

# Keith Bechtol

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Large Synoptic Survey Telescope  
933 N. Cherry Avenue  
Tucson, AZ 85721

Office: (520) 318-8512  
Room: N506  
kbechtol@lsst.org

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- Appointments**
- ◇ **Associate Scientist (Current Position)** 2016–present  
Large Synoptic Survey Telescope
  - ◇ John Bahcall Postdoctoral Fellow 2015–2016  
Wisconsin IceCube Particle Astrophysics Center, University of Wisconsin–Madison
  - ◇ KICP Postdoctoral Fellow 2012–2015  
Kavli Institute for Cosmological Physics, University of Chicago
  - ◇ SLAC National Accelerator Laboratory Summer 2007  
Based at CERN working on ATLAS experiment  
Advisors: Charlie Young and Su Dong
  - ◇ Research Experience for Undergraduates Summer 2005  
Laboratory for Elementary Particle Physics, Cornell University  
Advisor: David Kreinick
  - ◇ College of William & Mary Physics Department Summer 2004  
Advisor: Jeffrey Nelson

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- Education**
- ◇ STANFORD UNIVERSITY 2007–2012  
Ph.D. in Physics, September 2012  
Dissertation Advisor: Stefan Funk  
*Unbeamed Extragalactic Emitters and the Origin of the Isotropic Diffuse Gamma-ray Background*
  - ◇ COLLEGE OF WILLIAM & MARY 2003–2007  
B.S. *summa cum laude* in Physics, May 2007  
Senior Thesis Advisor: Joshua Erlich  
*Constraining Photon-Axion Oscillation Models with Supernovae Data*

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- Current Research Interests**
- ◇ Detection of stellar substructures in the Galactic halo using wide-field optical surveys, including ultra-faint galaxies and stellar streams; spectroscopic follow-up to determine dark matter content
  - ◇ Indirect dark matter searches
  - ◇ Commissioning, science verification, and observing strategy for optical surveys
  - ◇ Photometric calibration of optical survey data, including interstellar dust extinction
  - ◇ Census of non-thermal phenomena at the highest energies and greatest distances explored via the extragalactic gamma-ray background and high-energy cosmic neutrinos

- ◇ Cosmic rays in the interstellar and intergalactic medium, particularly star-forming galaxies and galaxy clusters
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**Awards**

- ◇ Division of Astrophysics ‘Young Stars’ Award, early career recognition, American Physical Society, 2014
  - ◇ Stanford Graduate Fellowship, highest honor awarded to a continuing graduate student by Stanford University, 2010–2012
  - ◇ Paul Kirkpatrick Award, demonstrated capacity for and commitment to the teaching of undergraduate physics, Stanford University Physics Department, 2008
  - ◇ Donald E. Harrison Jr. Award, given to senior with highest demonstrated achievement in physics, College of William & Mary Physics Department, 2007
  - ◇ President’s Award, College of William & Mary, 2007
  - ◇ Member Phi Beta Kappa, elected 2006
  - ◇ E.G. Clark Memorial Award, given to a rising senior in physics, College of William & Mary Physics Department, 2006
  - ◇ Barry M. Goldwater Scholarship, 2005–2007
  - ◇ DeWilde Fellowship, research grant, College of William & Mary Physics Department, 2004
  - ◇ James Monroe Scholarship, research grant, College of William & Mary, 2006
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**Invited  
Seminars and  
Colloquia**

