

Luke David Keller

Curriculum Vitae

Ithaca College
Department of Physics
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Education

1999 Ph.D. in Astronomy, University of Texas at Austin
1995 M.A. in Astronomy, University of Texas at Austin
1990 B.Sc. in Physics, University of Arizona, Tucson

Teaching Experience and Positions Held

2014-present **Professor, Ithaca College, Department of Physics & Astronomy**

Teaching: *Galaxies, Cells, and Molecules: the Nature of Science*
Honors Seminar: Origin narratives in science, religion, and fiction
Introduction to Physics I (algebra-based)
Physics of Sound (Introductory, algebra-based)
Physics of Human Movement (Mechanics, algebra-based)
Astronomy (Introductory, algebra based)
Principles of Physics II: Electricity & Magnetism (calculus-based)
Principles of Physics III: Heat & Optics (calculus-based)
Principles of Physics IV: Modern Physics (calculus-based)
Mathematical Methods for Physics
Quantum Mechanics (1st semester, using Griffiths)
Selected Topics in Advanced Physics: Optics, Astrophysics, Atomic Physics, Spectroscopy, General Relativity
Advanced Laboratory II
Senior Thesis

Research: Observational Astronomy. Studies of chemistry, formation, and evolution of stars and planetary systems using imaging and spectroscopy
Optics. Instrumentation for astronomical imaging and spectroscopy, NASA Stratospheric Observatory for Infrared Astronomy (SOFIA)
Physics Pedagogy and General Education Science. Development of student-centered, performance-based teaching methods for introductory courses in physics and astronomy based on physics and astronomy education research; development of integrative introductory natural science courses for college general education

2016-2021 **Charles A. Dana Professor in the Natural Sciences, Ithaca College**
2012-2015 **Chair, Ithaca College,** Department of Physics & Astronomy
2009-2014 **Associate Professor, Ithaca College,** Department of Physics & Astronomy
2003-2009 **Assistant Professor, Ithaca College,** Department of Physics
2003 **Lecturer, Cornell University,** Department of Astronomy
1999-2003 **Research Associate, Cornell University.** Project Scientist for the Faint Object Infrared Camera for the Sofia Telescope (FORCAST). Design and construction of a facility class 5-40 μm camera for SOFIA. Optical design and integration of instrument, planning and facilitating observations with FORCAST, as well as pre-flight, ground-based calibration, verification, and testing.
1997-1999 **Adjunct Faculty, Austin Community College, Austin Texas.** Instructor of record for introductory astronomy courses.

Visiting Appointments and Consulting

- 2006-present **Consultant, Institute for Global Environmental Strategies.** Review of educational materials from NASA Education and Public Outreach programs
- 2009-2010 **Astronomy Special Consultant, American Heritage Dictionary.** Composition and review of astronomy and astrophysics word definitions
- 2009-2015 **Visiting Scholar, Cornell University.** SOFIA test and verification, data processing and analysis software and documentation

Honors and Awards

- 2018 **London Faculty Sabbatical Program**, Ithaca College London Centre
- 2016-2021 **Dana Professor, Ithaca College**
- 2011 **NASA Group Achievement Award**
- 2010 **Faculty Excellence Award**, Ithaca College
- 2006 **Outstanding Instructor Recognition**, College Board Advanced Placement Best Practices Physics Course Study
- 2006 **Sigma Xi**, the scientific research society
- 1997 **Outstanding Teaching Assistant**, American Association of Physics Teachers
- 1996 **Fred T. Goetting Presidential Scholarship**, University of Texas at Austin

Professional Affiliations

Sigma Pi Sigma, Society of Physics Students, Sigma Xi, American Astronomical Society, Astronomical Society of the Pacific, Society of Photo-optical Instrumentation Engineers

Grants

- 2016 NASA and Universities Space Research Association, "Data Analysis for Guaranteed Time Observations in SOFIA Cycle 3," Principle Investigator, **\$11,200**
- 2013-2015 NASA and Universities Space Research Association, "SOFIA/FORCAST Grism Spectroscopy," (Principle Investigator, renewed) **\$250,000**
- 2011-2012 NASA and Universities Space Research Association, "SOFIA/FORCAST Grism Spectroscopy," (Principle Investigator) **\$631,000**
- 2009-2010 NASA and Universities Space Research Association, "SOFIA/FORCAST Grism Spectroscopy," **\$220,631** (Principle Investigator)
- 2005-2008 NASA Astrobiology Instrument Definition Program, "Astrobiology on SOFIA: Mid-Infrared Spectroscopy Package," (co-Investigator) **\$92,922** awarded to L. D. Keller
- 2008-2011 NASA Jet Propulsion Laboratory, "*PAH emission from disks around intermediate-mass stars: the peculiar aroma of hydrocarbons orbiting Herbig Ae/Be stars*," (Principle Investigator) **\$25,000**
- 2005-2007 The Research Corporation for the Advancement of Science, "*Spectroscopic characterization of proto-planetary disks orbiting intermediate-mass stars*" (Principle Investigator) **\$34,400**
- 2005-2007 American Astronomical Society Small Research Grant, **\$5500**

