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Education

Ph.D. 1990 : Physics/University of Wisconsin-Madison
M.S. 1985 : Physics/University of Wisconsin-Madison
B.A. 1983 : Physics/Dartmouth College

Employment

2010 — present : Professor of Physics, Penn State
2010 — present : Professor of Astronomy and Astrophysics, Penn State
2013 — 2017 : Associate Director, Institution for Gravitation and the Cosmos, Penn State
2002 — 2010 : Associate Professor of Physics, Penn State
2002 — 2010 : Associate Professor of Astronomy and Astrophysics, Penn State
2001 — 2002 : IceCube Project Science Coordinator, Lead for IceCube Science Operations, and Research Professor of Physics, UW-Madison
1994 — 2002 : Assistant Professor of Physics, U. of Pennsylvania
1993 — 1994 : Senior Research Fellow in Physics, Caltech
1990 — 1993 : Research Fellow in Physics, Caltech
1985 — 1990 : Research Assistant, UW-Madison

Awards

- Royal Society Wolfson Visiting Fellowship, University of Sussex, UK, 2022-2024
- Bruno Rossi Prize in High Energy Astrophysics (co-winner), 2021.
- Breakthrough Prize in Fundamental Physics (co-winner), 2016.
- Leverhulme Trust Visiting Professorship, University of Manchester, UK, 2015
- Institute for Cyberscience Faculty Fellow, Penn State, 2012
- Fulbright Scholar, Humboldt Universität, Berlin, Germany, 2009
- Research Visit Grant, Deutscher Akademischer Austausch Dienst (DAAD), Humboldt Universität, Berlin, Germany, 2008
- Society of Physics Students Teaching Award, Penn State, 2006
- NSF CAREER, 1999
- Outstanding Teaching Assistant, UW-Madison, 1983
- Francis W. Sears Physics Prize, Dartmouth College, 1983
- Sigma Xi Prize, Dartmouth College, 1983
- Phi Beta Kappa, Dartmouth College, 1982

- Rufus Choate Scholar, Dartmouth College, 1982
- Francis L. Town Scientific Prize, Dartmouth College, 1981

Seminars and workshops (and invited talks at professional meetings)

- *Astrophysical Tau Neutrinos*, Jan. 2024, Astronomy and Astrophysics Colloquium at Penn State.
- *Astrophysical Tau Neutrinos*, Feb. 2024, seminar at Oxford University, UK (invitation accepted).
- *Astrophysical Tau Neutrinos*, Mar. 2024, seminar at University College London, UK (invitation accepted).
- *Astrophysical Tau Neutrinos*, Apr. 2024, seminar at the Ohio State University (invitation accepted).
- *Astrophysical Tau Neutrinos*, Apr. 2024, seminar at Case Western Reserve University (invitation accepted).
- *Tau Neutrinos with IceCube*, Dec. 2023, The 17th International Workshop on Tau Lepton Physics (Tau2023), Louisville, KY, invited talk.
- *Astrophysical Tau Neutrinos*, Sep. 2023, seminar at Cornell University.
- *All Tau Neutrinos, Great and Small*, fall 2022, seminar at University of Sussex, UK.
- *Tau Neutrinos with IceCube*, Tau2021, Sep. 2021, Indiana University (virtual), invited talk.
- *Retro Reflectors in WATCHMAN*, WATCHMAN Collaboration meeting, Jan. 2020, Monterey, CA, invited talk.
- *WATCHMAN Data Acquisition Electronics*, WATCHMAN Collaboration meeting, May 2019, Edinburgh, UK, invited talk.
- *WATCHMAN Data Acquisition Electronics*, WATCHMAN Collaboration meeting, Jan. 2019, Honolulu, HI, invited talk.
- *Neutrino Messengers from the Cosmos: Discoveries, Implications and Prospects*, Oct. 2018, Penn State Physics Department Colloquium (with Prof. Derek Fox).
- *WATCHMAN Data Acquisition Electronics*, WATCHMAN Collaboration meeting, Sep. 2018, Liverpool, UK, invited talk.
- *WATCHMAN Data Acquisition Electronics*, WATCHMAN Collaboration meeting, May. 2018, Davis, CA, invited talk.
- *WATCHMAN Data Acquisition Electronics*, WATCHMAN Collaboration meeting, Jan. 2018, Sheffield, UK, invited talk.
- *The Dawn of Multi-Messenger Astronomy*, TAUP 2017, Jul. 2017, Sudbury, Ontario, Canada, invited talk.
- *Neutrino Physics with INO, ORCA and PINGU*, NuPhys 2015, Dec. 2015, London, UK, invited talk.
- *Neutrino Physics with PINGU*, fall 2015, seminar at Sheffield University, UK.
- *Neutrino Physics with PINGU*, fall 2015, seminar at University of Birmingham, UK.
- *Neutrino Physics with PINGU*, fall 2015, seminar at University of Manchester, UK.
- *Neutrino Physics with PINGU*, fall 2015, seminar at UCL, UK.

