

Curriculum Vitae

Kevork N. Abazajian

CONTACT INFORMATION

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EDUCATION

University of California, San Diego, San Diego, California USA

Ph.D., Physics, 2001

- Thesis: *Neutrino Cosmology and Astrophysics*
- Advisor: Professor George M. Fuller

M.S., Physics, 1997

University of Houston, University Park, Houston, Texas USA

B.S., Physics, 1996

- *Magna cum Laude*, With Honors in Physics
- Minors in Mathematics and Philosophy

ACADEMIC POSITIONS

University of California, Irvine, Department of Physics & Astronomy, Irvine, California USA

Professor **2017 to present**

- Director of the UC Irvine Center for Cosmology

Associate Professor **2013 to 2017**

Assistant Professor **2011 to 2013**

University of Maryland, Department of Physics, College Park, Maryland USA

Assistant Professor **2006 to 2011**

- Member of the Maryland Center for Fundamental Physics
- Member of the U Maryland/Goddard Space Flight Center Joint Space-Science Institute

Los Alamos National Laboratory, Theoretical Division, Los Alamos, NM USA

Director's Postdoctoral Fellow **2003 to 2006**

- T-6 & T-8 Groups, Theoretical Astrophysics and Elementary Particle and Field Theory

NASA/Fermilab Theoretical Astrophysics Group, Batavia, IL USA

Research Associate **2001 to 2003**

- Associate Fellow, Center for Cosmological Physics, University of Chicago
- Visiting Scholar, Astronomy & Astrophysics Department, University of Chicago

University of California, San Diego, La Jolla, CA USA

NASA Graduate Student Research Program Fellow

1999 to 2001

- NASA Science Mission Directorate, NASA Headquarters

Graduate Research Assistant

1997 to 1999

- Prof. George M. Fuller, PI

PUBLICATIONS

Citations: over 12,770; Published *h*-index: 38. See separate publications list.

63. **“High energy photon emission from wakefields”**
D. M. Farinella, C. K. Lau, X. M. Zhang, J. K. Koga, S. Taimourzadeh, Y. Hwang, K. Abazajian, N. Canac, T. Ebisuzaki, P. Taborek and T. Tajima
Phys. Plasmas **23**, 073107 (2016)
DOI: 10.1063/1.4956450
62. **“Neutrino Physics from the Cosmic Microwave Background and Large-Scale Structure,”**
K. N. Abazajian, and M. Kaplinghat
Ann.Rev.Nucl.Part.Sci. 66 (2016) no.1, 401-420
DOI: 10.1146/annurev-nucl-102014-021908
61. **“Testing for New Physics: Neutrinos and the Primordial Power Spectrum,”**
N. Canac, G. Aslanyan, K. N. Abazajian, R. Easther and L. C. Price,
JCAP 1609 (2016) no.09, 022
arXiv:1606.03057 [astro-ph.CO].
60. **“Sterile neutrino dark matter: Weak interactions in the strong coupling epoch”**
T. Venumadhav, F. Y. Cyr-Racine, K. N. Abazajian and C. M. Hirata.
Phys. Rev. D **94**, no. 4, 043515 (2016)
arXiv:1507.06655 [astro-ph.CO]
UCI-TR-2015-12, INT-PUB-15-032
59. **“Properties of resonantly produced sterile neutrino dark matter subhaloes”**
S. Horiuchi, B. Bozek, K. N. Abazajian, M. Boylan-Kolchin, J. S. Bullock, S. Garrison-Kimmel and J. Oñorbe.
Mon. Not. Roy. Astron. Soc. **456**, no. 4, 4346 (2016)
arXiv:1512.04548 [astro-ph.CO]
INT-PUB-15-072, UCI-HEP-TR-2015-23
58. **“Resonant Sterile Neutrino Dark Matter in the Local and High-*z* Universe”**
B. Bozek, M. Boylan-Kolchin, S. Horiuchi, S. Garrison-Kimmel, K. Abazajian and J. S. Bullock.
Mon. Not. Roy. Astron. Soc. **459**, 1489 (2016)
arXiv:1512.04544 [astro-ph.CO]
UCI-HEP-TR-2015-24
57. **“Bright gamma-ray Galactic Center excess and dark dwarfs: Strong tension for dark matter annihilation despite Milky Way halo profile and diffuse emission uncertainties”**
K. N. Abazajian and R. E. Keeley.
Phys. Rev. D **93**, no. 8, 083514 (2016)
UCI-TR-2015-19
arXiv:1510.06424 [hep-ph]