Ithaca College Service

- 2020 Faculty Facilitator, **Anti-racism Workspace for White-identifying Students**
- 2020-present **Physics and Astronomy Anti-racism Working Group**
- 2019-present **The Innovation Scholars Advisory Committee**
- 2020 Pilot Study Member, **Center for Faculty Excellence Summer Institute**
- 2016-2018 Co-chair, **Steering Committee, Middle States Reaccreditation Self-Study**
- 2014 Co-chair, **Search committee, Provost and Vice President for Educational Affairs**
- 2014-2018 **Research Council**
- 2013-2015 Chair, **C.P. Snow Lecture Steering Committee**, School of Humanities & Sciences
- 2011-2013 **Committee for College-wide Requirements**

2010 **President's Advisory Council on Innovation**
 2008-2015 **Academic Policies Committee** (elected representative from Humanities and Sciences)
 2010 **Faculty Workload Task Force**
 2008-2018 Faculty Mentor, **Outdoor Adventure Learning Community**
 2006-2007 Chair, Policy sub-committee of the **Academic Policies Committee**
 2006-2007 Chair, **Faculty Council ad hoc committee**: Standardization of Student Statements
 (a.k.a. Teaching evaluations)
 2006-2008 **Faculty Council** representative to the Academic Policies Committee
 2006 School of Humanities & Sciences ad hoc committee: review of General Education
 requirements in the natural sciences
 2005-2010 **Faculty Council** (elected representative from Natural Sciences)

National and Community Service

2021 IC Representative, **American Institute of Physics National Task Force to Elevate African American representation in Undergraduate Physics & Astronomy**
 2019 **NASA SOFIA**: Cycle 8 Time Allocation Committee
 2017 **National Science Foundation** review panel: Improving Undergraduate STEM Education
 2013-2014 **EmaginationEd** Think Tank, advisory committee for new K-12 educational initiatives in New York City Schools.
 2011-2016 **NASA SOFIA Users Group**, advisory committee for Stratospheric Observatory for Infrared Astronomy
 2011-present **Lime Hollow Center for Environment and Culture**: Board of Directors
 2011 **Lincoln Center Institute for the Arts in Education**: Imagination Award advisory panel
 2010 **Lincoln Center Institute for the Arts in Education**: Imagination Award advisory panel
 2009-2010 **NASA Infrared Telescope Facility**: Time Allocation Committee
 2008 **NASA Spitzer Space Telescope**: Cycle 5 review panel
 2008 Local Organizing Committee, **Division for Planetary Sciences** of the **American Astronomical Society**, annual meeting, Ithaca, NY: helped organize two-day workshop on teaching introductory college-level astronomy
 2007 **NASA**: Astronomy and Physics Research and Analysis ground-based instrumentation review panel

Publications in refereed journals and edited volumes

(* indicates Ithaca College student co-author)

Kraemer, Kathleen E.; Sloan, G.C.; **Keller, Luke D.**; McDonald, Iain ; Zijlstra, Albert A.; Groenewegen, Martin A.T. **2019**, “*Stellar Pulsation and the Production of Dust and Molecules in Galactic Carbon Stars*,” *Astrophysical Journal*, 887 (1), 82

Keller, Luke D.; Sloan, G.C.; Oliveira, J.M.; Kraemer, K.E.; van Loon, J.Th.; Wood, P.R.; Zijlstra, A.A.; Simon, J.D.; Ferreira, R.*; Garay-MacLean, M.*; Hyatt, J.T.*; Geidel, K.*; Quinn, J.*; Santoro, D.*; and Knapp, T.* **2019**, “*Identification of Herbig Ae/Be Stars in the Small Magellanic Cloud*,” *Astrophysical Journal*, 878, 147

Holzer, Madeleine and **Keller, Luke D.** **2020**, “Why Science is not a recipe,” in *Extraordinary Partnerships: How the Arts and Humanities are Transforming America*, Lever Press, Christine Henseler editor.

Thompson, Maggie A.; Weinberger, Alysia J.; **Keller, Luke D.**; Arnold, Jessica A.; and Stark, Christopher C. **2019**, “Studying the Evolution of Warm Dust Encircling BD +20 307 Using SOFIA,” *Astrophysical Journal*, 875, 45

Arneson, R. A.; Gehrz, R. D.; Woodward, C. E.; Helton, L. A.; Shenoy, D.; Evans, A.; **Keller, L. D.**; Hinkle, K. H.; Jura, M.; Lebzelter, T.; Lisse, C. M.; Rushton, M. T.; Mizrachi, J. **2017**, “A SOFIA FORCAST Grism Study of the Mineralogy of Dust in the Winds of Proto-planetary Nebulae: RV Tauri Stars and SRd Variables,” *Astrophysical Journal*, 843, 51