- ◇ *New Satellite Galaxies of Our Milky Way*. Physics Department Colloquium, University of Wisconsin–Madison, April 2016
- ◇ *New Satellite Galaxies of Our Milky Way*. Physics Department Seminar, University of Cincinnati, February 2016
- ◇ *New Satellite Galaxies of Our Milky Way*. Physics Department Seminar, University of Connecticut, February 2016
- ◇ *The Search for Milky Way Satellite Galaxies from Optical to Gamma Rays*. Astronomy Department Seminar, University of Wisconsin–Madison, October 2015
- ◇ *Exploring the Nature of Dark Matter with Ultra-faint Galaxies*. Physics Division Seminar, Argonne National Laboratory, September 2015
- ◇ *News on the Search for Milky Way Satellite Galaxies*. KICP Colloquium, University of Chicago, May 2015
- ◇ *Spectrum and Origin of the Extragalactic Gamma-ray Background AND Searching for Ultra-faint Satellite Galaxies of the Milky Way in the Dark Energy Survey*. CCAPP Seminar, The Ohio State University, October 2014
- ◇ *Spectrum and Origin of the Extragalactic Gamma-ray Background AND Searching for Ultra-faint Satellite Galaxies of the Milky Way in the Dark Energy Survey*. NPAC Seminar, University of Wisconsin–Madison, October 2014
- ◇ *The Intensity of Isotropic Diffuse Emission Measured with the Fermi-LAT AND Searching for Ultra-faint Satellite Galaxies of the Milky Way in the Dark Energy Survey*. Astronomy Department Seminar, University of Illinois Urbana-Champaign, February 2014
- ◇ *Gamma Rays from Galaxies! Cosmic Rays, Dark Matter, and the Fermi-DES Connection*. CCAPP Seminar, The Ohio State University, December 2013
- ◇ *Searching for Satellite Galaxies of the Milky Way in the Dark Energy Survey*. Fermilab Center for Particle Astrophysics, September 2013
- ◇ *Unbeamed extragalactic emitters and the origin of the gamma-ray background*. Santa Cruz Institute for Particle Physics, June 2012
- ◇ *Searching for Dark Matter with the Fermi LAT*. College of William & Mary Department of Physics, March 2012

- ◇ *The Extragalactic Gamma-ray Background*. Fermilab Center for Particle Astrophysics, December 2011
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**Conference Presentations**

- ◇ *Evidence against Star-forming Galaxies as the Primary Source of IceCube Neutrinos*. TeV Particle Astrophysics, Geneva, Switzerland, 2016
- ◇ *Connections between Optical Surveys and Astro-Particle Physics*. Computing in High-Energy AstroParticle Research, Columbus, OH, 2016 (invited speaker)
- ◇ *Prospects for Associating TeV to PeV Cosmic Neutrinos with Explosive Optical Transients*. Cross-correlation Spectacular with LSST, Brookhaven National Laboratory, NY, 2016 (poster)
- ◇ *Estimating the GeV Emission of Millisecond Pulsars in Dwarf Spheroidal Galaxies*. Cross-correlation Spectacular with LSST, Brookhaven National Laboratory, NY, 2016 (poster)
- ◇ *Evidence Against Star-forming Galaxies at the Primary Source of IceCube Neutrinos*. Perspectives on the Extragalactic Frontier, Trieste, Italy, 2016 (invited speaker)
- ◇ *Searching for Milky Way Satellites from Optical to Gamma Rays*. Astrophysics of Dark Matter, Sesto, Italy, 2016 (invited speaker)
- ◇ *New Satellites of our Milky Way*. 227th AAS, Kissimmee, FL, 2016 (invited speaker, plenary talk)
- ◇ *Indirect Dark Matter Searches*. TeV Particle Astrophysics, Kashiwa, Japan, 2015 (invited speaker, plenary talk)
- ◇ *The search for dark matter annihilation in dwarf spheroidal galaxies now and in the GMT era*. Giant Magellan Telescope Community Meeting, Pacific Grove, CA (poster)
- ◇ *The Search for Milky Way Satellite Galaxies from Optical to Gamma Rays*. Topics in Underground and Particle Astrophysics, Torino, Italy, 2015 (invited speaker)
- ◇ *Searching for Ultra-faint Galaxies in the Dark Energy Survey*. Topics in Underground and Particle Astrophysics, Torino, Italy, 2015 (invited speaker)
- ◇ *Phased Arrays for Radio Detection of Ultra-high Energy Neutrinos*. International Cosmic Ray Conference, The Hague, Netherlands, 2015
- ◇ *The Search for Milky Way Satellite Galaxies from Optical to Gamma Rays*. Conference on the Intersections of Particle and Nuclear Physics, Vail, CO, 2015 (invited speaker)
- ◇ *Searching for Milky Way Satellite Galaxies in the Dark Energy Survey*. Local Group Astrostatistics, Ann Arbor, MI, 2015
- ◇ *The Search for Milky Way Satellite Galaxies from Optical to Gamma Rays*. IceCube Particle Astrophysics Symposium, Madison, WI, 2015
- ◇ *Phased Arrays for Radio Detection of Ultra-high Energy Neutrinos*. IceCube Particle Astrophysics Symposium, Madison, WI, 2015
- ◇ *Radio Detection of Ultra-high Energy Cosmic Neutrinos*. International Conference on High Energy Physics, Valencia, Spain, 2014 (invited speaker)
- ◇ *Gamma-ray Observations of Galaxy Clusters: A Brief Review*. TeV Particle Astrophysics / Identification of Dark Matter, Amsterdam, Netherlands, 2014 (invited speaker)
- ◇ *Greenland Neutrino Observatory*. Acoustic and Radio EeV Neutrino Detection Activities, Annapolis, MD, 2014 (invited speaker)
- ◇ *The Spectrum of Isotropic Diffuse Gamma-ray Emission between 100 MeV and 820 GeV*. High-Energy Messengers: Connecting the Non-thermal Extragalactic Backgrounds, Chicago, IL, 2014
- ◇ *The Intensity and Origin of the Extragalactic Gamma-ray Background*. April APS Meeting, Savannah, GA, 2014 (invited speaker, APS Division of Astrophysics ‘Young Stars’ featured talk)
- ◇ *Searching for Satellite Galaxies of the Milky Way in the Dark Energy Survey*. Dark Matter, Los Angeles, CA, 2014 (invited speaker, plenary talk)
- ◇ *The intensity of Isotropic Diffuse Emission Measured with the Fermi-LAT*. 223rd AAS, Washington, DC, 2014

