Dr. Dennis Lee

JPL Postdoctoral Fellow

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Education

Northwestern University Sep 2018 – Aug 2024
PhD, Astronomy Evanston, IL
- Dissertation: *Dust Polarimetry through Far Infrared Observations and Millimeter Wavelength Instrument Development*
- Advisor: Giles Novak

Harvard University Aug 2012 – May 2016
AB, Astrophysics and Physics Cambridge, MA
- Thesis: *Star Formation in the Central Molecular Zone*
- Advisor: Cara Battersby

Professional Experience

NASA Jet Propulsion Laboratory Aug 2024 – Present
JPL Postdoctoral Fellow Pasadena, CA

Center for Interdisciplinary Exploration and Research in Astrophysics Sep 2018 – Aug 2024
Graduate Student Researcher Evanston, IL

Wayfair LLC Jul 2016 – Jul 2018
Senior Analyst, Notifications Marketing Boston, MA

Principal Investigator Proposals Awarded

- **The NIR Extinction Law and a Potential First Detection of the 1.05 micron PAH Feature** 2025
  Palomar Observatory, TripleSpec, 0.5 nights.
- **Dust Polarization of Rho Oph A: Probing the Missing Spatial Scales** 2023
  ALMA Cycle 10, 33 hours.
- **Characterizing the Multiplicity of Protostellar Systems in Mon R2** 2023
  Keck Observatory, NIRC2, 0.5 nights.

Teaching Experience

- Teaching Assistant, Northwestern University Spring 2024
  ASTRON 111: Introduction to Astrobiology
- Teaching Assistant, Northwestern University Winter 2024
  PHYSICS 136: General Physics Laboratory (Waves and Modern Physics)
- Teaching Assistant, Northwestern University Spring 2020
  ASTRON 220: Introduction to Astrophysics
- Teaching Assistant, Northwestern University Winter 2020
  ASTRON 102: Milky Way Galaxy
- Teaching Assistant, Northwestern University Fall 2019
  PHYSICS 136: General Physics Laboratory (Mechanics)

Presentations

* Poster, † Invited

- **Grain Alignment and the Far-Infrared Polarization Spectrum**
  20 May 2025, PRIMA and the Future of Far-Infrared Science
  California Institute of Technology/IPAC, Pasadena, California
- † **Galactic Dust: Emission and Extinction**
  12 Feb 2025, Astrophysics Lunch
  Cornell University, Ithaca, New York
- **Millimeter Wavelength Dust Polarization with TolTEC: A New Imaging Polarimeter**
  31 Oct 2024, Caltech Observational Cosmology Seminar
  California Institute of Technology, Pasadena, California

- † **Dust Polarimetry through Far Infrared Observations and Millimeter Wavelength Instrument Development**
  23 Sep 2024, Astronomy Tea Talk
  California Institute of Technology, Pasadena, California
- † **Modeling the Far-Infrared Polarization Spectrum of a High-Mass Star Forming Cloud**
  7 Jun 2024, Midwest Magnetic Field Workshop
  University of Wisconsin–Madison, Madison, Wisconsin
- **Polarimetry with the TolTEC camera: a new imaging polarimeter for the Large Millimeter Telescope**
  9 Jan 2024, 243rd Meeting of the American Astronomical Society
  Ernest N. Morial Convention Center, New Orleans, Louisiana
- *__Relative Orientation of Magnetic Field and Cloud Structure in L1688__
  26 Jun 2023, Stars @ Lyon 2023
  CPE Lyon, Villeurbanne, France
- **A far-infrared view of the magnetic field in star formation: comparing SOFIA/HAWC+ polarization measurements with simulations**
  25 May 2023, Midwest Magnetic Field Workshop
  University of Wisconsin–Madison, Madison, Wisconsin (Virtual)
- *__Polarimetric Commissioning for TolTEC__
  20 Jul 2022, SPIE Astronomical Telescopes + Instrumentation 2022
  Montréal, Québec, Canada
- **Relative Orientation of Magnetic Field and Cloud Structure in L1688**
  2 Mar 2022, Our Galactic Ecosystem: Opportunities and Diagnostics in the Infrared and Beyond
  UCLA Lake Arrowhead Lodge, Lake Arrowhead, California
- **Relative Orientation of Magnetic Field and Cloud Structure in L1688**
  16 Feb 2022, SOFIA Community Tele-Talk Series (Virtual)
- **Magnetic Field and Elongated Cloud Structure in L1688**
  23 Jun 2021, Magnetic Fields and the Structure of the Filamentary Interstellar Medium
  SOFIA Science Series (Virtual)
- **Polarization Modulation and Half-Wave Plate Rotator**
  11 Dec 2020, TolTEC National Science Foundation Annual Site Visit
  University of Massachusetts, Amherst (Virtual)