- Green, Joel D.; Jones, Olivia C.; **Keller, Luke D.**; Poteet, Charles A.; Yang, Yao-Lun; Fischer, William J.; Evans, Neal J., II; Sargent, Benjamin A.; Rebull, Luisa M. **2016**, "The Mid-infrared Evolution of the FU Orionis Disk," *Astrophysical Journal*, 832, 4
- Meaning, N. and **Keller, Luke D.** **2016**, "Narrating science and religion: storytelling strategies in *Journey of the Universe*," *Diegesis: Interdisciplinary E-Journal for Narrative Research* 5.2, 21-34
- Salgado, F.; Berné, O.; Adams, J. D.; Herter, T. L.; **Keller, L. D.**; Tielens, A. G. G. M. **2016**, "The Orion HII Region and the Orion Bar in the Mid-infrared," *Astrophysical Journal*, 830, 118
- Gehrz, R. D.; Evans, A.; Helton, L. A.; Shenoy, D. P.; Banerjee, D. P. K.; Woodward, C. E.; Vacca, W. D.; Dykhoff, D. A.; Ashok, N. M.; Cass, A. C.; Carlon, R. L.; Corgan, D. T.; Eyres, S. P. S.; Joshi, V.; **Keller, Luke D.**; Krautter, J.; Liimets, T.; Rushton, M.; Starrfield, S. **2015**, "The Early Infrared Temporal Development of Nova Delphini 2013 (V339 DEL) Observed with the Stratospheric Observatory for Infrared Astronomy (SOFIA) and from the Ground," *Astrophysical Journal*, 812, 132
- Rogers, Michael; **Keller, Luke**; Crouse, Andrew; and Price, Matthew **2015**, "Implementing Comprehensive Reform of Introductory Physics at a Primarily Undergraduate Institution: A Longitudinal Case Study," *Journal of College Science Teaching*, Vol. 44, No. 3, pp. 82-90
- Werner, M. W.; Sahai, R.; Davis, J.; Livingston, J.; Lykou, F.; DE Buizer, J.; Morris, M. R.; **Keller, L.**; Adams, J.; Gull, G.; Henderson, C.; Herter, T.; Schoenwald, J. **2014**, "Mid-infrared Imaging of the Bipolar Planetary Nebula M2-9 from SOFIA," *Astrophysical Journal*, 780, 156
- Herter, T. L.; Vacca, W. D.; Adams, J. D.; **Keller, L. D.**; Schoenwald, J.; Hirsch, L.; Wang, J.; De Buizer, J. M.; Helton, L. A.; Llorens, M. C. **2013**, "Data Reduction and Early Science Calibration for FORCAST, A Mid-Infrared Camera for SOFIA," *Publications of the Astronomical Society of the Pacific*, 125, 1393
- Adams, Joshua J.; Simon, Joshua D.; Bolatto, Alberto D.; Sloan, G. C.; Sandstrom, Karin M.; Schmiedeke, Anika; van Loon, Jacco Th.; Oliveira, Joana M.; **Keller, Luke D.** **2012**, "Dusty OB Stars in the Small Magellanic Cloud. II. Extragalactic Disks or Examples of the Pleiades Phenomenon?," *Astrophysical Journal*, 771, 112
- Salgado, F.; Berné, O.; Adams, J. D.; Herter, T. L.; Gull, G.; Schoenwald, J.; **Keller, L. D.**; De Buizer, J. M.; Vacca, W. D.; Becklin, E. E.; Shuping, R. Y.; Tielens, A. G. G. M.; Zinnecker, H. **2012**, "First Science Results from SOFIA/FORCAST: The Mid-infrared View of the Compact H II Region W3A," *Astrophysical Journal Letters*, 749, L21
- Adams, Joseph D.; Herter, Terry L.; Osorio, Mayra; Macias, Enrique; Megeath, S. Thomas; Fischer, William J.; Ali, Babar; Calvet, Nuria; D'Alessio, Paola; De Buizer, James M.; Gull, George E.; Henderson, Charles P.; **Keller, Luke D.**; Morris, Mark R.; Remming, Ian S.; Schoenwald, Justin; Shuping, Ralph Y.; Stacey, Gordon; Stanke, Thomas; Stutz, Amelia; Vacca, William **2012**, "First Science Observations with SOFIA/FORCAST: Properties of Intermediate-luminosity Protostars and Circumstellar Disks in OMC-2," *Astrophysical Journal Letters*, 749, L24
- Hirsch, Lea, Adams, Joseph D., Herter, Terry L., Hora, Joseph L., De Buizer, James M., Megeath, S. Thomas, Gull, George E., Henderson, Charles P., **Keller, Luke D.**, Schoenwald, Justin; Vacca, William, **2012**, "SOFIA/FORCAST and Spitzer/IRAC Imaging of the Ultracompact H II Region W3(OH) and Associated Protostars in W3," *Astrophysical Journal*, 757, 113
- Harvey, Paul M.; Adams, Joseph D.; Herter, Terry L.; Gull, George; Schoenwald, Justin; **Keller, Luke D.**; De Buizer, James M.; Vacca, William; Reach, William; Becklin, E. E., **2012**, "First Science Results from SOFIA/FORCAST: Super-resolution Imaging of the S140 Cluster at 37 μm ," *Astrophysical Journal Letters*,

Nikola, T.; Herter, T. L.; Vacca, W. D.; Adams, J. D.; De Buizer, J. M.; Gull, G. E.; Henderson, C. P.; **Keller, L. D.**; Morris, M. R.; Schoenwald, J.; Stacey, G.; Tielens, A, **2012**, "Mid-IR FORCAST/SOFIA Observations of M82," *Astrophysical Journal Letters*, 749, L19

Herter, T. L.; Adams, J. D.; De Buizer, J. M.; Gull, G. E.; Schoenwald, J.; Henderson, C. P.; **Keller, L. D.**; Nikola, T.; Stacey, G.; Vacca, W. D., **2012**, "First Science Observations with SOFIA/FORCAST: The FORCAST Mid-infrared Camera," *Astrophysical Journal Letters*, 749, L18