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- ◇ *Selected Fermi-LAT Results from the Past Year*. IceCube Particle Astrophysics Symposium, Madison, WI, 2013 (invited speaker, plenary talk)
  - ◇ *Non-thermal Emission of Star-forming Galaxies: Status and Outlook from keV to TeV Energies*. 4th International *Fermi* Symposium, Monterey, CA, 2012 (invited speaker, plenary talk)
  - ◇ *Contribution of Unresolved Galaxies to the Extragalactic Diffuse Gamma-ray Background*. 220th AAS “Extragalactic Gamma-ray Background” Meeting in a Meeting, Anchorage, AK, 2012 (invited speaker)
  - ◇ *Indirect Searches for Dark Matter with the Fermi LAT: Results After Three Years*. Brookhaven Forum 2011: A First Glimpse of the Tera Scale, Upton, NY, 2011 (invited speaker, plenary talk)
  - ◇ *Cosmic-ray Connections between the Interstellar and Intergalactic Medium*. Clusters of Galaxies as Cosmic Laboratories, Stockholm, Sweden, 2011 (invited speaker)
  - ◇ *GeV Observations of Star-forming Galaxies with the Fermi LAT*. Beamed and Unbeamed Gamma-rays from Galaxies, Muonio, Finland, 2011 (invited speaker, plenary talk)
  - ◇ *GeV Observations of Local Group Galaxies with Fermi LAT*. Science with the New Generation of High Energy Gamma-ray Experiments, Trieste, Italy, 2010
  - ◇ *Fermi LAT Detection of Gamma-ray Emission from Starburst Galaxies M82 and NGC 253*. Fermi Symposium, Washington, DC, 2009 (plenary talk)
  - ◇ *GeV Gamma-ray Observations of Galaxy Clusters with the Fermi LAT*. TeV Particle Astrophysics, SLAC National Accelerator Laboratory, CA, 2009
  - ◇ *GeV Gamma-ray Observations of Galaxy Clusters with the Fermi LAT*. American Physical Society April Meeting, Denver, CO, 2009
  - ◇ *Strategy for Flat-fielding: Camera Calibrations, Optical Configurations, and Calculations*. LSST Camera-Wide Workshop, SLAC National Accelerator Laboratory, CA, 2008
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**Additional Meetings**

- ◇ Detecting Dark Matter with Gamma Rays, SLAC National Accelerator Laboratory, CA, 2011
  - ◇ SLAC Summer Institute: History of the Universe, SLAC National Accelerator Laboratory, CA, 2011
  - ◇ Supercomputing 2010, New Orleans, LA, 2010
  - ◇ Advanced Gamma-ray Imaging System (AGIS) Collaboration Meeting, Salt Lake City, UT, 2009
  - ◇ SLAC Summer Institute: Cosmic Accelerators, SLAC National Accelerator Laboratory, CA, 2008
  - ◇ CERN Summer Student Lecture Programme, Geneva, Switzerland, 2007
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**Publications**

◇ LEADING CONTRIBUTOR PUBLICATIONS

Led analysis components and/or writing and am listed as a corresponding author. Please refer to the *Fermi*-LAT Collaboration Publication Policy (<http://www-glast.stanford.edu/policy-letter.pdf>) for LAT Collaboration papers.

