Kara A. Ponder

Curriculum Vitae

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Research Interests

Dark Energy, Supernova Cosmology, Statistical Methods, Artificial Intelligence.

Employment

Aug 2020– **Research Associate**, *Machine Learning Initiative and Kavli Institute for Particle Astrophysics and Cosmology (KIPAC)*, SLAC National Accelerator Laboratory, Stanford University.

Sept 2017–Aug 2020 **Berkeley Center for Cosmological Physics Computational Data Science Fellow**, *Department of Physics*, University of California, Berkeley.

Education

2012–2017 **Ph.D. Physics**, *Department of Physics and Astronomy*, University of Pittsburgh, Pittsburgh, PA, USA.
Advisors: Professors Michael Wood-Vasey and Andrew Zentner

2012–2014 **M.S. Physics**, *Department of Physics and Astronomy*, University of Pittsburgh, Pittsburgh, PA, USA.

2009–2012 **B.S. Physics and Astronomy**, *Department of Physics and Astronomy*, University of Georgia, Athens, GA, USA.

Awards and Fellowships

2019 **LSST Dark Energy Science Collaboration (DESC) Travel grant**.
DESC Collaboration Meeting at APC, Paris, France

2017 **LSST Dark Energy Science Collaboration (DESC) Travel grant**.
DESC Collaboration Meeting at SLAC National Accelerator Laboratory, Menlo Park, CA

2016 **University of Pittsburgh School of Arts & Sciences Fellowship**, *For Fall 2016 and Summer 2017*.
Pitt PACC, Department of Physics and Astronomy - University of Pittsburgh

2016 **LSST DESC Travel grant**.
DESC Collaboration Meeting in Oxford, England, UK

2016 **Supernova Through the Ages: Understanding the Past to Prepare for the Future (SN2016) Conference Student Travel grant**.
SN2016 Conference, Easter Island, Chile

2015 **Zaccheus Daniels Fellowship**, *For Summer 2016*.
Department of Physics and Astronomy - University of Pittsburgh

2014 **Department of Energy (DOE) Office of Science Graduate Student Research (SCGSR) Awardee**.
Department of Energy, Office of Science

2012 **Kenneth P. Dietrich School of Arts & Sciences Fellowship**, *For Spring and Summer 2013*.
Kenneth P. Dietrich School of Arts & Sciences - University of Pittsburgh

2012 **Physics and Astronomy Award**.
Department of Physics and Astronomy - University of Georgia

2011 **Linville L. Hendren Memorial Scholarship for Outstanding Proficiency in Physics**.
Department of Physics and Astronomy - University of Georgia

Collaborations

Aug 2019 – **COIN: Cosmostatistics Initiative**.

Sept 2017 – **The Nearby Supernova Factory**.

March 2014 – **Vera C Rubin Observatory Legacy Survey of Space and Time (LSST) Dark Energy Science Collaboration (DESC)**.
Member of Supernova Working Group
Member of Collaboration Council: November 2015-2017, 2018-2020
Pipeline Scientist: Sept 2020–
Co-lead of the Supernova Machine Learning Topical Team: March 2021–

Feb 2014 – 2017 **Sloan Digital Sky Survey (SDSS) III and IV**.
SDSS III replaced by SDSS IV in June 2014. Officially Joined SDSS IV in March 2016

Accepted Proposals

2019–2021 **Hubble Space Telescope**, 51 Orbits in Cycle 27.
Supernovae in the Infrared avec Hubble (SIRAH)
PI: Saurabh Jha, CoI: KAP

2019–2020 **Hubble Space Telescope**, Snapshot.
Confirming Strong Galaxy Gravitational Lenses in the DESI Legacy Imaging Surveys
PI: Xiaosheng Huang, CoI: KAP

Spring/Summer 2017 **VLT 8.2 m**, 99 hours in Period 99, Multi Unit Spectroscopic Explorer (MUSE): Optical IFS.
All-weather MUse Supernova Integral field Nearby Galaxies (AMUSING) survey IV
PI: Lluís Galbany, CoI: KAP

Fall 2016/Spring 2017 **VLT 8.2 m**, 45 hours in Period 98, Multi Unit Spectroscopic Explorer (MUSE): Optical IFS.
All-weather MUse Supernova Integral field Nearby Galaxies (AMUSING) survey IV
PI: Lluís Galbany, CoI: KAP

Fall 2016 **Calar Alto 3.5 m**, Backup targets in service mode, Potsdam MultiAperture Spectrophotometer (PMAS): Optical IFS.
PI: Lluís Galbany, CoI: KAP

Fall 2015 **WIYN 3.5 m**, 4 nights, Proposal ID: 2015B-0347, WHIRC: NIR imaging camera and HexPak: optical IFU mounted on bench spectrograph.
PI: W. Michael Wood-Vasey, CoI: KAP

Experience

Feb 2019- **Referee for Physics Review D, AAS Journals, Astronomy and Computing**.