D. Gehrz, E. E. Becklin, J. de Buizer, T. Herter, **L. D. Keller**, A. Krabbe, P. M. Marcum, T. L. Roellig, G. H. L. Sandell, P. Temi, W. D. Vacca, E. T. Young, and H. Zinnecker, **2011**, "Status of the Stratospheric Observatory for Infrared Astronomy (SOFIA)," *Advances in Space Research*, Volume 48, Issue 6, pp. 1004-1016

A. S. Meech, K. J. et al. (**Luke D. Keller** one of 187 coauthors, a personal record!), **2011**, "EPOXI: Comet 103P/Hartley 2 Observations from a Worldwide Campaign," *Astrophysical Journal Letters*, 734, L1

Luke Keller and Jürgen Wolf, "NASA's New Airborne Observatory: Flown on a Boeing 747, SOFIA will carry infrared astronomy to new heights," *Sky & Telescope Magazine*, October **2010** issue, p. 22

Najita, Joan R., Carr, John S., Strom, Stephen E., Watson, Dan M., Pascucci, Haria, Hollenback, David, Gorti, Uma, **Keller, Luke D.** **2010**, "Spitzer Spectroscopy of the Transition Object TW Hya," *Astrophysical Journal*, 712, 274

Keller, L. D. & Sloan, G. C. **2009**, "PAH emission from disks around intermediate-mass stars: the peculiar aroma of hydrocarbons orbiting Herbig Ae/Be stars." *Astronomical Society of the Pacific Conference Series: Cosmic Dust - Near and Far*, 414, 107

Christopher C. Stark, Marc J. Kuchner, Wesley A. Traub, John D. Monnier, Eugene, Serabyn, Mark Colavita, Chris Koresko, Bertrand Mennesson, **Luke D. Keller** **2009**, "51 Ophiuchus: A Possible Beta Pictoris Analog Measured with the Keck Interferometer Nuller," *Astrophysical Journal*, 703, 1188

Watson, Dan M., Leisenring, Jarron M., Furlan, Elise, Bohac, C. J., Sargent, B., Forrest, W. J., Calvet, Nuria, Hartmann, Lee, Nordhaus, Jason T., Green, Joel D., Kim, K. H., Sloan, G. C., Chen, C. H., **Keller, L. D.**, d'Alessio, Paola, Najita, J., Uchida, Keven I. Houck, J. R. **2009** "Crystalline Silicates and Dust Processing in the Protoplanetary Disks of the Taurus Young Cluster," *Astrophysical Journal Supplement*, 180, 84

Luke D. Keller, G. C. Sloan, W. J. Forrest, S. Ayala, P. D'Alessio, S. Shah*, N. Calvet, L. Hartmann, J. Najita, B. Sargent, A. Li, D. M. Watson, & C. H. Chen **2008**, "PAH Emission from Herbig Ae/Be Stars," *Astrophysical Journal*, 684, 411

Berthoud, M.C., **Keller, L.D.**, Herter, T.L., Whelan*, D., and Richter, M.J., **2007**, "CO overtone emission from a circumstellar disk around 51 Ophiuchi," *Astrophysical Journal*, 660, 461

Chen, C. H., Sargent, B. A., Bohac, C., Kim, K. H., Leibensperger*, E., Jura, M., Najita, J., Forrest, W. J., Watson, D. M., Sloan, G. C., **Keller, L. D.** **2006**, "Spitzer IRS Spectroscopy of IRAS-discovered Debris Disks," *Astrophysical Journal Supplement*, 166, 351

Furlan, E., Hartmann, L., Calvet, N., D'Alessio, P., Franco-Hernández, R., Forrest, W. J., Watson, D. M., Uchida, K. I., Sargent, B., Green, J. D., **Keller, L. D.**; Herter, T. L. **2006**, "A Survey and Analysis of Spitzer Infrared Spectrograph Spectra of T Tauri Stars in Taurus," *Astrophysical Journal Supplement*, 165, 56