- *Searching for Dark Matter Annihilation in Recently Discovered Milky Way Satellites with Fermi-LAT*. A. Albert et al., accepted for publication in *Astrophysical Journal*, arXiv:1611.03184
- *An Ultra-Faint Galaxy Candidate Discovered in Early Data from the Magellanic Satellites Survey*. A. Drlica-Wagner, K. Bechtol, et al., accepted for publication in *Astrophysical Journal Letters*, arXiv:1609.02148
- *Estimating the GeV Emission of Millisecond Pulsars in Dwarf Spheroidal Galaxies*. M. Winter, G. Zaharijas, K. Bechtol, & J. Vandebroucke, accepted for publication in *Astrophysical Journal Letters*, arXiv:1607.06390
- *Evidence against star-forming galaxies as the dominant source of IceCube neutrinos*. K. Bechtol et al., accepted for publication in *Astrophysical Journal*, arXiv:1511.00688
- *Eight Ultra-faint Galaxy Candidates Discovered in Year Two of the Dark Energy Survey*. A. Drlica-Wagner, K. Bechtol et al., *Astrophysical Journal*, 813, 109, 2015

- *A Technique for Detection of PeV Neutrinos Using a Phased Radio Array.* A. G. Vieregg, K. Bechtol, & A. Romero-Wolf, *Journal of Cosmology and Astroparticle Physics*, 02, 005, 2016
  - *Search for Gamma-Ray Emission from DES Dwarf Spheroidal Galaxy Candidates with Fermi-LAT Data.* A. Drlica-Wagner, A. Albert, K. Bechtol et al., *Astrophysical Journal*, 809, 4, 2015
  - *Eight New Milky Way Companions Discovered in First-year Dark Energy Survey Data.* K. Bechtol et al., *Astrophysical Journal*, 807, 50, 2015
  - *The spectrum of isotropic diffuse gamma-ray emission between 100 MeV and 820 GeV.* M. Ackermann et al., *Astrophysical Journal*, 799, 86, 2015
  - *Prospects for Detecting Gamma Rays from Annihilating Dark Matter in Dwarf Galaxies in the Era of DES and LSST.* C. He, K. Bechtol, A. Hearin, & D. Hooper, *Physical Review D*, 91, 063515, 2015
  - *GeV Observations of Star-forming Galaxies with the Fermi LAT.* M. Ackermann et al., *Astrophysical Journal*, 755, 164, 2012
  - *Search for gamma-ray emission from X-ray selected Seyfert galaxies with Fermi-LAT.* M. Ackermann et al., *Astrophysical Journal*, 747, 104, 2012
  - *TARGET: A multi-channel digitizer chip for very-high-energy gamma-ray telescopes.* K. Bechtol, et al., *Astroparticle Physics*, 36, 156, 2012
  - *Fermi Large Area Telescope Observations of Local Group galaxies: Detection of M31 and search for M33.* A.A. Abdo et al., *Astronomy & Astrophysics*, 523, L2, 2010
  - *GeV Gamma-ray Flux Upper Limits from Clusters of Galaxies.* M. Ackermann et al., *Astrophysical Journal Letters*, 717, L71, 2010
  - *Detection of Gamma-Ray Emission from the Starburst Galaxies M82 and NGC 253 with the Large Area Telescope on Fermi.* A.A. Abdo et al., *Astrophysical Journal Letters*, 709, L152, 2010
- ◇ SELECTED CO-AUTHOR PUBLICATIONS
- Generated or reviewed text, wrote software used for analyses, produced plots, cross-checked analyses, or performed observations/laboratory work.
- *Farthest Neighbor: The Distant Milky Way Satellite Eridanus II.* T. S. Li et al., submitted to *Astrophysical Journal*, arXiv:1611.05052
  - *Nearest Neighbor: The Low-Mass Milky Way Satellite Tucana III.* J. Simon et al., submitted to *Astrophysical Journal*, arXiv:1610.05301
  - *The Dark Energy Survey view of the Sagittarius stream: Discovery of two faint stellar system candidates.* E. Luque et al. 2016, submitted to *Monthly Notices of the Royal Astronomical Society*, arXiv:1608.04033
  - *Development Toward a Ground-Based Interferometric Phased Array for Radio Detection of High Energy Neutrinos.* J. Avva et al., arXiv:1605.03525
  - *The Dark Energy Survey: more than dark energy – an overview.* T. Abbott et al., *Monthly Notices of the Royal Astronomical Society*, 460, 1270, 2016
  - *Resolving the Extragalactic  $\gamma$ -ray Background above 50 GeV with Fermi-LAT.* M. Ackermann et al., *Physical Review Letters*, 116, 151105, 2016
  - *Limits on dark matter annihilation signals from the Fermi LAT 4-year measurement of the isotropic gamma-ray background.* M. Ackermann et al., *Journal of Cosmology and Astroparticle Physics*, 9, 008, 2015
  - *Discovery of a Stellar Overdensity in Eridanus-Phoenix in the Dark Energy Survey.* T. Li et al., *Astrophysical Journal*, 817, 135, 2016
  - *Digging deeper into the Southern skies: a compact Milky-Way companion discovered in first-year Dark Energy Survey data.* *Monthly Notices of the Royal Astronomical Society*, 458, 603, 2016
  - *Search for Gamma-ray Emission from the Coma Cluster with Six Years of Fermi-LAT Data.* M. Ackermann et al., *Astrophysical Journal*, 819, 149, 2016