Aug 2016-Aug 2017 **Co-President of the Association of Physics and Astronomy Graduate Students**.
Department of Physics and Astronomy, University of Pittsburgh

Observing

Oct 2016 **Magellan 6.5 m**, 3 telescope nights, Low Dispersion Survey Spectrograph 3 (LDSS-3): Slit spectrograph in Optical and Folded-port InfraRed Echellette (FIRE): Echelle mode NIR spectrograph.

Nov 2013 - May 2017 **WIYN 3.5 m**, 59.5 telescope nights, WHIRC: NIR imaging camera.
SweetSpot survey (PI: W. Michael Wood-Vasey, CoI: KAP)

Nov 2015 **WIYN 3.5 m**, 2 telescope nights, HexPak: integral field unit mounted on bench spectrograph.
SweetSpot survey follow up (PI: W. Michael Wood-Vasey, CoI: KAP)

May 2014 **Bok 2.3 m**, 4.5 telescope nights, 90prime: optical imaging camera.
Reverberation Mapping project in SDSS III

Additional Research

Jan - June 2015 **Visiting student at the SLAC National Accelerator Laboratory**.
Funded through DOE SCGSR

June - Aug 2011 **Research Experience for Undergraduates (REU)**, Purdue University.
Simulated different alignments to optimize the Very Energetic Radiation Imaging Telescope Array System (VERITAS)
Advisors: Professor John Finley and Dr. Glenn Sembroski

Jan - May 2011 **Undergraduate Researcher**, University of Georgia.
Simulations of High Velocity Cloud Mixing with the Milky Way Halo
Advisor: Professor Robin Shelton
Publication from work: 'Mixing between High Velocity Clouds and the Galactic Halo'
Gritton, Jeffrey A., Shelton, Robin L., Kwak, Kyujin, The Astrophysical Journal, Volume 795, Issue 1, article id. 99, 9 pp. (2014)

Organized Conferences

Feb 2021 **SLAC Science + Stanford AI: Bridging the Farm**, *SOC/LOC*, Virtual, Menlo Park, CA.

Feb 2019 **LSST DESC Winter Meeting**, *LOC*, Berkeley, CA.

Feb 2019 **LSST DESC Broker Workshop**, *LOC*, Berkeley, CA.

April 2018 **New advances in NIR type Ia supernova science**, *SOC*, Pittsburgh, PA.

Nov 2016 **Preparing for SN science in the LSST era: A kick-off workshop**, *LOC*, Pittsburgh, PA.

Teaching

Aug - Dec 2012 **Teaching Assistant**, *Department of Physics and Astronomy*, University of Pittsburgh.
Course: Astronomy 0089

Selected Conferences and Talks

May 2021 **"Using Machine Learning to Prepare for Photometric Supernova Cosmology"**, Invited Talk.
Cosmic Physics Center Seminar at Fermi National Accelerator Laboratory, Virtual

Feb 2021 **"Building a DESC Transient Broker System: The Next Phase of PLAsTiCC"**, Invited Plenary.
LSST DESC Collaboration Meeting, Virtual

Oct 2020 **"Dark Energy Science Collaboration Needs from Alerts and Brokers"**, Invited Talk.
LSSTC enabling science 2020 broker workshop. Part I, Virtual

Feb 2020 **"PLAsTiCC: Convincing other people to solve your problems"**, Invited Talk.
Artificial Intelligence at SLAC Seminar, SLAC National Accelerator Lab,Menlo Park, CA

Oct 2019 **"The Nearby Supernova Factory - Science and Data Overview"**, Contributed Plenary Talk.
SNIa-Cosmology Analysis Meeting, University of Chicago, Chicago, IL

Jan 2019 **"Validating the PLAsTiCC Simulations"**, *Kara Ponder for the PLAsTiCC Team*, Contributed Talk.
American Astronomical Society Meeting 233, Seattle, WA