Service and Outreach

- **CIERA Connections**, *Founding Organizer* 2022 – 2024
  Organized the logistics and visit of individuals with astronomy or physics graduate degrees, but currently work outside of traditional academia.
- **Harvard College**, *Alumni Interviewer* 2021 – 2024
  Interviewed applicants in the Chicago area applying to Harvard College as undergraduates.
- **Astronomy on Tap**, *Organizer, Host* 2018 – 2024
  Serve as the host for free public events with scientific talks broadly accessible to the public.
- **Research Experiences in Astronomy at CIERA for High School Students (REACH)**, *Organizer, Speaker* 2022 – 2023
  Reviewed applications and gave introductory scientific talks about astronomy.
- **Data Science for the Public Good Conference**, *Organizer, Speaker* 2021
  Developed and taught material at a conference exposing high school students to broad applications of data science.

Technical Skills

- **Languages:** Python, C/C++, SQL (PostgresSQL, Vertica, MySQL, MS SQL)
- **Software:** Microsoft Office, Solidworks, Autodesk EAGLE, Matlab, Mathematica, Git
- **High Performance Computing:** Experience with SLURM, OpenMP, and OpenMPI.
- **Laboratory:** Experience with CNC machining, soldering, and electrical components.
- **Languages:** Fluent in Cantonese and written traditional Chinese.

Publications

7 peer-reviewed publications (3 first-author, 4 n-th author), 6 non-refereed/proceedings

First-Author Peer-Reviewed

- **The End of the Road for Far-infrared Reddening Maps? Evidence for Reddening Errors Driven by Changes in PAH Abundance**
  Lee, D., Hensley, B.S., Chang, T.-C., and Doré, O..
  arXiv e-prints, arXiv:2508.11746, 2025,
  doi:10.48550/arXiv.2508.11746 NASA/ADS
- **Modeling the Far-infrared Polarization Spectrum of a High-mass Star-forming Cloud**
  Lee, D., Chen, C.-Y., Novak, G., Chuss, D.T., Cox, E.G., Karpovich, K., Ashton, P., Berthoud, M., Li, Z.-Y., and Michail, J.M..
  The Astrophysical Journal, 972, 102, 2024,
  doi:10.3847/1538-4357/ad631c NASA/ADS
- **HAWC+/SOFIA Polarimetry in L1688: Relative Orientation of Magnetic Field and Elongated Cloud Structure**
  Lee, D., Berthoud, M., Chen, C.-Y., Cox, E.G., Davidson, J.A., Encalada, F.J., Fissel, L.M., Harrison, R., Kwon, W., Li, D., Li, Z.-Y., Looney, L.W., Novak, G., and 4 colleagues.
  The Astrophysical Journal, 918, 39, 2021,
  doi:10.3847/1538-4357/ac0cf2 NASA/ADS