- *Neutrino Physics with PINGU*, fall 2015, seminar at Imperial College, UK.
- *Neutrino Physics with PINGU*, fall 2015, seminar at Lancaster University, UK.
- Unable to accept due to travel constraints: *Lecturer (with a short course or a talk) to the VI School on Cosmic Rays and Astrophysics*, Mesoamerican Centre for Theoretical Physics (MCTP), Chiapas, Mexico. All expenses would have been paid.
- *PINGU Overview*, RWTH, Germany, Detector Design and Technology for Next Generation Neutrino Observatories, Dec. 8-10, 2014.
- *Neutrino Physics with IceCube and Its Extensions*, Sungkyunkwan University, S. Korea, International Symposium on Recent Progress in Physics, Nov. 5-7, 2014.
- *The Discovery of Ultrahigh Energy Astrophysical Neutrinos with IceCube*, Bowdoin College, Physics Department, Oct. 30, 2014.
- *Particle Physics with PINGU*, Cornell University, LEPP Journal Club, Mar. 28, 2014.
- *PINGU and the Neutrino Mass Hierarchy*, SLAC National Laboratory, Particle Physics Project Prioritization Panel (P5), Dec. 2-5, 2013.
- *GeV-scale Physics in the South Pole Icecap*, Argonne National Laboratory, Intensity Frontier Workshop IF4: Baryon Number Violation on April 26, 2013.
- *Panelist for Panel Discussion: Inter-Frontier Connections*, Argonne National Laboratory, Intensity Frontier Workshop IF3: Neutrinos on April 26, 2013.
- *Progress on Data Analysis: Low Energy (Neutrino Oscillations, WIMPs)*, UW-Madison, IceCube Scientific Advisory Committee on April 19, 2013.
- *Searches for Neutrinos from Dark Matter*, KICP and PNAS, Sackler Colloquia on Dark Matter Universe: On the Threshold of Discovery on October 19, 2012.
- *IceCube/DeepCore and IceCube/PINGU: Prospects for Few-GeV Scale ? Physics in the Ice*, NuFact 2012 (Williamsburg, VA), NuFact 2012 on July 27, 2012.
- *IceCube/DeepCore and IceCube/PINGU: Prospects for Few-GeV Scale ? Physics in the Ice*, BEACH 2012 (Wichita, KS), BEACH 2012 on July 25, 2012.
- *IceCube's Neutrino Microscope*, Columbia University, Colloquium on April 16, 2012.
- *IceCube's Neutrino Microscope*, Stanford Linear Accelerator Center, Seminar on April 10, 2012.
- *Low Energy Neutrino Workshop Summary*, Ohio State University, Novel Searches for Dark Matter with Neutrino Telescopes Workshop on July 5, 2010.
- *Icy Cold Neutrinos in Three Delicious Flavors*, American Chemical Society National Meeting, American Chemical Society National Meeting, Division of Nuclear Chemistry & Technology on August 18, 2009.
- *Physics with Ice Cube's Deep Core Sub-Array*, University College London, Seminar on June 5, 2009.
- *Physics with Ice Cube's Deep Core Sub-Array*, Imperial College London, Seminar on June 4, 2009.
- *Fundamental Neutrino Physics with IceCube's Deep Core Sub-array*, Max-Planck-Institut fuer Physik, Munich, Germany, Colloquium on May 12, 2009.
- *Fundamental Neutrino Physics with IceCube's Deep Core Sub-array*, University of Erlangen-Nürnberg, Colloquium on May 11, 2009.

- *The Physics Potential of IceCube's Deep Core Sub-Array*, Istituto Veneto di Scienze, Lettere ed Arti, Venice, Italy, XIII International Workshop on Neutrino Telescopes on March 11, 2009.
- *Fundamental Neutrino Physics with IceCube's Deep Core Sub-array*, Johannes-Gutenberg-Universitaet, Institut fuer Physik, Mainz, Germany, Elementarkraefte und mathematische Grundlagen Seminar on January 7, 2009.
- *Particle Physics with the IceCube Deep Core Sub-Array*, DESY/Zeuthen National Laboratory, Berlin, Germany, Experimental High Energy Physics Research Seminar on November 21, 2008.
- *IceCube and Neutrino-Triggered Target of Opportunity Optical Observations*, Penn State, Astronomy and Astrophysics Tuesday Lunch Talk on March 4, 2008.
- *Ultrahigh Energy Neutrino Physics with IceCube*, Purdue University, Astrophysics/High Energy Seminar on April 10, 2007.
- *Ultrahigh Energy Neutrino Physics with IceCube*, University of Indiana, Particle Physics Seminar on April 9, 2007.
- *Neutrino Astronomy and Particle Physics with the IceCube Detector*, Ohio State University, Center for Cosmology and Astroparticle Physics on April 5, 2007.
- *Tau Neutrino Detection in IceCube*, UW-Madison, Second Workshop on TeV Particle Astrophysics on August 27, 2006.
- *Future Development of the IceCube Detector*, IHEP, Beijing, China, Ultrahigh Energy Tau Neutrino Workshop on April 12, 2006.
- *Neutrino Astronomy at the South Pole*, Indiana University of Pennsylvania, Physics and Astronomy Department on February 17, 2006.
- *An Introduction to Neutrino Astronomy at the South Pole*, Penn State, Astronomy and Astrophysics Tuesday Lunch Group on January 31, 2006.
- *IceCube Detector Verification and Commissioning*, UW-Madison, IceCube NSF Review Panel on May 25, 2005.
- *IceCube: First Light*, University of California-Santa Barbara, Kavli Institute for Theoretical Physics on May 12, 2005.
- *AMANDA and IceCube: Large-scale Neutrino Detectors at the South Pole*, Bowdoin College, Physics Department on April 7, 2005.
- *Icefishing for Ultrahigh Energy Neutrinos with IceCube*, Bowdoin College, Public Lecture on April 7, 2005.
- *Detectors and Data Acquisition (2 lectures)*, Abdus Salam International Center for Theoretical Physics, Seventh School on Non-Accelerator Astroparticle Physics on July 30, 2004.
- *Solar and Reactor Neutrinos*, Abdus Salam International Center for Theoretical Physics, Seventh School on Non-Accelerator Astroparticle Physics on July 29, 2004.
- *Particle Astrophysics at Penn State*, Penn State, Penn State Society of Physics Students on January 21, 2004.
- *IceCube Detector Verification and Commissioning*, University of Wisconsin, Madison, IceCube Project Advisory Panel on December 18, 2003.
- *IceCube Detector Operating Modes*, University of Maryland, IceCube Collaboration Software Group on August 25, 2003.
- *IceCube InIce and Global Trigger Processors*, University of Maryland, IceCube Collaboration Software Group on August 25, 2003.