June 2018 **"The Nearby Supernova Factory: Efforts in Optimization and Visualization"**, Contributed Plenary.
Data Visualization and Exploration in the LSST Era, University of Illinois at Urbana-Champaign, IL

April 2018 **"SweetSpot Survey: Overview and Early Results"**, Invited Plenary Talk.
New Advances in NIR type Ia Supernova Science Workshop, Pittsburgh, PA

March 2018 **"Are Type Ia Supernovae in Restframe H-band Brighter in More Massive Galaxies?"**, Invited Talk.
Cosmology and Astronomy Seminar, UC Davis, Davis, CA

Nov 2016 **"Utilizing SweetSpot Host Galaxies for LSST"**, Contributed Plenary Talk.
Preparing for SN science in the LSST era: A kick-off workshop, University of Pittsburgh, Pittsburgh, PA

Aug 2016 **"SweetSpot: A Near Infrared Survey of Type Ia Supernovae in the Nearby Hubble Flow"**, Contributed Plenary Talk.
Supernova Through the Ages: Understanding the Past to Prepare for the Future, Easter Island, Chile

July 2015 **"Accounting for Multiple Populations of Type Ia Supernovae"**, Contributed Talk.
Santa Fe Cosmology Workshops, St. John's College, Santa Fe, NM

Oct 2014 **"Incorporating Astrophysical Systematics into a Generalized Likelihood"**, Invited Talk.
CMU Astrostatistics meeting, Carnegie Mellon University, Pittsburgh, PA

May 2011 **"The Mixing of High Velocity Clouds"**, Invited Talk.
Undergraduate Award's Day Colloquium - University of Georgia, Athens, GA

Public/Outreach Lectures

Sept 2019 **"Exploring Dark Energy with the Large Synoptic Survey Telescope"**.
Chabot Space and Science Center, Oakland, CA

June 2019 **"Exploring Dark Energy through Supernova Cosmology"**.
Physics in and Through Cosmology, Lawrence Berkeley National Lab, Berkeley, CA

Jan 2017 **"Exploring Dark Energy with the Large Synoptic Survey Telescope"**.
Allegheny Observatory Public Lecture Series, Pittsburgh, PA

Publications

Publications as Lead Author or Main Science Team

Apr 2021 **Rose, B. M. and 28 other authors including Ponder, K. A., endorsed by the Roman Supernova Science Investigation Teams LSST DESC Supernova Working Group**, *"Synergies between Vera C. Rubin Observatory, Nancy Grace Roman Space Telescope, and Euclid Mission: Constraining Dark Energy with Type Ia Supernovae"*, DOE/NASA Request for Information, arXiv:2104.01199.
Contribution: Writing.

Dec 2020 **Hložek, R., Ponder, K. A., and 20 other authors, LSST DESC, LSST TVS**, *"Results of the Photometric LSST Astronomical Time Series Classification Challenge (PLAsTiCC)"*, Submitted to AAS Journals, arXiv:2012.12392.
Contribution: Validation, visualization, writing - editing, writing - original draft.

Oct 2020 **Kennamer, Noble, Ishida, Emille E. O., Gonzalez-Gaitan, Santiago; de Souza, Rafael S., Ihler, Alexander, Ponder, Kara, Vilalta, Richardo, Moller, Anais, Jones, David O., Dai, Mi, Krone-Martins, Alberto, Quint, Bruno, Sreejith, Sreevarsha, Malz, Alex I., Galbany, Lluis (LSST DESC and COIN)**, *"Active learning with RESSPECT: Resource allocation for extragalactic astronomical transients"*, 2020 IEEE Symposium Series on Computational Intelligence, arXiv: 2010.05941.
Contribution:

Jun 2020 **Ponder, K., Wood-Vasey, Weyant, A., Barton, N. T., Galbany, L., Garnavich, P. , Matheson, T.**, *"Are Type Ia Supernovae in Restframe H Brighter in More Massive Galaxies?"*, Submitted to AAS Journals, arXiv:2006.13803 .
Contribution: Lead author.

Nov 2019 **Malz, A., Hložek, R., and 20 other authors including Ponder, K., LSST DESC, LSST TVS**, *"The Photometric LSST Astronomical Time-series Classification Challenge (PLAsTiCC): Selection of a performance metric for classification probabilities balancing diverse science goals"*, Astrophysical Journal, Volume 158, Issue 5, article id 171, arXiv:1809.11145.
Contribution: Visualization and editing.

