rubin Data Production team (2020-2021).
2. Prepared RTN-026 (“Validation Tests of the DP0.1 TAPserver on IDF”) as a member of the System Performance Verification & Validation team (2021-2022).
3. Contributed to RTN-027/PREOPS-862 (“Validation of the DP0.2 Processing”) as a member of the System Performance Verification & Validation team (2021-2022).
4. Been an active member of the System Performance Community Engagement Team (2022-present).

**DES Commissioning, Operations, Calibrations, & Analysis (2004–present)**

1. Developed a photometric calibration strategy for the DES (Tucker et al. 2006) (2005–2018).
2. Co-wrote a pipeline (mostly in python) to process and analyze the data from the PreCam Survey (2010– 2014).
3. Co-wrote the PreCam Survey observing proposal, organized the PreCam Survey observing runs, helped provide technical support for PreCam observers, and observed for 32 nights of the PreCam Survey (2010-2011).
4. Wrote a suite of Java code for creating catalog-based simulations of stars within the DES and PreCam Surveys for optimizing the photometric calibrations strategy of the DES (2009–2010).
5. Prepared a functional requirements document for the DES 10-micron all-sky camera (RASICAM) (2006).
6. Wrote and maintained the Global Calibrations Module – a software module for calculating zeropoint offsets for overlapping DECam observations – for the DES Data Management (DESDM) data processing pipeline (2006–2018).
7. Wrote and maintained the Photometric Standards Module – a code module for enabling the automated analysis of DES standard star observations to produce a photometric solution for a night – for the DESDM) data processing pipeline (2005–2018).
8. Was an active member of the DES Science Verification Team (2012–2014).
9. Was an active member of the DES Operations Team (2013–2019).

**SNAP Calibration & Simulations (2002–2008)**

1. Acted as a liaison between the SNAP Calibrations Group and the SNAP Simulations Group (2004–2007).
2. Prepared a chapter on the SNAP Calibration Pipeline for the SNAP Calibration Volume (2004–2006).
3. Co-developed a template photometric calibration plan for SNAP to serve as a basis for code development for modeling the effects of calibration errors on the the perceived filter response functions (2004).
4. Co-wrote an Exposure Time Calculator to investigate different options (ground-based, airborne, and space-based missions) for obtaining and calibrating a set of optical/near-infrared spectrophotometric standard stars for the SNAP mission (2004).

5. Wrote code within the SNAP simulations framework that, during each night's "build" of the framework, created an updated webpage containing the current values for the SNAP filter and detector characteristics (2004).
6. Prepared observing proposals, observed candidate SNAP photometric standard stars with the Apache Point Observatory ARC-3.5m telescope, and processed and analyzed the results (2002–2004).

#### **SDSS Photometric Calibration Reductions (1996–2008)**

1. Built, maintained, and oversaw the running of the the "PT Factory", the (mostly) automated framework that processed and calibrated data from the Photometric Telescope (2002–2008).
2. Maintained and upgraded the SDSS small-telescope data processing pipeline, MTIPIPE and related software products (Tucker, Kent, Richmond, et al. 2006) (1997–2008).
3. Helped in the implementation of the original SDSS Data Release 1 Data Archive Server (DAS) imaging and spectroscopic web query tools (2002-2003).
4. Provided the software support for calibrating the SDSS  $u'g'r'i'z'$  standard star network (Smith, Tucker, Kent, et al. 2002) (1997–2002).
5. Worked on the commissioning of and early observing with the replacement to the Monitor Telescope, the SDSS 0.5-m Photometric Telescope ("PT") (1999).
6. Worked on the commissioning of and the observing with the original SDSS 0.6-m Monitor Telescope ("MT") (1996–1998).

#### **OBSERVING EXPERIENCE**

1. Gemini-South 8-m telescope at Cerro Pachon, Chile
2. Blanco 4-m telescope at Cerro Tololo Interamerican Observatory (CTIO)
3. SOAR 4-m telescope at Cerro Pachon, Chile
4. Astrophysical Research Corporation (ARC) 3.5-m telescope at Apache Point Observatory (APO)
5. WIYN 3.5-m telescope at Kitt Peak National Observatory (KPNO)
6. NASA Infrared Telescope Facility (IRTF) 3-m telescope on Mauna Kea
7. Du Pont 2.5-m telescope at Las Campanas Observatory (LCO)
8. SMARTS 1.5-m telescope at CTIO
9. USNO 1-m telescope at Flagstaff Station
10. Swope 1-m telescope at LCO
11. SMARTS 1-m telescope at CTIO
12. SMARTS 0.9-m telescope at CTIO
13. WIYN 0.9-m telescope at KPNO
14. Curtis-Schmidt 0.6-m/0.9-m telescope at CTIO
15. SDSS 0.6-m Monitor Telescope at APO
16. SDSS 0.5-m Photometric Telescope at APO