- Sloan, G. C., **L. D. Keller**, W. J. Forrest, E. Leibensperger*, B. Sargent, A. Li, J. Najita, D. M. Watson, C. H. Chen, J. D. Green, F. Kemper, T. L. Herter, P. D'Alessio, P. W. Morris, D. J. Barry, P. Hall, B. R. Brandl, P. C. Myers, & J. R. Houck **2005**, "Mid Infrared Spectra of PAH Emission in Herbig Ae/Be stars," *Astrophysical Journal*, 632, 956
- Calvet, N.; D'Alessio, P.; Watson, D. M.; Franco-Hernández, R.; Furlan, E.; Green, J.; Sutter, P. M.; Forrest, W. J.; Hartmann, L.; Uchida, K. I.; **Keller, L. D.**; Sargent, B.; Najita, J.; Herter, T. L.; Barry, D. J.; Hall, P. **2005**, "Disks in Transition in the Taurus Population: Spitzer IRS Spectra of GM Aurigae and DM Tauri," *Astrophysical Journal Letters*, 630, L185
- Furlan, E., N. Calvet, P. D'Alessio, L. Hartmann, W. J. Forrest, D. M. Watson, K. L. Luhman, K. I. Uchida, J. D. Green, B. Sargent, J. Najita, G. C. Sloan, **L. D. Keller**, and T. L. Herter **2005**, "Spitzer IRS Spectra Of Young Stars Near The Hydrogen-Burning Mass Limit," *Astrophysical Journal*, 621, L129
- Watson, Dan M., F. Kemper, Nuria Calvet, **Luke D. Keller**, Elise Furlan, Lee Hartmann, W. J. Forrest, C. H. Chen, Keven I. Uchida, Joel D. Green, B. Sargent, G. C. Sloan, Terry L. Herter, Bernhard R. Brandl, J. R. Houck, J. Najita, Paola D'Alessio, P. C. Myers, D. J. Barry, P. Hall, & P. W. Morris **2004**, "Mid Infrared Spectra of Class I Protostars in Taurus," *Astrophysical Journal Supplement Series*, 154, 391
- Forrest, W. J., B. Sargent, E. Furlan, P. D'Alessio, N. Calvet, L. Hartmann, K. I. Uchida, J. D. Green, D. M. Watson, C. H. Chen, F. Kemper, **L. D. Keller**, G. C. Sloan, T. L. Herter, B. R. Brandl, J. R. Houck, D. J. Barry, P. Hall, P. W. Morris, J. Najita, & P. C. Myers **2004**, "Mid Infrared Spectra of Classical T Tauri Stars," *Astrophysical Journal Supplement Series*, 154, 443
- Jura, M., C. H. Chen, E. Furlan, J. Green, B. Sargent, W. J. Forrest, D. M. Watson, D. J. Barry, P. Hall, T. L. Herter, J. R. Houck, G. C. Sloan, K. Uchida, P. D'Alessio, B. R. Brandl, **L. D. Keller**, F. Kemper, P. Morris, J. Najita, N. Calvet, L. Hartmann, & P. C. Myers **2004**, "Mid Infrared Spectra of Dust Debris Around Main Sequence Stars," *Astrophysical Journal Supplement Series*, 154, 453
- Uchida, K. I., N. Calvet, L. Hartmann, F. Kemper, W. J. Forrest, D. M. Watson, P. D'Alessio, C. H. Chen, E. Furlan, B. Sargent, B. R. Brandl, T. L. Herter, P. Morris, P. C. Myers, J. Najita, G. C. Sloan, D. J. Barry, J. Green, **L. D. Keller**, & P. Hall **2004**, "The State Of Protoplanetary Material 10 Million Years After Stellar Formation: Circumstellar Disks In The TW Hydrae Association," *Astrophysical Journal Supplement Series*, 154, 439
- Pak, Soojong, Jaffe, D. T., Stacey, G. J., Bradford, C. M., Klumpe, Eric W., & **Keller, Luke D. 2004**, "Near-Infrared Molecular Hydrogen Emission from the Central Regions of Galaxies: Regulated Physical Conditions in the Interstellar Medium," *Astrophysical Journal*, 609, 692
- E. Furlan, W. J. Forrest, D. M. Watson, K. I. Uchida, B. R. Brandl, **L. D. Keller**, & T. L. Herter, **2003**, "Near-Infrared, Adaptive Optics Observations of the T Tauri Multiple-Star System," *Astrophysical Journal Letters*, 596, L87
- Keller, Luke D.**, Pilachowski, C., & Sneden, C. **2001**, " $^{12}\text{C}/^{13}\text{C}$ in Field Halo Giant Stars", *Astronomical Journal*, Vol. 122, 2554
- Giovanelli, R. *et al.* **2001**, "The Optical/Infrared Quality of High Atacama Sites. I. Preliminary Results of Optical Seeing", *Publications of the Astronomical Society of the Pacific*, 113, 789-802
- Giovanelli, R. *et al.* **2001**, "The Optical/Infrared Quality of High Atacama Sites. II. Infrared Characteristics," *Publications of the Astronomical Society of the Pacific*, 113, 803-813
- Keller, Luke D.**, Jaffe, D.T., Ershov, O. A., Benedict, Tom A., & Graf, U. U. **2000**, "Fabrication and Testing of Chemically Micromachined Silicon Echelle Gratings", *Applied Optics*, 39, 1094
- Keller, Luke D. 2000**, "Science, Observation, and Mystery," *Parabola Magazine*, 25:2
- Levenson, N. A., Graham, James R., **Keller, Luke D.**, & Richter, Matthew J. **1998**, "Panoramic Views of the Cygnus Loop", *Astrophysical Journal Supplement*, 118, 541

- Luhman, M. L., Jaffe, D. T., **Keller, L. D.**, & Pak, S. **1995**, "H2 Emission as a Tracer of Molecular Hydrogen: Large-Scale Observations of Orion", *Astrophysical Journal*, 436, L185
- Maiolino, R., Ruiz, M., Rieke, G. H., & **Keller, L. D.** **1995**, "New Constraints on the Unified Model of Seyfert Galaxies", *Astrophysical Journal*, 446, 561
- Pak, Soojong, Jaffe, D.T., & **Keller, L. D.** **1996**, "H2 Emission From the Inner 400 Parsecs of the Galaxy", *Astrophysical Journal*, 457, L43
- Luhman, M. L., Jaffe, D. T., **Keller, L. D.**, & Pak, S. **1995**, "A New Fabry-Perot Spectrometer for Observations of Diffuse Near-Infrared Line Emission", *Publications of the Astronomical Society of the Pacific*, 107, 184

Selected publications in conference proceedings

(NOTE: Proceedings of SPIE The International Society for Optical Engineering are full-length papers that are reviewed, but not formally refereed, by the session chairs and published in conference proceedings. SPIE proceedings are a primary journal for astronomical instrumentation.)