- *IceCubism: How and When a Cube Will Capture Cones*, College de France, Paris, High Energy Neutrino Astronomy Workshop on June 17, 2003.
- *IceCube*, NeSS 2002, NeSS 2002/Astrophysics and Cosmology Working Group on September 20, 2002.
- *Recent Results from AMANDA and Prospects for IceCube*, Penn State, Astronomy Department Colloquium in September 2002.
- *Recent Results from AMANDA and Prospects for IceCube*, Cornell University, Particle Physics Seminar in August 2002.
- *Results from the Antarctic Muon and Neutrino Detector Array (AMANDA)*, Max-Planck-Institut fur Physik and Technische Universitat Muenchen, XXth International Conference on Neutrino Physics and Astrophysics (Neutrino 2002) on May 29, 2002.
- *Icefishing for Neutrinos with AMANDA*, Penn State University, Particle Astrophysics Seminar in April 2001.
- *Neutrino Astronomy Deep Down and Way Down Under*, University of Delaware, Physics Department Colloquium in March 2001.
- *Icefishing for Neutrinos with AMANDA*, Lehigh University, Physics Department Colloquium in February 2001.
- *The Sudbury Neutrino Observatory*, University of Minnesota, Physics Department Colloquium in February 2001.
- *Icefishing for Neutrinos with AMANDA*, Drexel University, Physics Department Colloquium in February 2001.
- *Icefishing for Neutrinos with AMANDA*, Brookhaven National Lab, Particle Physics Seminar in November 2000.
- *Icefishing for Neutrinos with AMANDA*, University of Maryland, Particle Physics Seminar in October 2000.
- *Recent Results from AMANDA*, American Physical Society, Division of Particles and Fields in August 2000.
- *Recent Results from AMANDA*, ICHEP-2000, International Conference on High Energy Physics in July 2000.
- *Icefishing for Neutrinos with AMANDA*, Temple University, Physics Department Colloquium in May 2000.
- *Status of the SNO Experiment*, APS Meeting, American Physical Society Meeting in April 2000.
- *Icefishing for Neutrinos with AMANDA*, Cornell University, Particle Physics Seminar in August 1999.
- *Solar and Atmospheric Neutrinos*, National Academy of Sciences and Humboldt Foundation, German-American Frontiers of Science in June 1999.
- *The Sudbury Neutrino Observatory and the Solar Neutrino Opportunity*, University of Michigan, High Energy Physics Seminar in March 1999.
- *The Sudbury Neutrino Observatory and the Solar Neutrino Opportunity*, Temple University, Physics Department Colloquium in November 1998.
- *The Sudbury Observatory and the Solar Neutrino Opportunity*, UC-Santa Cruz, High Energy Physics Seminar in September 1998.

- *The Sudbury Neutrino Observatory and the Solar Neutrino Opportunity*, Stanford Linear Accelerator Center, High Energy Physics Seminar in September 1998.
- *The Sudbury Neutrino Observatory and the Solar Neutrino Opportunity*, University of Kansas, Physics Department Colloquium in August 1998.
- *Data Acquisition Electronics for IceCube*, UC-Irvine, IceCube Workshop in March 1998.
- *Exploiting the Solar Neutrino Opportunity: Second Generation Solar Neutrino Detectors*, Bryn Mawr College, Physics Department Colloquium in November 1997.
- *The Sudbury Neutrino Observatory and the Solar Neutrino Opportunity*, University of Delaware/Bartol Institute, High Energy Physics Seminar in February 1997.
- *The Sudbury Neutrino Observatory and the Solar Neutrino Opportunity*, University of Pittsburgh, High Energy Physics Seminar in February 1997.
- *The Sudbury Neutrino Observatory and the Solar Neutrino Opportunity*, Princeton University, High Energy Physics Seminar in February 1997.
- *Exploiting the Solar Neutrino Opportunity: Second Generation Solar Neutrino Detectors*, Cornell University, Physics Department Colloquium in January 1997.
- *The Design and Status of the Sudbury Neutrino Observatory*, 18th Texas Symp. on Relativistic Astrophysics, 18th Texas Symposium on Relativistic Astrophysics in December 1996.
- *The Solar Neutrino Opportunity*, Cornell University (APS), New York State American Physical Society 75th Topical Symposium in October 1996.
- *Massive Neutrinos and the Sudbury Neutrino Observatory*, Cornell University, High Energy Physics Seminar in May 1996.
- *Massive Neutrinos and the Sudbury Neutrino Observatory*, Caltech, High Energy Physics Seminar in April 1996.
- *Massive Neutrinos and the Sudbury Neutrino Observatory*, UC-San Diego, High Energy Physics Seminar in April 1996.
- *The SNO Data Acquisition System*, Paris Conf. on Electronics for High Energy Neutrino Detectors, Paris Conference on Electronics for High Energy Neutrino Detectors in March 1996.
- *Massive Neutrinos and the Sudbury Neutrino Observatory*, Rutgers University, High Energy Physics Seminar in February 1996.
- *Status of the SNO Experiment*, Paris Conf. on Electronics for High Energy Neutrino Detectors, Paris Conference on Electronics for High Energy Neutrino Detectors in January 1996.
- *Recent Results in Tau Physics from CLEO-II*, Lake Louise Winter Institute, Lake Louise Winter Institute in February 1994.
- *The CLEO-II Limit on $M(\text{nutau})$ and Prospects for Its Improvement*, Stanford, SLAC Tuesday Seminar in November 1993.
- *The CLEO-II Limit on $M(\text{nutau})$ and Prospects for Its Improvement*, 3rd Workshop on the Tau Charm Factory, Third Workshop on the Tau Charm Factory in June 1993.
- *Studies of Radiation Damage to CAMEX64 Preamplifiers Exposed to Gamma-rays at the Cornell High Energy Synchrotron Source*, IEEE Nuclear Science Symposium, Poster Session in October 1992.
- *A Limit on the Tau Neutrino Mass*, Ohio State, 2nd Workshop on Tau Lepton Physics in September 1992.

- *The Tau Neutrino Mass at CLEO-II*, UCLA, 2nd UCLA International Conference on Gamma Ray and Neutrino Cosmology in February 1992.
- *Tau Physics at CLEO-II*, Aspen Winter Physics Conf. on Elementary Particle Physics, Aspen Winter Physics Conference on Elementary Particle Physics in January 1992.
- *Limits on the Production of Neutral SUSY Higgs Bosons from Z0 Decays*, APS, Meeting of the American Physical Society on April 16, 1990.
- *Limits on the Production of Charged Higgs Bosons from Z0*, APS, Meeting of the American Physical Society on April 16, 1990.
- *Gating in the ALEPH Time Projection Chamber*, IVth Int. Wire Chamber Conf., IVth International Wire Chamber Conference in February 1986.