Sept 2019 **Kessler R., Narayan G., and 27 other individual authors including Ponder, K. A.**, *"Models and Simulations for the Photometric LSST Astronomical Time Series Classification Challenge (PLAsTiCC)"*, Publications of the Astronomical Society of the Pacific, Volume 131, Issue 1003, pp. 094501, arXiv:1903.11756.
Contribution: Validating the models and simulations, writing, and editing.

Oct 2018 **The PLAsTiCC team, LSST DESC, LSST TVS, and 22 individual authors including Ponder, K.**, *"The Photometric LSST Astronomical Time-series Classification Challenge (PLAsTiCC): Data set"*, arXiv:1810.00001.
Contribution: Validating the models and simulations, writing, and editing.

Aug 2019 **Holoien, T. W.-S., Huber, M. E., Shappee, B. J., and 35 other authors including Ponder, K.A.**, *"PS18kh: A New Tidal Disruption Event with a Non-Axisymmetric Accretion Disk"*, The Astrophysical Journal, Volume 880, Issue 2, article id. 120, 21 pp., arXiv:1808.02890.
Contribution: Provided special SNIFS data reductions with the Nearby Supernova Factory pipeline.

May 2018 **Weyant, A., Wood-Vasey W. M. , Joyce, R., Allen, L. , Garnavich, P. , Jha S.W., Kroboth, J.R., Matheson, T., Ponder, K.A.**, *"The First Data Release from SweetSpot: 74 Supernovae in 36 Nights on WIYN+WHIRC"*, The Astronomical Journal, Volume 155, Issue 5, article id. 201, arXiv:1703.02402.
Contribution: I was the lead graduate student on this project after A. Weyant. Observations with the WIYN 3.5 m telelscope, writing, and editing.

Feb 2018 **L. Galbany, J. P. Anderson, 17 more authors including K. A. Ponder**, *"PISCO: The Pmas/ppak Integral-field Supernova hosts COmpilation"*, The Astrophysical Journal, Volume 855, Issue 2, article id. 107, arXiv:1802.01589.
Contribution: Proposal submission and editing.

Nov 2017 **Shivvers, I., Zheng. W., 25 more authors including Kara A. Ponder**, *"The Nearby Type Ibn Supernova 2015G: Signatures of Asymmetry and Progenitor Constraints"*, Monthly Notices of the Royal Astronomical Society, Volume 471, p. 4381–4397, arXiv:1704.04316.
Contribution: Provided near infrared observations with the WIYN 3.5 m telescope and data, writing, editing.

Aug 2017 **Ponder, K. A.**, *"Fitting and Phenomenology in Type IA Supernova Cosmology: Generalized Likelihood Analyses for Multiple Evolving Populations and Observations of Near-Infrared Lightcurves Including Host Galaxy Properties"*, ProQuest Dissertations And Theses. Publication Number: AAT 10692580; ISBN: 9780355410532, ADS link.
Contribution: Lead author.

June 2016 **Ponder, K., Wood-Vasey, W.M., Zentner, A.**, *"Incorporating Astrophysical Systematics into a Generalized Likelihood for Cosmology with Type Ia Supernova"*, Astrophysical Journal, Volume 825, Issue 1, article id 35, arXiv:1511.04647.
Contribution: Lead author.

Publications as Member of Collaboration

May 2021 **Boone, K, and 43 additional authors including Ponder, K. A.**, *"The Twins Embedding of Type Ia Supernovae. II. Improving Cosmological Distance Estimates"*, The Astrophysical Journal, Volume 912, Issue 1, article id. 71, arXiv:2105.02204.
Contribution: Reduced the data from the Nearby Supernova Factory, writing: editing.

May 2021 **Boone, K, and 43 additional authors including Ponder, K. A.**, *"The Twins Embedding of Type Ia Supernovae. I. The Diversity of Spectra at Maximum Light"*, The Astrophysical Journal, Volume 912, Issue 1, article id. 70, arXiv:2105.02676.
Contribution: Reduced the data from the Nearby Supernova Factory, writing: editing.

May 2020 **Aldering, G., and 43 additional authors including Ponder, K. A.**, *"The SNEMO and SUGAR Companion Data Sets"*, Research Notes of the AAS, Volume 4, Issue 5, id.63, arXiv:2005.03462.
Contribution: Reduced the data from the Nearby Supernova Factory.