- Shuping, Ralph; **Keller, Luke D.**; Adams, Joseph D.; Petkova, Maya; Wood, Kenneth; Herter, Terry; Sloan, Greg; Jaffe, Daniel Thomas; Greene, Thomas P.; Ennico, Kimberly **2017**, "A full 1-40 micron spectral energy distribution for the Becklin-Neugebauer object: Placing constraints on disk size for a runaway massive young stellar object," *American Astronomical Society Meeting Abstracts*, 229, 241.12
- Keller, Luke D.**; Sloan, G. C.; Ferreira, Rafael*; Oliveira, J. M.; van Loon, J. Th.; Kraemer, K. E.; Wood, P. R.; and Simon, J. D. **2015**, "Proto-planetary disks orbiting intermediate-mass stars in the Small Magellanic Cloud," Conference: Star and Planet Formation I, Tucson Arizona
- Ferreira, Rafael*; **Keller, Luke D.**; and Sloan, G. C. **2015**, "Properties of Young Stars with Proto-Planetary Disks in the Small Magellanic Cloud," Conference: Star and Planet Formation I, Tucson Arizona
- Smith, Erin C.; Miles, John W.; Helton, L. Andrew; Sankrit, Ravi; Andersson, B. G.; Becklin, Eric E.; De Buizer, James M.; Dowell, C. D.; Dunham, Edward W.; Güsten, Rolf; Harper, Doyal A.; Herter, Terry L.; **Keller, Luke D.**; Klein, Randolph; Krabbe, Alfred; Logsdon, Sarah; Marcum, Pamela M.; McLean, Ian S.; Reach, William T.; Richter, Matthew J.; Roellig, Thomas L.; Sandell, Göran; Savage, Maureen L.; Temi, Pasquale; Vacca, William D.; Vaillancourt, John E.; Van Cleve, Jeffrey E.; Young, Erick T. **2014**, "SOFIA science instruments: commissioning, upgrades and future opportunities," *Proceedings of the SPIE*, 9147
- Adams, Joseph D.; Herter, Terry L.; Gull, George E.; Schoenwald, Justin; Henderson, Charles P.; **Keller, Luke D.**; De Buizer, James M.; Stacey, Gordon J.; Nikola, Thomas; Vacca, William D.; Hirsch, Lea; Wang, Jason; Helton, L. Andrew, **2012**, "The FORCAST mid-infrared facility instrument and in-flight performance on SOFIA," *SPIE*, 8446
- Keller, Luke D.**, Deen, C.P., Jaffe, D.T., Ennico, Kimberly A., Greene, Thomas P., Adams, Joseph D., Herter, Terry, Solan, Gregory **2010**, "Progress report on FORCAST grism spectroscopy as a future general observer instrument mode on SOFIA," *Proceedings of the SPIE*, 7735
- Deen, C.P., **Keller, L.**, Chitrakar, N., Ennico, Kimberly, Jaffe, Daniel T., Adams, Joseph D., Greene, Thomas P., Herter, Terry, and Sloan, Gregory **2010**, "Quick-look reduction software for FORCAST grism mode on SOFIA," *SPIE*, 7735
- Ennico, Kimberly, **Keller, L.**, Adams, J., Herter, T., Deen, C., Mar, D., Chitrakar, N., Jaffe, D., Greene, T. **2007**, "Grisms For FORCAST - A New Medium Resolution 5-40 Micron Spectroscopic Mode On SOFIA - Performance Testing," *American Astronomical Society Meeting Abstracts*, 211, 11.14
- Sweta Shah*, **Luke Keller**, and Nirbhik Chitrakar* **2006**, "Infrared Identification of Herbig AeBe stars in the Small Magellanic Cloud," *American Astronomical Society/American Association of Physics Teachers Joint Meeting Joint Meeting*, *American Astronomical Society Meeting* 209, 168.14

Keller, Luke D., Sloan, G. C., Shah, S*, Chitrakar, N.*, Forrest, W. J., Sargent, B., Watson, D. M., Li, A., Najita, J., Chen, C. H., Green, J. D., Herter, T. F., D'Alessio, P., Calvet, N., Hartman, L., Houck, J. R. **2006**, "Mid-infrared Spectra of PAH Emission in Herbig AeBe Stars," American Astronomical Society/American Association of Physics Teachers Joint Meeting, American Astronomical Society Meeting 209, 81.01

Luke Keller and Michael Rogers **2006**, "Innovative Use of SCALE-UP for Teaching General Education Astronomy," American Astronomical Society/American Association of Physics Teachers Joint Meeting Joint Meeting, American Astronomical Society Meeting 209, #71.03

Ennico, K. A., **Keller, L. D.**, Mar, D. J., Herter, T. L., Jaffe, D. T., Adams, J. D., and Greene, T. P. **2006**, "Grism performance for mid-IR (5 - 40 micron) spectroscopy," SPIE, 6269, 52

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Research Students

^D Dana Intern with Luke Keller, Ithaca College

^{††} Luke Keller was a member of Marc Berthoud's Ph.D. dissertation committee, 2003-2007.

^{†††} Ithaca College Physics Senior Thesis advisee

Jediah Tau ^{†††} (Ithaca College, B.S. in Physics expected May 2021)

Testing radiative transfer models of protoplanetary disks. Independent study of General Relativity.

Brady Elster ^{†††} (Ithaca College, B.S. in Physics expected May 2022)

Determining physical characteristics of candidate protoplanetary disk host stars using optical spectra.