Service to profession

- Co-Organizer, The Astrophysical Multimessenger Observatory Network (AMON) Workshop, Chiba, Japan, May 2019.
- Scientific Organizing Committee, Enabling Multi-Messenger Astrophysics in the Big Data Era Workshop, Space Science Telescope Institute, Baltimore, MD, USA, April 2019.
- International Advisory Committee member, XXVII International Conference on Neutrino Physics and Astrophysics (Neutrino 2016), July 2016, London, UK.
- Three-Neutrino Working Group Co-Convener for *Workshop on the Intermediate Neutrino Program (WINP2015)* at Brookhaven National Laboratory, Feb. 2015.
- Co-Organizer for *Third Astrophysical Multimessenger Observatory Network Workshop* at DESY/Zeuthen, Berlin, Germany, Dec. 2014.
- Co-Organizer for *IceCube-Gen2 Electronics mini-Workshop* at RWTH in Aachen, Germany, Dec. 2014.
- Snowmass 2013 Convener for *Cosmic Frontier: WIMP Dark Matter Indirect Detection (CF2)*.
- NNN12 Program Advisory Committee member, from July 2012 to December 2012.
- KM3NeT Scientific Standing Committee member, December 2010 to December 2012.
- IceCube Collaboration Executive Committee member, August 2007 to May 2013.
- Reviewer of proposals for NSF Particle Astrophysics, DOE High Energy Physics and Canadian NSERC Sub-atomic Physics Program, since 2004.
- Invited thesis committee member for M. Kowalski, Humboldt-Universität, Berlin, Germany, October 2003 to January 2004.
- URA Visiting Committee for Fermilab (Advisory body), March 2003 to March 2005.

Teaching

- PHYS 213: General Physics: Fluids & Thermal Physics, Fall 2003, 404 students.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Fall 2003, 583 students.
- PHYS 496: Independent Studies, Fall 2003, 1 students.
- PHYS 600: Thesis Research, Fall 2003, 1 students.

- PHYS 213: General Physics: Fluids & Thermal Physics, Spring 2003, 372 students.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Spring 2003, 447 students.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Fall 2005, 489 students.
- PHYS 213: General Physics: Fluids & Thermal Physics, Fall 2005, 398 students.
- PHYS 213: General Physics: Fluids & Thermal Physics, Fall 2006, students.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Fall 2006, students.
- PHYS 212: General Physics: Electricity & Magnetism, Fall 2007, 913 students.
- PHYS 211: General Physics: Mechanics, Fall 2009, 828 students.
- PHYS 237: Modern Physics, Fall 2010, 40 students.
- PHYS 237: Modern Physics, Spring 2011, 40 students.
- PHYS 237: Modern Physics, Fall 2011, 56 students.
- PHYS 237: Modern Physics, Spring 2012, students.
- PHYS 211: General Physics: Mechanics, Fall 2012, 860 students.
- PHYS 212: General Physics: Electricity & Magnetism, Spring 2013, 685 students.
- PHYS 211: General Physics: Mechanics, Spring 2014, 991 students.
- PHYS 211: General Physics: Mechanics, Spring 2015, 1478 students.
- PHYS 213: General Physics: Fluids & Thermal Physics, Fall 2016, 37 students.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Fall 2016, 38 students.
- PHYS 213: General Physics: Fluids & Thermal Physics, Fall 2017, 319 students.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Fall 2017, 505 students.
- PHYS 213: General Physics: Fluids & Thermal Physics, Fall 2018, 252 students.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Fall 2018, 454 students.
- PHYS 213: General Physics: Fluids & Thermal Physics, Fall 2019, 204 students.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Fall 2019, 378 students.
- PHYS 213: General Physics: Fluids & Thermal Physics, Fall 2020, 177 students.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Fall 2020, 325 students.
- PHYS 212: General Physics: Electricity & Magnetism, Fall 2021, 639 students.
- PHYS 213: General Physics: Fluids & Thermal Physics, Fall 2023, 180 students.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Fall 2023, 300 students.

Research Grants and Contracts:

- National Science Foundation, *WoU-MMA: IceCube Data Analysis in the U.S.*, \$730,000, from Sep. 2022 to Aug. 2025.
- National Science Foundation, *Management and Operations of the IceCube Neutrino Observatory 2021-2026*, \$429,000, through Mar. 2024.
- Brookhaven National Laboratory, *BNL WbLS DAQ* \$133,000, through May 2024.
- Lawrence Berkeley National Laboratory, *Data Acquisition Software for Eos*, \$254,000, Aug. 2022 - Sep. 2024.