TWELVE  
CAREER-DEFINING  
PUBLICATIONS

1. Shectman S.A., Landy S.D., Oemler A., **Tucker D.L.**, Lin H., Kirshner R.P., Schechter P.L. 1996, “The Las Campanas Redshift Survey,” *The Astrophysical Journal*, 470, 172
2. **Tucker D.L.**, Oemler A., Kirshner R.P., Lin H., Shectman S.A., Landy S.D., Schechter P.L., Müller V., Gottlöber S., Einasto J. 1997, “The Las Campanas Redshift Survey Galaxy-Galaxy Autocorrelation Function,” *The Monthly Notices of the Royal Astronomical Society*, 285, 5P
3. Allam S.S., **Tucker D.L.**, Lin H., Hashimoto Y. 1999, “Star Formation in Las Campanas Compact Groups,” *The Astrophysical Journal (Letters)*, 522, L92
4. **Tucker D.L.**, Oemler A., Hashimoto Y., Shectman S.A., Kirshner R.P., Lin H., Landy S.D., Schechter P.L., Allam, S.S. 2000, “Loose Groups of Galaxies in the Las Campanas Redshift Survey,” *The Astrophysical Journal (Supplement)*, 130, 237
5. Smith J.A., **Tucker D.L.**, Kent S., et al. 2002, “The Sloan Digital Sky Survey: The  $u'g'r'i'z'$  Standard Star System,” *The Astronomical Journal*, 123, 2121
6. Stoughton C., Lupton R. H., Bernardi M., et al. 2002, “Sloan Digital Sky Survey: Early Data Release,” *The Astronomical Journal*, 123, 485
7. Lee B. C., Allam S. S., **Tucker D. L.**, et al. 2004, “A Catalog of Compact Groups of Galaxies in the SDSS Commissioning Data,” *The Astronomical Journal*, 127, 1811
8. **Tucker D. L.**, Kent S., Richmond M. W, et al. 2006, “The Sloan Digital Sky Survey Monitor Telescope Pipeline,” *Astronomische Nachrichten*, 327, 821
9. Allam S. S., **Tucker D. L.**, Lin H., Diehl H. T., Annis J., Buckley-Geer E. J., Frieman J. A. 2007, “The 8 O’Clock Arc: A Serendipitous Discovery of a Strongly Lensed Lyman Break Galaxy in the SDSS DR4 Imaging Data,” *The Astrophysical Journal (Letters)*, 662, L51
10. **Tucker D. L.**, Annis J. T., Lin H., et al. 2007, “The Photometric Calibration of the Dark Energy Survey,” in *The Future of Photometric, Spectrophotometric and Polarimetric Standardization*, ASP Conference Series, Vol.364, ed. C. Sterken, (San Francisco: Astronomical Society of the Pacific), p. 187
11. Abbott, T. M. C., Adamów, M., Aguena, M., et al. 2021, “The Dark Energy Survey Data Release 2,” *The Astrophysical Journal (Supplement)*, 255, 20
12. **Tucker, D. L.**, Wiesner, M. P., Allam, S. S., et al. 2022, “SOAR/Goodman Spectroscopic Assessment of Candidate Counterparts of the LIGO/Virgo Event GW190814,” *The Astrophysical Journal*, 929

CITATIONS

As of January 2023, the total number of citations to publications on which I was an author/co-author on is<sup>2</sup>:

- 62,711 on 550 publications (according to ADS)
- 79,325 on 605 publications (according to Google Scholar Citations).

See also my ORCID entry at <http://orcid.org/0000-0001-7211-5729>

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<sup>2</sup>These are slight overestimates, due to a handful of other astronomy papers by other *D. Tucker*'s.

RESEARCH  
GRANTS

1. Co-PI on NSF Grant AST-0098401, “Southern Standard Stars for the  $u'g'r'i'z'$  Filter System,” (PI: J. Allyn Smith; award: \$233,000)
2. Co-I on Hubble Space Telescope Cycle 16 Proposal GO-11167, “A Unique High Resolution Window to Two Strongly Lensed Lyman Break Galaxies,” (PI: Sahar Allam; award: \$133,612)
3. Co-I on Hubble Space Telescope Cycle 16-Supplemental Proposal GO-11974, “High-Resolution Imaging for 9 Very Bright, Spectroscopically Confirmed, Group-Scale Lenses,” (PI: Sahar Allam; award: \$419,851)
4. Co-I on Hubble Space Telescope Cycle 17 Proposal GO-11602, “High-Resolution Imaging of Three New UV-Bright Lensed Arcs,” (PI: Sahar Allam; award: \$150,485)
5. Co-I on Spitzer Space Telescope Cycle 4 Proposal 40430, “Spitzer Observations of the Brightest Lensed LBGs,” (PI: Sahar Allam; award: \$75,215)
6. Co-I on Spitzer Space Telescope Cycle 5 Proposal 50086, “Doubling the Sample of Bright Lensed LBGs Observed by Spitzer,” (PI: Sahar Allam; award: \$381,631)
7. Co-PI on NSF Grant AST-1212268, “Calibration and Standardization of Large Surveys and Missions in Astronomy and Astrophysics,” (PI: Dr. Susana Deustua; award: \$25,000)