56. **“Discovery of a New Galactic Center Excess Consistent with Upscattered Starlight”**
 K. N. Abazajian, N. Canac, S. Horiuchi, M. Kaplinghat and A. Kwa.
 JCAP **1507**, no. 07, 013 (2015)
 arXiv:1410.6168 [astro-ph.HE]
55. **“Sensitivity of HAWC to high-mass dark matter annihilations”**
 A. U. Abeysekara *et al.* [HAWC Collaboration].
 Phys. Rev. D **90**, no. 12, 122002 (2014)
 arXiv:1405.1730 [astro-ph.HE]
 LANL-LA-UR-14-23188
54. **“The Knotted Sky II: Does BICEP2 require a nontrivial primordial power spectrum?”**
 K. N. Abazajian, G. Aslanyan, R. Easther and L. C. Price.
 JCAP **1408**, 053 (2014)
 arXiv:1403.5922 [astro-ph.CO]
53. **“The Knotted Sky I: Planck constraints on the primordial power spectrum”**
 G. Aslanyan, L. C. Price, K. N. Abazajian and R. Easther.
 JCAP **1408**, 052 (2014)
 arXiv:1403.5849 [astro-ph.CO]
52. **“Running with BICEP2: Implications for Small-Scale Problems in CDM”**
 S. Garrison-Kimmel, S. Horiuchi, K. N. Abazajian, J. S. Bullock and M. Kaplinghat.
 Mon. Not. Roy. Astron. Soc. **444**, 961 (2014)
 arXiv:1405.3985 [astro-ph.CO]
51. **“Neutrino Physics from the Cosmic Microwave Background and Large Scale Structure”**
 K. N. Abazajian, K. Arnold, J. Austermann, B. A. Benson, C. Bischoff, J. Bock, J. R. Bond and J. Borrill *et al.*.
 American Physical Society Division of Particles and Fields Community Summer Study Report (Snowmass)
 Astropart. Phys. **63**, 66 (2015)
 arXiv:1309.5383 [astro-ph.CO]
50. **“Inflation Physics from the Cosmic Microwave Background and Large Scale Structure”**
 K. N. Abazajian, K. Arnold, J. Austermann, B. A. Benson, C. Bischoff, J. Bock, J. R. Bond and J. Borrill *et al.*.
 American Physical Society Division of Particles and Fields Community Summer Study Report (Snowmass)
 Astropart. Phys. **63**, 55 (2015)
 arXiv:1309.5381 [astro-ph.CO]
49. **“Resonantly-Produced 7 keV Sterile Neutrino Dark Matter Models and the Properties of Milky Way Satellites”**
 K. N. Abazajian.
 Phys. Rev. Lett. **112**, 161303 (2014)
 arXiv:1403.0954 [astro-ph.CO]
48. **“Astrophysical and Dark Matter Interpretations of Extended Gamma-Ray Emission from the Galactic Center”**
 K. N. Abazajian, N. Canac, S. Horiuchi and M. Kaplinghat.