- Battelle - Lawrence Livermore National Laboratory, *Far-Field Neutrino Detector R&D*, \$54,834, from Feb. 2023 to Aug. 2024.
- Battelle - Lawrence Livermore National Laboratory, *Far-Field Neutrino Detector R&D*, \$159,000, from Jul. 2021 to Jul. 2022.
- National Science Foundation (MRI), *Acquisition of a Purpose-Built Deep Learning Compute System to Advance Fundamental Research and Education at Penn State*, \$454,286, from Aug. 2020 to Jul 2023.
- Battelle - Lawrence Livermore National Laboratory, *Far-Field Neutrino Detector R&D*, \$331,434, from Feb. 2020 to Sep. 2020.
- Battelle - Lawrence Livermore National Laboratory, *Preliminary Design of the WATCHMAN DAQ System*, \$131,231, from Oct. 2019 to Jun. 2020.
- Battelle - Lawrence Livermore National Laboratory, *WATCHMAN PMT Pressure Tests Phase One at Penn State*, \$83,166, from May 2019 to Apr. 2020.
- Battelle - Lawrence Livermore National Laboratory, *WATCHMAN DAQ Electronics*, \$32,787, from Jan. 2018 to May 2019.
- National Science Foundation, *WoU-MMA: IceCube Data Analysis in the U.S.* , \$735,000, from Sep. 2019 to Aug. 2022.
- National Science Foundation, *IceCube Gen2 Phase 1: an IceCube Extension for Precision Neutrino Physics and Astrophysics*, \$23,000,000, from Oct. 2018 to Sep. 2023 (with K. Hanson, D. Williams, and T. DeYoung).
- National Science Foundation, *Precision Atmospheric Neutrino Oscillation Measurements with IceCube DeepCore*, \$201,000, from Sep. 2018 to Aug. 2019.
- National Science Foundation (MRI), *CyberLAMP: Acquisition of High Performance Hybrid Computing Cluster to Advance Cyber-enabled Science and Education at Penn State*, \$1,315,269, from August 2016 to July 2019.
- National Science Foundation, *Atmospheric Neutrino Oscillations with IceCube DeepCore*, \$810,000, from August 2015 to July 2018.
- National Science Foundation, *The Astrophysical Multimessenger Observatory Network*, \$597,514, from Jul. 2017 to Jun 2020 (with co-PI D. Fox and PI M. Mostafá).
- National Science Foundation, *The Astrophysical Multimessenger Observatory Network*, \$384,373, from June 2014 to May 2017 (with co-PI D. Fox and PI M. Mostafá).
- National Science Foundation, *Neutrino Physics and Astrophysics with IceCube Data*, \$1,132,348, from August 2012 to July 2015 (with T. DeYoung).
- National Science Foundation, *Maintenance and Operation of IceCube 2010-2011*, \$33,955, from October 2010 to September 2011 (with T. DeYoung).
- National Science Foundation, *IceCube Year 9*, \$146,715, from April 2010 to March 2011 (with T. DeYoung).
- National Science Foundation, *Neutrino Physics and Astrophysics with IceCube Data*, \$963,261, from August 2009 to July 2012 (with T. DeYoung).
- National Science Foundation, *Maintenance and Operation of IceCube 2008-2009*, \$92,637, from October 2008 to September 2009 (with T. DeYoung).
- National Science Foundation, *IceCube Year 6*, \$457,167, from April 2007 to March 2008 (with T. DeYoung).

- National Science Foundation, *Maintenance and Operation of IceCube 2007*, \$83,166, from April 2007 to September 2007 (with T. DeYoung).
- National Science Foundation, *Analysis of IceCube Data*, \$750,000, from July 2006 to June 2009.
- National Science Foundation, *IceCube Year 5*, \$766,140, from April 2006 to March 2007.
- National Science Foundation, *IceCube Year 4*, \$692,582, from April 2005 to March 2006.
- National Science Foundation, *IceCube Year 3*, \$818,049, from April 2004 to March 2005.
- National Science Foundation, *Searches for Ultrahigh Energy Neutrinos with AMANDA*, \$450,000, from August 2003 to July 2006.
- National Aeronautics and Space Administration, *ANITA: Antarctic Impulsive Transient Antenna*, \$1,010,000, from April 2003 to September 2008.
- National Science Foundation, *IceCube Year 2*, \$350,000, from April 2003 to March 2004.
- National Science Foundation, *IceCube Startup Phase*, \$35,300, from August 2002 to July 2003.
- National Science Foundation, *The Search for Ultrahigh Energy Neutrinos and an Improved Readout System for AMANDA*, \$359,477, from June 1999 to May 2003.

Other research or creative accomplishments

- Lead author of *The IceCube observatory detects neutrino and discovers a blazar as its source* in *The Conversation* (“...an independent, nonprofit publisher of commentary and analysis, authored by academics and edited by journalists for the general public”). The article has over 70,000 reads and is ranked 75th for readership level of all articles since 2011 by Penn State authors, and in the top three for articles about physical science.
- Radio broadcast on local NPR station recorded at South Pole, March 2006.

New courses and teaching methods

- PHYS 211: General Physics: Incorporation and testing of prelecture videos and just-in-time-teaching with smartPhysics, spring 2015.
- PHYS 211/212: General Physics: Interactive teaching, improved assessment, 2012–present.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Honors Option, September 2003 to December 2003.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Lecture demonstration upgrade, September 2003 to December 2003.
- PHYS 214: General Physics: Wave Motion & Quantum Physics, Schreyer Institute Grant Proposal, June 2003 to December 2003.
- PHYS 213: General Physics: Fluids & Thermal Physics, Physics 213 Honors Option, September 2005 to December 2005.
- PSU 016 (S.350): First Year Seminar, Particle Astrophysics lecture for First Year Seminar, since April 2008.

Academic advising

- Undergraduate honors thesis advisor of: D. Atlee, L. Boyer, A. Dasgupta, J. Hart, S. Hug, D. Lutton, M. Quinnan, P. Roth, T. Salameh, E. Thyrum, V. A. Viscomi, A. Weinrich, M. Weiss.

- Mentor of first-year graduate students: A. Hucke, A. Idrisy, D. Landy, B. Robbins, M. Saika, S. Wood.
- Thesis advisor of: I. Taboada, S. Movit, D. L. Rutledge, M. Dunkman, F. Huang, J. Lanfranchi, D. Pankova, C. Turley., A. Baldoni, G. Wendel
- Thesis committee member of: S. Gao, D. Hollander, C. Messick, W. Wright, K. Malone.