TEACHING

1. Mentored the research projects of several undergraduates and high-school students over the course of the past 12 years (see section on “Mentoring Activities”); several of these projects have resulted in publications in refereed professional journals.
2. Given seminars and public talks to a range audiences, most often at the undergraduate level (see section on “Seminars, Colloquia, & Public Outreach”).
3. Participated in the NASA Center for Astronomy Education (CAE) Teaching Excellence in Introductory Astronomy Workshop, January 7-8, 2006. This workshop focused on dilemmas college astronomy instructors face and developed practical solutions for troubling issues in curriculum, instruction, and assessment.
4. Was a Teaching Assistant for numerous astronomy courses as a graduate student.

**Cristin Rider** (Undergraduate Student)

- Internship for Physics Majors (IPM) program (Summer 2002), off-site on-call laboratory technician (Academic Year 2002/2003), and Summer intern (Summer 2003)
- Project: Study of star clusters in the SDSS  $u'g'r'i'z'$  filter system.
- Publication: Rider et al. 2004, "A Survey of Open Clusters in the  $u'g'r'i'z'$  Filter System. I. Results for NGC 2548 (M48)," *Astronomical Journal*, 127, 2210

**David Moore** (Undergraduate Student)

- Internship for Physics Majors (IPM) program (Summer 2004)
- Project: Study of star clusters in the SDSS  $u'g'r'i'z'$  filter system.

**Bartosz Fornal** (Undergraduate Student)

- Internship for Physics Majors (IPM) program (Summer 2006)
- Project: Study of star clusters in the SDSS  $u'g'r'i'z'$  filter system.
- Publication: Fornal et al. 2007, "A Survey of Open Clusters in the  $u'g'r'i'z'$  Filter System. III. Results for the Cluster NGC 188," *Astronomical Journal*, 133, 1409

**Martin Schaffer** (High School Physics Teacher)

- DOE Academies Creating Teacher Scientists (ACTS) program (Summer 2009)
- Project: Processing DECam 2k x 2k CCD imaging data from a CTIO-1m telescope observing run.

**Holly Batchelor** (Undergraduate Student)

- Internship for Physics Majors (IPM) program (Summer 2010)
- Project: Processing DECam 2k x 2k CCD imaging data from a CTIO-1m telescope observing run, and preparing real-time tools for the DES PreCam Survey.

**Deokguen (Daniel) Park** (High School Student)

- Illinois Mathematics & Science Academy (IMSA) program, Academic Years 2010/2011 and 2011/2012.
- Project 1: Processing DECam 2k x 2k CCD imaging data from a CTIO-1m telescope observing run.
- Project 2: Study of the globular cluster NGC 1851 in the DES filter system from DES PreCam Survey data.
- Publication: Park 2012, "Calibration of CCD Images Using Astronomical Standard Stars," *Journal of Experimental Secondary Science*.

**H. Hope Head** (Undergraduate Student)

- Computing Division internship (Summer 2011) and DOE intern (Summer 2012)
- Project 1: Astrometric calibration of DES PreCam Survey data.
- Project 2 (with Prof. J. A. Smtih): photometric calibration of WIYN-0.9m and CTIO-1m data.

**William Foust** (Undergraduate Student)

- DOE intern (Summer 2012)
- Project: Preparation of Star Flat code for DES.

MENTORING  
ACTIVITIES  
(CONT'D)

**Mees Fix** (Undergraduate Student)

- DOE intern (Summer 2013), DES-funded intern (Academic Year 2013/2014, Summer 2014, Academic Year 2014/2015)
- Project: Spectrophotometric standard stars for DES.
- Publication: Fix et al. 2015, "Discovery of a New Blue Quasar: SDSS J022218.03-062511.1," *Astronomische Nachrichten*, 336, 614

**Samuel Wyatt** (Undergraduate Student)

- DOE intern (Summer 2013), DES-funded intern (Academic Year 2013/2014, Summer 2014, Academic Year 2014/2015)
- Project: Secondary and tertiary Photometric standard stars for DES.

**Deborah Gullede** (Undergraduate Student)

- DES-funded intern (Academic Year 2015/2016, Summer 2016, Academic Year 2016/2017, Summer 2017)
- Project: Spectrophotometric standard stars for DES.