- Phys. Rev. D **90**, 023526 (2014)
arXiv:1402.4090 [astro-ph.HE]
47. **“The High- z Universe Confronts Warm Dark Matter: Galaxy Counts, Reionization and the Nature of Dark Matter”**
C. Schultz, J. Oñorbe, K. N. Abazajian and J. S. Bullock.
Mon. Not. Roy. Astron. Soc. **442**, 1597 (2014)
arXiv:1401.3769 [astro-ph.CO]
 46. **“Sterile neutrino dark matter bounds from galaxies of the Local Group”**
S. Horiuchi, P. J. Humphrey, J. Oñorbe, K. N. Abazajian, M. Kaplinghat and S. Garrison-Kimmel.
Phys. Rev. D **89**, no. 2, 025017 (2014)
arXiv:1311.0282 [astro-ph.CO]
 45. **“Are Light Sterile Neutrinos Preferred or Disfavored by Cosmology?”**
S. Joudaki, K. N. Abazajian and M. Kaplinghat.
Phys. Rev. D **87**, no. 6, 065003 (2013) [arXiv:1208.4354 [astro-ph.CO]]
 44. **“Models of the Contribution of Blazars to the Anisotropy of the Extragalactic Diffuse Gamma-ray Background”**
J. P. Harding and K. N. Abazajian.
JCAP **1211**, 026 (2012) [arXiv:1206.4734 [astro-ph.HE]]
 43. **“Detection of a Gamma-Ray Source in the Galactic Center Consistent with Extended Emission from Dark Matter Annihilation and Concentrated Astrophysical Emission”**
K. N. Abazajian and M. Kaplinghat.
Phys. Rev. D **86**, 083511 (2012) [arXiv:1207.6047 [astro-ph.HE]]
 42. **“Lower Limits on the Strengths of Gamma Ray Lines from WIMP Dark Matter Annihilation”**
K. N. Abazajian, P. Agrawal, Z. Chacko and C. Kilic.
Phys. Rev. D **85**, 123543 (2012) [arXiv:1111.2835 [hep-ph]]
 41. **“Constraints on WIMP and Sommerfeld-Enhanced Dark Matter Annihilation from HESS Observations of the Galactic Center”**
K. N. Abazajian and J. P. Harding.
JCAP **1201**, 041 (2012) [arXiv:1110.6151 [hep-ph]]
 40. **“Current and Future Constraints on Dark Matter from Prompt and Inverse-Compton Photon Emission in the Isotropic Diffuse Gamma-ray Background”**
K. N. Abazajian, S. Blanchet and J. P. Harding.
Phys. Rev. D **85**, 043509 (2012) [arXiv:1011.5090 [hep-ph]]
 39. **“The Contribution of Blazars to the Extragalactic Diffuse Gamma-ray Background and Their Future Spatial Resolution”**
K. N. Abazajian, S. Blanchet and J. P. Harding.
Phys. Rev. D **84**, 103007 (2011) [arXiv:1012.1247 [astro-ph.CO]]
 38. **“Cosmological and Astrophysical Neutrino Mass Measurements”**
K. N. Abazajian, E. Calabrese, A. Cooray, F. De Bernardis, S. Dodelson, A. Friedland, G. M. Fuller, S. Hannestad *et al.*
Astropart. Phys. **35**, 177-184 (2011) [arXiv:1103.5083 [astro-ph.CO]]
 37. **“The Consistency of Fermi-LAT Observations of the Galactic Center with a Millisecond Pulsar Population in the Central Stellar Cluster”**