Andrew McGee (Ithaca College, B.S. in Physics expected May 2023)

Development of radiative transfer models of protoplanetary disks. Independent study of General Relativity. Determining physical characteristics of candidate protoplanetary disk host stars using optical and infrared photometry.

Alexander Massoud ^{†††} (Ithaca College, B.S. in Physics May 2020)

Analysis of near-infrared molecular hydrogen gas emission from protoplanetary disk candidates.

George Cozma (Ithaca College, B.S. in Physics expected May 2021)

Comparison of thermal infrared emission from protoplanetary disks and solar system bodies.

Tori Knapp ^{†††} (Ithaca College, B.S. in Physics May 2019)
High spatial resolution study of multiplicity in protoplanetary disk systems using the Hubble Space Telescope. Refinement of radiative transfer modeling of protoplanetary disks.

Drake Tubbs (Ithaca College, B.S. in Physics May 2019)
Testing radiative transfer models using independent observations of protoplanetary disks.

Adam Rabayda ^{†††} (Ithaca College, B.S. in Physics May 2019)
Rocket propulsion systems (senior thesis). Calibration of the expansion of the universe using galaxy spectral and computer modeling.

Megan Holman ^{†††} (Ithaca College, B.S. in Physics May 2019)
Spectral analysis of young solar systems; communicating the latest astrophysics results to the general public.

Anthony Pizzo^D (Ithaca College, B.S. in Television-Radio May 2019)
Creating short videos to enhance student learning in introductory astronomy courses.

Daniel Santoro ^{†††} (Ithaca College, B.A. in Physics May 2017)
Spectral analysis and modeling of newly forming planets in a distant galaxy.

Joseph Quinn ^{†††} (Ithaca College, B.S. in Physics May 2017)
Spectral analysis of newly forming planets in a distant galaxy.

Matthew Bellardini ^{†††} (Ithaca College, B.S. in Physics May 2017)
SOFIA observations of carbon stars.

Andrea Santiago-Boyd ^{†††} (Ithaca College, B.S. in Physics May 2017)
Imaging and spectral analysis

Katherine Kennovin ^{†††} (Ithaca College, B.S. in Physics May 2014)
Working on analysis of photon dominated regions (Orion bar) using SOFIA imaging and spectroscopy.

Madison Mangano ^{†††} (Ithaca College, B.S. in Physics May 2016)
Working on sonification of spectral signals. SOFIA observations and data analysis.

Jeffrey Porzio (Ithaca College, B.S. in Physics May 2014)
Working on sonification of astronomical spectra.

Martin Garay MacLean^{D, †††} (Ithaca College, B.S. in Physics December 2013)
Working on analysis of proto-planetary disks in the Small Magellanic Cloud and on data analysis software for SOFIA.

Casey Byrne ^{†††} (Ithaca College, B.S. in Physics May 2013)
Worked on data analysis software for SOFIA and wavelength calibration for FORCAST grism spectral mode for SOFIA.

Joey Engelbrecht (Ithaca College, B.A. in Physics May 2013)
Worked on analysis of proto-planetary disk spectra infrared image analysis software development.

Robert Lewis (Ithaca College, B.A. in Physics May 2013)
Worked on infrared spectral and image analysis software development.

Joshua Cheng (Ithaca College, B.A. expected in Physics May 2014)
Worked on infrared image analysis software development.

Kevin Geidel (Ithaca College, B.A. in Physics May 2010)
Worked on spectroscopy and modeling of Herbig Ae/Be star-disk systems

Vince Whitney (Ithaca College, B.A. in Physics, May 2011)
Worked on *Spitzer* spectroscopy and modeling of Herbig Ae/Be star-disk systems

Preston Barrows^D (Ithaca College, B.A. in Physics, May 2010)
Worked on design and testing of an infrared camera for the Stratospheric Observatory for Infrared Astronomy

Jordan Hyatt (Ithaca College, B.S. in Physics May 2010)
Worked on *Spitzer* spectroscopy and modeling of Herbig Ae/Be star-disk systems

Nirbhik Chitrakar (Ithaca College, B.S. in Physics May 2008)
Worked on astrophysics of planet formation and SOFIA data analysis software

Brandon Sforzo (Ithaca College, B.A. in Physics, Cornell University B.S. in Mechanical Engineering, May 2008) Currently a graduate student in Aerospace Engineering at the Georgia Institute of Technology

Maksim Sipos^D (Ithaca College, B.S. in Physics May 2008)
Currently a graduate student in Physics at the University of Illinois at Urbana-Champaign

Sweta Shah^D (Ithaca College, B.A. in Physics 2007)
Masters degree in Astronomy at Leiden University, The Netherlands

Michael Pacelli (Ithaca College, B.A. in Physics 2007)
Currently a graduate student in Aeronautical Engineering at SUNY Binghamton

Marc Berthoud (Cornell University, Ph.D.†† in Astronomy 2007)
Currently a postdoctoral research associate at the Yerkes Observatory, University of Chicago

David Whelan, Ph.D. (Ithaca College, B.A. in Physics 2005)
Currently visiting professor PhD in Astronomy at the University of Virginia

Eric Leibensperger^D (Ithaca College, B.A. in Physics & B.S. in Chemistry 2005)
Currently assistant professor, SUNY Plattburg, NY

Summary of Public Invited Talks and Presentations

Public Talks

2019 Invited public talk, *Science & Suds*, Cortland Beer Co., Cortland, New York, and Lime Hollow Center for Environment and Culture, Cortland, New York, “Shedding Light on Dark Matter and Dark Energy”