Students and Postdocs

- 2019 – present : A. Baldoni, Graduate Student
- 2023 – present : A. Dasgupta, Undergraduate Student
- 2022 – present : K. DeHolton, Postdoctoral Researcher
- 2023 – present : Y. Liu, Graduate Student
- 2023 – present : Y. Wang, Graduate Student
- 2022 – present : J. Weldert, Postdoctoral Researcher
- 2019 – present : G. Wendel, Graduate Student
- 2021 – 2023 : H. Bandyopadhyay, Undergraduate Student
- 2020 – 2021 : P. Patel, Undergraduate Student
- 2019 – 2022 : A. Feinberg, Postdoctoral Researcher
- 2017 – 2021 : H. A. Ayala Solares, Postdoctoral Researcher
- 2016 – 2019 : P. Eller, Postdoctoral Researcher
- 2014 – 2018 : A. Keivani, Postdoctoral Researcher
- 2013 – 2014 : T. Anderson, Postdoctoral Researcher
- 2013 – 2014 : J.P.A.M. de Andre, Postdoctoral Researcher
- 2013 – 2015 : T. Arlen, Postdoctoral Researcher
- 2012 – 2017 : G. Tešić, Postdoctoral Researcher
- 2010 – 2011 : K. S. Caballero Mora, Postdoctoral Researcher
- 2008 – 2013 : D. Koskinen, Postdoctoral Researcher
- 2008 – 2010 : S. J. Lafebre, Postdoctoral Researcher
- 2007 – 2010 : D. Grant, Postdoctoral Researcher
- 2005 – 2009 : B. Fox, Postdoctoral Researcher
- 2005 – 2008 : C. Rott, Postdoctoral Researcher
- 2004 – 2010 : P. Toale, Postdoctoral Researcher
- 2004 – 2008 : D. Williams, Postdoctoral Researcher
- 2004 – 2007 : S. Seo, Postdoctoral Researcher
- 2004 – 2005 : M. Greene, Postdoctoral Researcher
- 2003 – 2006 : M. Kestel, Postdoctoral Researcher
- 2003 – 2004 : R. Nichol, Postdoctoral Researcher
- 2003 – 2004 : J. Coarasa Perez (USA), Postdoctoral Researcher
- 2002 – 2003 : B. P. Collin, Postdoctoral Researcher
- 2002 – 2003 : S. Jaminion, Postdoctoral Researcher

- 2014 – 2020 : J. Lanfranchi, Graduate Student
- 2019 – 2021 : J. Moore, Graduate Student
- 2014 – 2021 : D. Pankova, Graduate Student
- 2013 – 2018 : F. Huang, Graduate Student
- 2006 – 2008 : B. Robbins, Graduate Student
- 2006 – 2011 : C. Ha, Graduate Student,
- 2004 – 2011 : S. Movit, Graduate Student
- 2003 – 2011 : D. L. Rutledge, Graduate Student
- 2003 – 2004 : K. J. Palladino, Graduate Student
- 2019 – 2021 : T. Emeigh, Undergraduate Student
- 2019 – 2021 : E. Neights, Undergraduate Student
- 2017 – 2018 : K. Crust, Undergraduate Researcher
- 2016 – 2017 : A. Blount, Undergraduate Researcher
- 2015 – 2017 : M. Weiss, Undergraduate Researcher
- 2013 – 2014 : D. Lutton, Undergraduate Researcher
- 2013 – 2015 : M. Quinnan, Undergraduate Researcher
- 2013 – 2014 : C. Contreras, undergraduate Researcher
- 2013 – 2014 : J. Groh, Undergraduate Researcher
- 2013 – 2014 : Z. Snyder, Undergraduate Researcher
- 2013 – 2014 : N. Stanisha, Undergraduate Researcher
- 2010 – 2011 : L. Boyer, Undergraduate Researcher
- 2010 – 2012 : R. Wasserman, Undergraduate Researcher
- 2008 – 2011 : L. Bradley, Undergraduate Researcher
- 2007 – 2008 : R. Hill, Undergraduate Student
- 2007 – 2008 : G. Stephens, Undergraduate Student
- 2006 – 2008 : V. A. Viscomi, Undergraduate Student
- 2006 – 2011 : M. M. Foerster, Undergraduate Researcher
- 2005 – 2005 : E. O. Smith, Undergraduate Student
- 2005 – 2005 : K. R. Coughlin, Undergraduate Student
- 2004 – 2007 : J. Hart, Undergraduate Student
- 2004 – 2004 : L. Voicu, Research Fac/Staff
- 2004 – 2004 : J. Fenstermacher, Undergraduate Student
- 2004 – 2004 : L. A. Rutter, Undergraduate Student
- 2004 – 2004 : D. Krebs, Undergraduate Student
- 2003 – 2003 : J. Carpenter, Undergraduate Student
- 2003 – 2004 : M. Crowl, Undergraduate Student
- 2003 – 2004 : P. Roth, Undergraduate Student
- 2003 – 2005 : Q. Q. Taylor, Undergraduate Student

- 2002 – 2006 : D. Atlee, Undergraduate Student

Service: committees, etc.

- *Ashtekar Frontiers of Science* advisory committee, fall 2023.
- Member of the Physics Department APS-IDEA Committee, 2020–2022.
- Chair of the Physics Department Climate, Community and Diversity Committee, 2019–2021.
- Chair of the Physics Department Postdoctoral Professional Development Committee, 2019–2020.
- Member of Physics Department Promotion and Tenure Committee 2019–present.
- Chair of Eberly College of Science Promotion and Tenure Committee 2018–2019.
- Member of Eberly College of Science Promotion and Tenure Committee 2017–2018.
- Member of Introductory Courses committee, 2017–present.
- Member of Faculty Search Committee, 2017–2019.
- Member of university-wide advisory committee for CISO (Computing Information Security Office) November 2015–present.
- Member of university-wide Executive Committee for Research Computing and Cyberinfrastructure, September 2015–2020.
- Member of Undergraduate Program committee, June 2013–2015.
- Member of Introductory Courses committee, June 2013–2015.
- Member of Promotion and Tenure committee, May 2011 to April 2014.
- Member of Faculty Search committee, 2011–2013.
- Member of Peer Evaluation committee, June 2012 to May 2013.
- Member of Undergraduate Program committee, June 2011 to May 2013.
- Chair of Introductory Courses committee, May 2011 to May 2013.
- Member of Undergraduate Program committee, June 2010 to May 2011.
- Member of Graduate Recruiting committee, February 2010
- Member of Peer Evaluation committee, January 2010 to February 2010.
- Member of Undergraduate Program committee, June 2009 to May 2010.
- Member of Introductory Courses committee, June 2009 to May 2010.
- Member of Graduate Recruiting committee, June 2009 to May 2010.
- Member of Peer Evaluation committee, March 2008 to April 2008.
- Mentor of First-year Graduate Student, September 2007 to September 2008.
- Member of Graduate Program & Candidacy committee, June 2007 to May 2008.
- Member of Introductory Courses committee, June 2007 to May 2008.
- Member of Peer Evaluation committee, June 2007 to May 2008.
- Member of Introductory Courses committee, June 2006 to May 2007.
- Member of Graduate Program & Candidacy committee, June 2006 to May 2007.
- Chair of Climate committee, June 2005 to May 2006.
- Member of Search committee, June 2005 to May 2006.