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- *Accelerator measurements of magnetically-induced radio emission from particle cascades with applications to cosmic-ray air showers.* K. Belov et al., Physical Review Letters, 116, 141103, 2016
  - *Stellar Kinematics and Metallicities in the Ultra-faint Dwarf Galaxy Reticulum II.* J. Simon et al., Astrophysical Journal, 808, 95, 2015
  - *The Origin of the Extragalactic Gamma-Ray Background and implications for Dark-Matter Annihilation.* M. Ajello et al., Astrophysical Journal Letters, 800, 27, 2015
  - *Gamma-ray flaring activity from the gravitationally lensed blazar PKS 1830-211 observed by Fermi LAT.* A. A. Abdo et al., Astrophysical Journal, 799, 143, 2015
  - *Spatially Resolving a Starburst Galaxy at Hard X-ray Energies: NuSTAR, Chandra, and VLBA observations of NGC 253.* D. R. Wik et al., Astrophysical Journal, 797, 79, 2014
  - *Mass and galaxy distributions of four massive galaxy clusters from Dark Energy Survey Science Verification data.* P. Melchior et al., Monthly Notices of the Royal Astronomical Society, 449, 2219, 2015
  - *Search for Cosmic-Ray-induced Gamma-Ray Emission in Galaxy Clusters.* M. Ackermann et al., Astrophysical Journal, 787, 18A, 2014
  - *Inferred Cosmic-Ray Spectrum from Fermi Large Area Telescope  $\gamma$ -Ray Observations of Earth's Limb.* M. Ackermann et al., Physical Review Letters, 112, 151103, 2014
  - *Discovery of GeV Emission from the Circinus Galaxy with the Fermi Large Area Telescope.* M. Hayashida et al., Astrophysical Journal, 779, 131H, 2013
  - *The Fermi All-sky Variability Analysis: A List of Flaring Gamma-Ray Sources and the Search for Transients in Our Galaxy.* M. Ackermann et al., Astrophysical Journal, 771, 57, 2013
  - *Detection of the Characteristic Pion-Decay Signature in Supernova Remnants.* M. Ackermann et al., Science, 339, 807A, 2013
  - *Search for Spatially Extended Fermi-LAT Sources Using Two Years of Data.* J. Lande et al., Astrophysical Journal, 756, 5L, 2012
  - *Fermi Large Area Telescope Observation of Supernova Remnant S147.* J. Katsuta et al., Astrophysical Journal, 752, 135, 2012
  - *Fermi-LAT Detection of the Young Supernova Remnant Tycho.* F. Giordano et al., Astrophysical Journal, 744, L2, 2012
  - *Discovery of a GeV blazar shining through the Galactic plane.* J. Vandenbroucke et al., Astrophysical Journal Letters, 718, L166, 2010
  - *Fermi Large Area Telescope Observations of the Vela-X Pulsar Wind Nebula.* A.A. Abdo et al., Astrophysical Journal, 713, 146, 2010
  - *Observation of Supernova Remnant IC 443 with the Fermi Large Area Telescope.* A.A. Abdo et al., Astrophysical Journal, 712, 459, 2010
  - *Fermi-LAT Discovery of GeV Gamma-Ray Emission from the Young Supernova Remnant Cassiopeia A.* A.A. Abdo et al., Astrophysical Journal Letters, 710, L92, 2010
  - *Fermi Large Area Telescope Gamma-Ray Detection of the Radio Galaxy M87.* A.A. Abdo et al., Astrophysical Journal, 707, 55, 2009
  - *The on-orbit calibration of the Fermi Large Area Telescope.* A.A. Abdo et al., Astroparticle Physics, 32, 193, 2009
  - *The magnetized steel and scintillator calorimeters of the MINOS experiment.* D.G. Michael et al., Nuclear Instruments and Methods in Physics Research A, 596, 190, 2008
  - Co-author on over 150 Fermi-LAT Collaboration published journal articles
- ◇ SELECTED CONFERENCE PROCEEDINGS AND MISCELLANEOUS
- *Development of an ASIC for Dual Mirror Telescopes of the Cherenkov Telescope Array.* J. Vandenbroucke et al., in 32nd International Cosmic Ray Conference Proceedings, 2011