2017 Keynote presentation at Ithaca College presidential inauguration, “Imagination and Creativity: Requirements for Scientific Discovery”

2017 Keynote presentation at Koppernik Observatory, New York, “The Universe is Mostly Invisible: Shedding Light on Dark Energy and Dark Matter”

2017 Invited public presentation at Lime Hollow Center for Environment and Culture, Cortland, New York, “What’s Up? A Cosmic Tour of the Night Sky”

- 2016 Keynote presentation at Kopernik Observatory, New York, "Black Holes and Gravity Waves"
- 2016 Invited public talk, *Science & Suds*, Cortland Beer Co., Cortland, New York, "Black Holes Don't Suck! (they pull)"
- 2016 Keynote presentation with student, Madison Mangano, Ithaca College, James J. Whalen Academic Symposium, "Listening to the atoms and molecules of distant solar systems"
- 2014 Keynote presentation at Kopernik Observatory, New York, "Airborne Astronomy: NASA's SOFIA Telescope"
- 2011 Keynote presentation, Tompkins County Area Development, New York, "Imagination Inspires Innovation"
- 2011 Invited public talk, Sun City Radio Club, Bluffton, South Carolina, "Frequent Flyer: Radio astronomy from a flying telescope"
- 2011 Invited public talk, Southern Cayuga Planetarium, New York, "The Stratospheric Observatory for Infrared Astronomy"
- 2008 Invited public talk, Lost Dog Lounge, Ithaca, New York, "Science Cabaret: *ET Probably Does Exist*"
- 2008 Invited panelist, Lincoln Center Institute, New York: "*Imagination and Innovation*"
- 2008 Physics Café, Ithaca College: "*Searching for Extra-terrestrial Life: Molecules, UFOs, and Little Green Men*"
- 2004 Keynote presentation (with IC Prof. Beth Clark Joseph), Ithaca College Alumni Weekend: "*New Advances in Space Exploration*"
- 2004 Lecture, Longview, Ithaca, NY: "*Observing the Formation of Planets Around Distant Stars*"
- 2004 Keynote presentation, Syracuse Astronomical Society, Syracuse, NY: "*Observations of Planetary System Formation from Ground- and Space-based Observatories*"
- 2001 Invited public talk, Corning-Elmira Community College, Corning, NY: "*Current Progress in Understanding the Formation of Planetary Systems*"

Invited Scholarly Talks

- 2016 Disks and Planets Seminar, Universidad de Chile, Santiago, Chile: "Proto-planetary disks in Metal-Poor Environments"
- 2016 Astronomy Colloquium, Cerro Tololo Interamerican Observatory, La Serena, Chile: "Proto-planetary disks in Metal-Poor Environments"
- 2015 Science Colloquium, Wells College, Aurora, NY: "When did the first solar systems form and what were they like?"
- 2013 Planetary Lunch (lunchtime seminar), Cornell University, Ithaca, NY: "When did the first planets form and what were they like?"
- 2013 Astronomy Colloquium, Cornell University, Ithaca, NY: "Your Astronomy Course May Be the Last Chance! Making concepts stick with interactive instructional methods"
- 2011 Keynote presentation, Society of Physics Students Zone 2 Conference, Ithaca, New York: "Frequent Flyer: the Stratospheric Observatory for Infrared Astronomy"

- 2010 Chemistry Colloquium, State University of New York, Cortland, NY: "Astrochemistry and the formation of planetary systems"
- 2009 Science Colloquium, State University of New York, Oswego, NY: *"The Stratospheric Observatory for Infrared Astronomy"*
- 2009 Physics Seminar, Ithaca College, Ithaca, NY: "NASA's New Flying Observatory: A Giant Telescope in a 747"
- 2008 Invited Talk at "Cosmic Dust Near & Far," Astronomical Society of the Pacific conference, Heidelberg, Germany
- 2008 Physics Colloquium, University of Missouri, Columbia, MO: *"The Stratospheric Observatory for Infrared Astronomy: Facility Overview and Plans for First Light in 2008"*
- 2008 Astrophysics Seminar, University of Missouri, Columbia, MO: *"Spitzer IRS Spectra of PAH Emission from Herbig Ae/Be Stars"*
- 2006 Science Colloquium, Wells College, Aurora, NY: *"The Formation of Planetary Systems Orbiting Other Stars"*
- 2005 Invited talk at the *2005 Winter Conference on Astrophysics*, Aspen Center for Physics, Aspen, CO: *"Mid Infrared Spectra of PAH Emission in Herbig Ae/Be stars"*
- 2002 Astronomy Colloquium, University of Florida, Gainesville, FL: *"Astrochemical Approaches to Understanding Planet Formation"*
- 2002 Astronomy Colloquium, Cornell University, Ithaca, NY: *"Chemical Mixing on the Red Giant Branch: Clues to Understanding Galactic Chemical Evolution"*
- 2001 Astronomy Colloquium, Rochester Institute of Technology, Rochester, NY: *"Current Progress in Understanding Planetary System Formation: Adding Chemistry to the Dynamical Soup"*
- 2001 Physics/Astronomy Colloquium, Middle Tennessee State University, Murfreesboro, TN: *" $^{12}\text{C}/^{13}\text{C}$ in Field Halo Red Giant Stars: Nucleosynthesis and Chemical Mixing on the Red Giant Branch"*