Apr 2020 **Leget, P.-F., and 43 additional authors including Ponder, K. A.**, *"SUGAR: An improved empirical model of Type Ia Supernovae based on spectral features"*, Astronomy & Astrophysics, Volume 636, id.A46, 24 pp., arXiv:1909.11239.
Contribution: Reduced the data from the Nearby Supernova Factory.

Dec 2019 **Sloan Digital Sky Survey - Reverberation Mapping Project (34 authors including Kara A. Ponder)**, *"The Sloan Digital Sky Survey Reverberation Mapping Project: Initial CIV Lag Results from Four Years of Data"*, The Astrophysical Journal, Volume 887, Issue 1, article id. 38, arXiv:1904.03199.
Contribution: Observing on the Bok 2.3 m telescope.

Oct 2019 **Taubengerger, S., and 42 additional authors including Ponder, K. A.**, *"SN 2012dn from early to late times: 09dc-like supernovae reassessed"*, Monthly Notices of the Royal Astronomical Society, Volume 488, Issue 4, p.5473-5488, arXiv:1907.06753.
Contribution: Reduced the data from the Nearby Supernova Factory.

Dec 2017 **Sloan Digital Sky Survey - Reverberation Mapping Project (39 authors including Kara A. Ponder)**, *"The Sloan Digital Sky Survey Reverberation Mapping Project: Hα and Hβ Reverberation Measurements From First-Year Spectroscopy and Photometry"*, The Astrophysical Journal, Volume 851, Issue 1, article id. 21, arXiv:1711.03114.
Contribution: Observing on the Bok 2.3 m telescope.

Aug 2017 **LSST Science Collaborations (104 authors including Kara A. Ponder)**, *"Science-Driven Optimization of the LSST Observing Strategy"*, arXiv:1708.04058.
Contribution: I worked on a figure of merit for how many lightcurve points were needed to determine its fit parameters that balances quantity and quality.

Jan 2015 **Sloan Digital Sky Survey III- Reverberation Mapping Project (39 authors including Kara Ponder)**, *"The Sloan Digital Sky Survey Reverberation Mapping Project: Technical Overview"*, Astrophysical Journal Supplement, Volume 216, Issue 1, article id. 4.
Contribution: Observing on the Bok 2.3 m telescope.

Abstracts

Jan 2020 **Ponder, Kara for the PLAsTiCC Team**, *"The Photometric LSST Astronomical Time Series Classification Challenge (PLAsTiCC): Final Results"*, American Astronomical Society Meeting 235.

Jan 2020 **Ponder, Kara for the Nearby Supernova Factory**, *"The Nearby Supernova Factory – Data and Science Overview"*, American Astronomical Society Meeting 235.

Jan 2019 **Ponder K. A. for the PLAsTiCC Team**, *"Validating the PLAsTiCC Simulations"*, American Astronomical Society Meeting Abstracts 233.

Jan 2019 **Ponder K. A. for the Nearby Supernova Factory**, *"Survey Statistics for the Nearby Supernova Factory Data Release"*, American Astronomical Society Meeting Abstracts 233.

June 2016 **Ponder K. A., Wood-Vasey W. M. , Weyant A., Allen L., Garnavich P. M., Jha S.W., Joyce R. R., Matheson T., Rest A.**, *"IFU Spectroscopy of 32 SweetSpot Supernova Host Galaxies"*, American Astronomical Society Meeting Abstracts 228.

Codes and Data

July 2019 **Malz, A. and 9 other authors including K. Ponder**, *"aimalz/proclam: Journal Submission"*, Zenodo, DOI: 10.5281/zenodo.3352639 .
Contribution: Data visualization.

Jan 2019 **PLASTICC Team and PLASTICC Modelers**, *"Unblinded Data for PLAsTiCC Classification Challenge"*, Zenodo, DOI: 10.5281/zenodo.2539456.
Contribution: Data validation.

Nov 2016 **Galbany, L., D'Andrea, C., Prajs, S., Smith, M., Sullivan, M., Ponder, K., and 46 other authors**, *"Classification of DES16C2nm as a SLSN at z= 1.998"*, The Astronomer's Telegram, Volume 9700.
Contribution: Observing on the Magellan 6.5 m telescope.

Electronic Records

Click for link: **Google Scholar, inSPIRE HEP, Research Gate, LinkedIn**.

References

Michael Wood-Vasey, email: wmwv@pitt.edu.

Saul Perlmutter, email: saul@lbl.gov.

Renee Hložek, email:hlozek@dunlap.utoronto.ca.