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- *The Advanced Gamma-ray Imaging System (AGIS) - Camera Electronics Development*. H. Tajima et al., in American Astronomical Society/High Energy Astrophysics Division Proceedings, 2010
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- Leadership Roles within Collaborations**
- ◇ *Dark Energy Survey*, Coordinator of Interstellar Extinction Task Force, 2016–present
  - ◇ *Magellanic Satellites Survey*, Principle Investigator, 2015–present
  - ◇ *Dark Energy Survey*, Co-coordinator of Milky Way Satellites Sub-group, 2015–present
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- Selected Observation Proposals and Research Grants Participation**
- ◇ *The Magellanic Satellites Survey*. Blanco/DECam, Cerro Tololo Inter-American Observatory, 2016-2017 (multi-year proposal, Principle Investigator)
  - ◇ *Search for Dark Matter Annihilation in Newly Discovered Milky Way Satellite Galaxies*. Fermi Cycle-9 Guest Investigator Program, 2016
  - ◇ *The Lowest Luminosity Star-Forming Galaxy*. Magellan-Baade/IMACS, Las Campanas Observatory, 2015 (Principle Investigator)
  - ◇ *The Lowest Luminosity Star-Forming Galaxy*. ACS, WFC3, Hubble Cycle-23 Guest Observer Program, 2015
  - ◇ *Unveiling the southern Halo with DES: detailed observations of the Tucana II, Horologium I, and the Phoenix stream*. VLT/FLAMES, European Southern Observatory, 2015
  - ◇ *Spectroscopic Follow-Up of New Milky Way Dwarf Satellite Galaxies*. Director's Discretionary Time, AAT/2dF+AAOmega, Australian Astronomical Observatory, 2015
  - ◇ *Empowering Precision Cosmology through Accurate Cluster Mass Calibration*. Magellan-Clay/MegaCam, Las Campanas Observatory, 2013 (Principle Investigator)
  - ◇ *Broad-band (0.5–30 keV) X-ray imaging of starburst galaxies with Chandra and NuSTAR*. Chandra Cycle-13 General Observer Program, 2011
  - ◇ *Suzaku observations of Seyfert galaxies as gamma-ray source candidates selected from the Swift-BAT catalogue*. Suzaku Cycle-6 Guest Observer Program, 2011
  - ◇ *Understanding the Origin of the Extragalactic Gamma-ray Background*. Fermi Cycle-3 Guest Investigator Program, 2010 (multi-year proposal)
  - ◇ *Fermi Observations of Clusters of Galaxies and Theoretical Interpretation*. Fermi Cycle-2 Guest Investigator Program, 2009
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- Observing and Fieldwork Experience**
- ◇ DECam, Blanco 4 m telescope, Cerro Tololo Inter-American Observatory, February 2016
  - ◇ IMACS, Magellan-Baade 6.5 m telescope, Las Campanas Observatory, Chile, November 2015
  - ◇ DECam, Blanco 4 m telescope, Cerro Tololo Inter-American Observatory, November 2015
  - ◇ ANITA-III long-duration balloon flight, McMurdo Station, Antarctica, November–December 2014
  - ◇ DECam, Blanco 4 m telescope, Cerro Tololo Inter-American Observatory, Chile, October–November 2014
  - ◇ ANITA-III payload integration, Columbia Scientific Balloon Facility, July 2014
  - ◇ Experiment T-510 Beam Test, measuring radio frequency emission from cascades of secondary particles in a dense medium in the presence of a magnetic field to validate the models used to study the radio emission from extensive air showers caused by ultra-high energy cosmic rays in the Earth atmosphere, SLAC National Accelerator Laboratory, January 2014
  - ◇ MegaCam, Magellan-Clay 6.5 m telescope, Las Campanas Observatory, Chile, September 2013
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- Seminar and Workshop Organization**
- ◇ *WIPAC Journal Club*, organize weekly discussion of recent astrophysics papers and events, 2015–2016