- Member of Graduate Recruiting committee, January 2005 to February 2005.
- Member of Elementary Particles and Fields committee, June 2004 to May 2005.
- Chair of Climate committee, June 2004 to May 2005.
- Undergraduate (Student Services), September 2003
- Chair of Climate committee, June 2003 to May 2004.
- Member of Introductory Courses committee, February 2003 to June 2003.
- Chair of Climate committee, June 2002 to May 2003.
- Member of Elementary Particles and Fields committee, June 2002 to May 2003.

Public service

- *Ashtekar Frontiers of Science* public lecture, Feb. 2019.
- Presenter for *Astronomy on Tap*, State College, PA, Oct. 2018.
- Physics and Astronomy for Women (PAW), founder and faculty advisor, since 2003.
- Centre County Community Energy Project (Advisory body), Apr. 2008.
- School Teachers' Workshop in Particle Astrophysics, July 2004–July 2014. Co-Run week-long for-credit course on particle astrophysics for high school science teachers.
- Society of Physics Students ZONE Meeting Speaker, April 2008.
- With physics department lecturer Mr. John Hopkins, organized physics demonstrations at local public schools., 2006-2007.
- Performed several physics demonstrations at local public schools., 2006-2007.
- Neutrino Astronomy (talk given to Central PA Observers Amateur Astronomy Club), Jan. 2005.

Refereed Publications

- [1] R. Abbasi et al. “A Search for Coincident Neutrino Emission from Fast Radio Bursts with Seven Years of IceCube Cascade Events”. In: *Astrophys. J.* 946.2 (2023), p. 80. DOI: [10.3847/1538-4357/acbea0](https://doi.org/10.3847/1538-4357/acbea0). arXiv: [2212.06702](https://arxiv.org/abs/2212.06702) [[astro-ph.HE](#)].
- [2] R. Abbasi et al. “A Search for IceCube Sub-TeV Neutrinos Correlated with Gravitational-wave Events Detected By LIGO/Virgo”. In: *Astrophys. J.* 959.2 (2023), p. 96. DOI: [10.3847/1538-4357/aceefc](https://doi.org/10.3847/1538-4357/aceefc). arXiv: [2303.15970](https://arxiv.org/abs/2303.15970) [[astro-ph.HE](#)].
- [3] R. Abbasi et al. “Constraining High-energy Neutrino Emission from Supernovae with IceCube”. In: *Astrophys. J. Lett.* 949.1 (2023), p. L12. DOI: [10.3847/2041-8213/acd2c9](https://doi.org/10.3847/2041-8213/acd2c9). arXiv: [2303.03316](https://arxiv.org/abs/2303.03316) [[astro-ph.HE](#)].
- [4] R. Abbasi et al. “Constraints on Populations of Neutrino Sources from Searches in the Directions of IceCube Neutrino Alerts”. In: *Astrophys. J.* 951.1 (2023), p. 45. DOI: [10.3847/1538-4357/acd2ca](https://doi.org/10.3847/1538-4357/acd2ca). arXiv: [2210.04930](https://arxiv.org/abs/2210.04930) [[astro-ph.HE](#)].
- [5] R. Abbasi et al. “D-Egg: a dual PMT optical module for IceCube”. In: *JINST* 18.04 (2023), P04014. DOI: [10.1088/1748-0221/18/04/P04014](https://doi.org/10.1088/1748-0221/18/04/P04014). arXiv: [2212.14526](https://arxiv.org/abs/2212.14526) [[astro-ph.IM](#)].
- [6] R. Abbasi et al. “IceCat-1: The IceCube Event Catalog of Alert Tracks”. In: *Astrophys. J. Suppl.* 269.1 (2023), p. 25. DOI: [10.3847/1538-4365/acfa95](https://doi.org/10.3847/1538-4365/acfa95). arXiv: [2304.01174](https://arxiv.org/abs/2304.01174) [[astro-ph.HE](#)].
- [7] R. Abbasi et al. “IceCube Search for Neutrinos Coincident with Gravitational Wave Events from LIGO/Virgo Run O3”. In: *Astrophys. J.* 944.1 (2023), p. 80. DOI: [10.3847/1538-4357/aca5fc](https://doi.org/10.3847/1538-4357/aca5fc). arXiv: [2208.09532](https://arxiv.org/abs/2208.09532) [[astro-ph.HE](#)].
- [8] R. Abbasi et al. “Limits on Neutrino Emission from GRB 221009A from MeV to PeV Using the IceCube Neutrino Observatory”. In: *Astrophys. J. Lett.* 946.1 (2023), p. L26. DOI: [10.3847/2041-8213/acc077](https://doi.org/10.3847/2041-8213/acc077). arXiv: [2302.05459](https://arxiv.org/abs/2302.05459) [[astro-ph.HE](#)].
- [9] R. Abbasi et al. “Measurement of atmospheric neutrino mixing with improved IceCube DeepCore calibration and data processing”. In: *Phys. Rev. D* 108.1 (2023), p. 012014. DOI: [10.1103/PhysRevD.108.012014](https://doi.org/10.1103/PhysRevD.108.012014). arXiv: [2304.12236](https://arxiv.org/abs/2304.12236) [[hep-ex](#)].
- [10] R. Abbasi et al. “Observation of high-energy neutrinos from the Galactic plane”. In: *Science* 380.6652 (2023), adc9818. DOI: [10.1126/science.adc9818](https://doi.org/10.1126/science.adc9818). arXiv: [2307.04427](https://arxiv.org/abs/2307.04427) [[astro-ph.HE](#)].
- [11] R. Abbasi et al. “Observation of seasonal variations of the flux of high-energy atmospheric neutrinos with IceCube”. In: *Eur. Phys. J. C* 83.9 (2023), p. 777. DOI: [10.1140/epjc/s10052-023-11679-5](https://doi.org/10.1140/epjc/s10052-023-11679-5). arXiv: [2303.04682](https://arxiv.org/abs/2303.04682) [[astro-ph.HE](#)].