n-th Author Peer-Reviewed

- **SOFIA Polarization Spectrum of Three Star-forming Clouds**
  Cox, E.G., Novak, G., Chuss, D.T., *Lee, D.*, Berthoud, M., Karpovich, K., Michail, J.M., Li, Z.-Y., and Ashton, P.C..
  The Astrophysical Journal, 981, 132, 2025,
  doi:10.3847/1538-4357/ada447 NASA/ADS
- **Magnetic Field Alignment Relative to Multiple Tracers in the High-mass Star-forming Region RCW 36**
  Bij, A., Fissel, L.M., Bonne, L., Schneider, N., Berthoud, M., *Lee, D.*, Novak, G.A., Sadavoy, S.I., Pillai, T.G.S., Cunningham, M., Jones, P., and Simon, R..
  The Astrophysical Journal, 975, 267, 2024,
  doi:10.3847/1538-4357/ad77c7 NASA/ADS
- **Magnetic Fields Observed along the East–West Outflow of IRAS 16293-2422**
  Encalada, F.J., Looney, L.W., Novak, G., Sadavoy, S., Cox, E.G., Pereira-Santos, F., *Lee, D.*, Harrison, R., and Pattle, K..
  The Astrophysical Journal, 968, 101, 2024,
  doi:10.3847/1538-4357/ad4968 NASA/ADS
- **The Twisted Magnetic Field of the Protobinary L483**
  Cox, E.G., Novak, G., Sadavoy, S.I., Looney, L.W., *Lee, D.*, Berthoud, M., Bourke, T.L., Coudé, S., Encalada, F., Fissel, L.M., Harrison, R., Houde, M., Li, Z.-Y., and 6 colleagues.
  The Astrophysical Journal, 932, 34, 2022,
  doi:10.3847/1538-4357/ac722a NASA/ADS

Non-Refereed/Proceedings

- **The TolTEC camera: optical alignment and characterization**
  Lunde, E., Berthoud, M., DeNigris, N.S., Doyle, S., Ferrusca, D., Golec, J.E., Kuczarski, S., *Lee, D.*, Ma, Z., Mauskopf, P., McCrackan, M., McMahon, J., Novak, G., and 7 colleagues.
  Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy XI, 12190, 1219016, 2022,
  doi:10.1117/12.2630340 NASA/ADS
- **The TolTEC camera: the citlali data reduction pipeline engine**
  McCrackan, M., Ma, Z., DeNigris, N.S., Ryan, C., Souccar, K., Wilson, G.W., Aretxaga, I., Bij, A., Fissel, L., Golec, J.E., Gutermuth, R., *Lee, D.*, Novak, G., and 3 colleagues.
  Software and Cyberinfrastructure for Astronomy VII, 12189, 121891H, 2022,
  doi:10.1117/12.2629095 NASA/ADS
- **The TolTEC camera: polarimetric commissioning and performance of the continuously rotating half-wave plate**
  Lee, D., Novak, G., Berthoud, M., Bussan, J., Golenia, R., Van Clepper, E., Wilson, G., DeNigris, N.S., Ma, Z., McCrackan, M., Souccar, K., Fissel, L., Bij, A., and 18 colleagues.

Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy XI, 12190, 121901O, 2022,
doi:10.1117/12.2627725 NASA/ADS

- **The optical design and performance of TolTEC: a millimeter-wave imaging polarimeter**
  Lunde, E., Ade, P., Berthoud, M., Contente, R., DeNigris, N.S., Doyle, S., Ferrusca, D., Golec, J., Kuczarski, S., *Lee, D.*, Ma, Z., Mauskopf, P., McCrackan, M., and 9 colleagues.
  Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy X, 11453, 114534A, 2020,
  doi:10.1117/12.2562798 NASA/ADS
- **The TolTEC camera: an overview of the instrument and in-lab testing results**
  Wilson, G.W., Abi-Saad, S., Ade, P., Aretxaga, I., Austermann, J., Ban, Y., Bardin, J., Beall, J., Berthoud, M., Bryan, S., Bussan, J., Castillo, E., Chavez, M., and 44 colleagues.
  Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy X, 11453, 1145302, 2020,
  doi:10.1117/12.2562331 NASA/ADS
- **The TolTEC data analysis pipeline and software stack**
  Ma, Z., McCrackan, M., DeNigris, N.S., Souccar, K., Wilson, G.W., Horton, P., *Lee, D.*, Mauskopf, P., Novak, G., Rodríguez-Montoya, I., and Zaragoza-Cardiel, J..
  Software and Cyberinfrastructure for Astronomy VI, 11452, 114522O, 2020,
  doi:10.1117/12.2560735 NASA/ADS