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- ◇ *High-Energy Messengers: Connecting the Non-thermal Extragalactic Backgrounds*, proposed workshop concept, organized scientific agenda, invited speakers, 42 participants, 3 days of plenary talks and small-group discussion, June 2014
  - ◇ *KICP Friday Seminars*, selected, invited, and hosted speakers, 2013–2014
  - ◇ *KICP “Thunch” Journal Club*, organized weekly lunchtime discussion of recent astrophysics papers and events, 2012–2015
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**Service to  
Physics  
Community**

- ◇ Review Panelist, *Fermi* Cycle-7, Cycle-8, and Cycle-9 Guest Investigator Program, 2014, 2015, 2016
  - ◇ Visited Congressional and Executive offices in Washington, DC to advocate for fundamental scientific research in the United States, representing the SLAC Users Organization, 2012, 2013
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**Teaching and  
Outreach**

- ◇ High-school Internship Instructor, Wisconsin IceCube Particle Astrophysics Center, University of Wisconsin-Madison, lead designer and instructor for a dozen high-school students making simple N-body simulations, weekly, September–December 2015
  - ◇ Guest speaker for 80th Compton Lecture Series, Enrico Fermi Institute, University of Chicago, *Dark Energy: An Experimental Perspective*, October 2014
  - ◇ Guest lecture for “Leading Edge” undergraduate course, School of the Art Institute, *Searching for the Darkest Galaxies*, January 2014
  - ◇ Instructor, “Yerkes Winter Institute: Transforming Energy”, KICP Space Explorers, designed and taught laboratory on *Rube Goldberg Machines* for high-school students, December 2014
  - ◇ Astronomy Conversations Presenter, Adler Planetarium, informal interactions with museum visitors using a variety of science visualization technologies, typically once per month, 2012–2014
  - ◇ Tour Guide, SLAC National Accelerator Laboratory, lead public and special events tours of the laboratory for visitors, typically several times per month, 2009–2012
  - ◇ English language tutor for custodians at Stanford University, twice weekly lessons, 2007–2012
  - ◇ Public lecture for Palo Alto Libraries Summer Reading Program, *Evidence for the Big Bang*, July 2011
  - ◇ Small Group Evaluation Facilitator, Stanford University, conduct student interviews and provide feedback for teaching assistants, consultation and professional development for teaching assistants, 2010
  - ◇ Teaching Assistant Mentor, Stanford University, implementation of active participatory learning techniques in introductory physics courses, discussion section planning, 2009
  - ◇ Teaching Assistant, Stanford University
    - Thermodynamics and Foundations of Modern Physics, for physics majors, Spring 2008
    - Mechanics, for engineering students, Winter 2008
    - Light and Heat Laboratory, for engineering students, Autumn 2007
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**Student  
Supervision**

- ◇ Paul Williams, undergraduate student, University of Chicago, interactive tool to search for stellar overdensities in DES data, Winter 2014–Spring 2015
  - ◇ Georgia Virginia Panopoulos, undergraduate student, University of Crete, validation of *Fermi*-LAT effective area and cosmic-ray background contamination, Summer 2011
  - ◇ Ariel Levi Simons, Science Teacher And Researcher program at SLAC, testing of camera readout electronics for atmospheric Cherenkov telescopes, Summer 2010
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**Student  
Academic  
Organizations**

- ◇ Meeting of Astrophysics Students at Stanford, seminar organizer, 2010
- ◇ SLAC Association for Student Seminars, seminar coordinator for the only student-run organization at the SLAC National Accelerator Laboratory, 2009