- [12] R. Abbasi et al. “Search for Correlations of High-energy Neutrinos Detected in IceCube with Radio-bright AGN and Gamma-Ray Emission from Blazars”. In: *Astrophys. J.* 954.1 (2023), p. 75. DOI: [10.3847/1538-4357/acdfcb](https://doi.org/10.3847/1538-4357/acdfcb). arXiv: [2304.12675](https://arxiv.org/abs/2304.12675) [[astro-ph.HE](#)].
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- [14] R. Abbasi et al. “Search for neutrino lines from dark matter annihilation and decay with IceCube”. In: *Phys. Rev. D* 108.10 (2023), p. 102004. DOI: [10.1103/PhysRevD.108.102004](https://doi.org/10.1103/PhysRevD.108.102004). arXiv: [2303.13663](https://arxiv.org/abs/2303.13663) [[astro-ph.HE](#)].
- [15] R. Abbasi et al. “Search for sub-TeV Neutrino Emission from Novae with IceCube-DeepCore”. In: *Astrophys. J.* 953.2 (2023), p. 160. DOI: [10.3847/1538-4357/acdc1b](https://doi.org/10.3847/1538-4357/acdc1b). arXiv: [2212.06810](https://arxiv.org/abs/2212.06810) [[astro-ph.HE](#)].
- [16] R. Abbasi et al. “Searches for connections between dark matter and high-energy neutrinos with IceCube”. In: *JCAP* 10 (2023), p. 003. DOI: [10.1088/1475-7516/2023/10/003](https://doi.org/10.1088/1475-7516/2023/10/003). arXiv: [2205.12950](https://arxiv.org/abs/2205.12950) [[hep-ex](#)].
- [17] R. Abbasi et al. “Searches for Neutrinos from Large High Altitude Air Shower Observatory Ultra-high-energy γ -Ray Sources Using the IceCube Neutrino Observatory”. In: *Astrophys. J. Lett.* 945.1 (2023), p. L8. DOI: [10.3847/2041-8213/acb933](https://doi.org/10.3847/2041-8213/acb933). arXiv: [2211.14184](https://arxiv.org/abs/2211.14184) [[astro-ph.HE](#)].
- [18] T. Anderson et al. “Eos: conceptual design for a demonstrator of hybrid optical detector technology”. In: *JINST* 18.02 (2023), P02009. DOI: [10.1088/1748-0221/18/02/P02009](https://doi.org/10.1088/1748-0221/18/02/P02009). arXiv: [2211.11969](https://arxiv.org/abs/2211.11969) [[physics.ins-det](#)].
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- [20] A. S. Wilhelm, G. Wendel, B. Collins, D. Cowen, and I. Jovanovic. “Evaluation of light collection from highly scattering media using wavelength-shifting fibers”. In: *Nucl. Instrum. Meth. A* 1049 (2023), p. 168085. DOI: [10.1016/j.nima.2023.168085](https://doi.org/10.1016/j.nima.2023.168085). arXiv: [2301.09608](https://arxiv.org/abs/2301.09608) [[physics.ins-det](#)].
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- [25] R. Abbasi et al. “Framework and tools for the simulation and analysis of the radio emission from air showers at IceCube”. In: *JINST* 17.06 (2022), P06026. DOI: [10.1088/1748-0221/17/06/P06026](https://doi.org/10.1088/1748-0221/17/06/P06026). arXiv: [2205.02258](https://arxiv.org/abs/2205.02258) [[astro-ph.HE](#)].
- [26] R. Abbasi et al. “Graph Neural Networks for low-energy event classification and reconstruction in IceCube”. In: *JINST* 17.11 (2022), P11003. DOI: [10.1088/1748-0221/17/11/P11003](https://doi.org/10.1088/1748-0221/17/11/P11003). arXiv: [2209.03042](https://arxiv.org/abs/2209.03042) [[hep-ex](#)].
- [27] R. Abbasi et al. “Improved Characterization of the Astrophysical Muon-neutrino Flux with 9.5 Years of IceCube Data”. In: *Astrophys. J.* 928.1 (2022), p. 50. DOI: [10.3847/1538-4357/ac4d29](https://doi.org/10.3847/1538-4357/ac4d29). arXiv: [2111.10299](https://arxiv.org/abs/2111.10299) [[astro-ph.HE](#)].
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- [29] R. Abbasi et al. “Search for Astrophysical Neutrinos from 1FLE Blazars with IceCube”. In: *Astrophys. J.* 938.1 (2022), p. 38. DOI: [10.3847/1538-4357/ac8de4](https://doi.org/10.3847/1538-4357/ac8de4). arXiv: [2207.04946](https://arxiv.org/abs/2207.04946) [[astro-ph.HE](#)].
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- [33] R. Abbasi et al. “Search for neutrino emission from cores of active galactic nuclei”. In: *Phys. Rev. D* 106.2 (2022), p. 022005. DOI: [10.1103/PhysRevD.106.022005](https://doi.org/10.1103/PhysRevD.106.022005). arXiv: [2111.10169](https://arxiv.org/abs/2111.10169) [[astro-ph.HE](#)].
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- [35] R. Abbasi et al. “Search for Relativistic Magnetic Monopoles with Eight Years of IceCube Data”. In: *Phys. Rev. Lett.* 128.5 (2022), p. 051101. DOI: [10.1103/PhysRevLett.128.051101](https://doi.org/10.1103/PhysRevLett.128.051101). arXiv: [2109.13719](https://arxiv.org/abs/2109.13719) [[astro-ph.HE](#)].
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