**Chris McDonald** (Undergraduate Student)

- DES-funded intern (Academic Year 2015/2016)
- Project: Spectrophotometric standard stars for DES.

**Jack Mueller** (High School Student)

- Illinois Mathematics & Science Academy (IMSA) program, Summer 2015, Academic Year 2015/2016, Summer 2016, and Academic Year 2016/2017
- Project 1: Chromatic Effects within the Dark Energy Survey Camera's Filter System.
- Project 2: Active Galactic Nuclei Anomalies within the Dark Energy Camera's Filter System.
- Project 3: The Photometric Properties of Trans-Neptunian Objects within the Dark Energy Camera's Filter System.

**Jacob Robertson** (Undergraduate Student)

- DES-funded intern (Summer 2016, Academic Year 2016/2017, Summer 2017)
- Project: Spectrophotometric standard stars for DES.

**Marcelo Avilo** (Undergraduate Student)

- DOE intern, (Summer 2021)
- Project: LSST Kilonova Data Challenge.

**Anna Tasneem** (Undergraduate Student)

- DOE intern, (Summer 2022)
- Project: LSST Kilonova Data Challenge.



SEMINARS,  
COLLOQUIA,  
INVITED TALKS,  
AND PUBLIC  
OUTREACH

1. Astronomical Institute of the Romanian Academy, in Bucharest, Romania, June 1990.
2. Union College, in Schenectady, New York, April 1994.
3. Space Telescope Science Institute, in Baltimore, Maryland, April 1994.
4. Universität Göttingen, in Göttingen, Germany, May 1995.
5. University of Durham, in Durham, England, October 1995.
6. Copenhagen University, in Copenhagen, Denmark, October 1995.
7. New College of USF, in Sarasota, Florida, January 1996.
8. Jagiellonian University, Krakow, Poland, March 1996.
9. Max-Planck-Institut für Astronomie, in Heidelberg, Germany, May 1996.
10. Osservatorio Astronomico di Capodimonte, in Naples, Italy, May 1996.
11. Istituto Nazionale di Fisica Nucleare/Sezione di Perugia, in Perugia, Italy, May 1996.
12. Università Roma La Sapienza, in Rome, Italy, May 1996.
13. New Mexico State University, in Las Cruces, New Mexico, February 1999.
14. Tartu Observatory, in Toravere, Estonia, June 1999.
15. Fermilab, in Batavia, Illinois, October 1999 (Naperville and Peoria Astronomical Societies).
16. Rochester Institute of Technology, in Rochester, New York, November 1999.
17. Fermilab, in Batavia, Illinois, November 2002 (Skokie Astronomy Club).
18. Georgia Southern University, in Statesboro, Georgia, October 2003.
19. Fermilab, in Batavia, Illinois, November 2003 (Notre Dame Physics Club).
20. University of Massachusetts/Dartmouth, in Dartmouth, Massachusetts, March 2005.
21. Fermilab, in Batavia, Illinois, July 2005 (University of Wisconsin REU Program students).
22. Hibbard Elementary School, in Chicago, Illinois, May 2006 (4th, 5th, and 6th grade students).
23. Fermilab, in Batavia, Illinois, July 2006 (University of Wisconsin REU Program students).
24. Fermilab, in Batavia, Illinois, May 2007 (Ask-a-Scientist lecture).
25. Indiana University, in Bloomington, Indiana, October 2008.
26. Southern Connecticut State University, in New Haven, Connecticut, March 2010.
27. Fermilab, in Batavia, Illinois, April 2011 (North Park College Physics Club).
28. Austin Peay State University, in Clarksville, Tennessee, November 2013.

SEMINARS,  
COLLOQUIA,  
INVITED TALKS,  
AND PUBLIC  
OUTREACH  
(CONT'D)

29. Wichita State University, in Wichita, Kansas, February 2015.
30. Adler Planetarium, Chicago, Illinois, October 2015 (“Adler After Dark” public outreach event)
31. Conference on Data Analysis 2016 (“CoDA 2016”), March 2016 (invited talk)
32. Naperville Astronomical Association, in Naperville, Illinois, April 2018
33. Chicago Astronomical Society, July 2018
34. Yonsei University, in Seoul, South Korea, August 2018
35. AstroRob 2019, via Zoom, October 2019 (invited talk)
36. Naperville Astronomical Association, in Naperville, Illinois, October 2021
37. University of Louisville, Zoom seminar, November 2021
38. Universidade Cidade de São Paulo, Zoom seminar, April 2022
39. 14th Conference on the Intersections of Particle and Nuclear Physics (CIPANP 2022), in Lake Buena Vista, Florida, August 2022 (invited talk)