- K. N. Abazajian,
JCAP **1103**, 010 (2011) [arXiv:1011.4275 [astro-ph.HE]]
36. **“Conservative Constraints on Dark Matter from the Fermi-LAT Isotropic Diffuse Gamma-Ray Background Spectrum”**
K. N. Abazajian, P. Agrawal, Z. Chacko and C. Kilic
JCAP **1011**, 041 (2010), [arXiv:1002.3820 [astro-ph.HE]]
 35. **“Morphological Tests of the Pulsar and Dark Matter Interpretations of the WMAP Haze”**
J. P. Harding and K. N. Abazajian
Phys. Rev. D **81**, 023505 (2010) [arXiv:0910.4590 [astro-ph.CO]]
 34. **“The Seventh Data Release of the Sloan Digital Sky Survey”**
K. N. Abazajian *et al.* [SDSS Collaboration]
Astrophys. J. Suppl. **182**, 543 (2009) [arXiv:0812.0649 [astro-ph]]
 33. **“Chaos, Determinacy and Fractals in Active-Sterile Neutrino Oscillations in the Early Universe”**
K. N. Abazajian and P. Agrawal
JCAP **0810**, 006 (2008) [arXiv:0807.0456 [hep-ph]]
 32. **“Toward a halo mass function for precision cosmology: the limits of universality”**
J. L. Tinker, Andrey V. Kravtsov, Anatoly Klypin, Kevork Abazajian, Michael S. Warren, Gustavo Yepes, Stefan Gottlober, Daniel E. Holz
Astrophys. J. **688**, 709 (2008) [arXiv:0803.2706 [astro-ph]]
 31. **“Limits on the radiative decay of sterile neutrino dark matter from the unresolved cosmic and soft X-ray backgrounds”**
K. N. Abazajian, M. Markevitch, S. M. Koushiappas and R. C. Hickox
Phys. Rev. D **75**, 063511 (2007) [arXiv:astro-ph/0611144]
 30. **“Cosmological Constraints from the SDSS Luminous Red Galaxies”**
M. Tegmark *et al.* [SDSS Collaboration]
Phys. Rev. D **74**, 123507 (2006) [arXiv:astro-ph/0608632]
 29. **“Light Element Signatures of Sterile Neutrinos and Cosmological Lepton Numbers”**
C. J. Smith, G. M. Fuller, C. T. Kishimoto and K. N. Abazajian
Phys. Rev. D **74**, 085008 (2006) [arXiv:astro-ph/0608377]
 28. **“Constraints on sterile neutrino dark matter”**
K. Abazajian and S. M. Koushiappas
Phys. Rev. D **74**, 023527 (2006) [arXiv:astro-ph/0605271]
 27. **“A Large Dark Matter Core in the Fornax Dwarf Spheroidal Galaxy?”**
L. E. Strigari, J. S. Bullock, M. Kaplinghat, A. V. Kravtsov, O. Y. Gnedin, K. Abazajian and A. A. Klypin
Astrophys. J. **652**, 306 (2006) [arXiv:astro-ph/0603775]
 26. **“Percolation Galaxy Groups and Clusters in the SDSS Redshift Survey: Identification, Catalogs, and the Multiplicity Function”**
A. A. Berlind *et al.* [SDSS Collaboration]
Astrophys. J. Suppl. **167**, 1 (2006) [arXiv:astro-ph/0601346]
 25. **“Linear cosmological structure limits on warm dark matter”**
K. Abazajian
Phys. Rev. D **73**, 063513 (2006) [arXiv:astro-ph/0512631]

24. **“Production and evolution of perturbations of sterile neutrino dark matter”**
K. Abazajian
Phys. Rev. D **73**, 063506 (2006) [arXiv:astro-ph/0511630]
23. **“Parameterizing the Power Spectrum: Beyond the Truncated Taylor Expansion”**
K. Abazajian, K. Kadota and E. D. Stewart
JCAP **0508**, 008 (2005) [arXiv:astro-ph/0507224]
22. **“Precision Determination of the Mass Function of Dark Matter Halos”**
M. S. Warren, K. Abazajian, D. E. Holz and L. Teodoro
Astrophys. J. **646**, 881 (2006) [arXiv:astro-ph/0506395]
21. **“The nonlinear cosmological matter power spectrum with massive neutrinos: The halo model”**
K. Abazajian, E. R. Switzer, S. Dodelson, K. Heitmann and S. Habib
Phys. Rev. D **71**, 043507 (2005) [arXiv:astro-ph/0411552]
20. **“The Third Data Release of the Sloan Digital Sky Survey”**
K. Abazajian *et al.* [SDSS Collaboration]
Astron. J. **129**, 1755 (2005) [arXiv:astro-ph/0410239]
19. **“Cosmological lepton asymmetry, primordial nucleosynthesis, and sterile neutrinos”**
K. Abazajian, N. F. Bell, G. M. Fuller and Y. Y. Y. Wong
Phys. Rev. D **72**, 063004 (2005) [arXiv:astro-ph/0410175]
18. **“Cosmology and the Halo Occupation Distribution from Small-Scale Galaxy Clustering in the Sloan Digital Sky Survey”**
K. Abazajian *et al.* [SDSS Collaboration]
Astrophys. J. **625**, 613 (2005) [arXiv:astro-ph/0408003]
17. **“The Second Data Release of the Sloan Digital Sky Survey”**
K. Abazajian *et al.* [SDSS Collaboration]
Astron. J. **128**, 502 (2004) [arXiv:astro-ph/0403325]
16. **“Cosmological parameters from SDSS and WMAP”**
M. Tegmark *et al.* [SDSS Collaboration]
Phys. Rev. D **69**, 103501 (2004) [arXiv:astro-ph/0310723]
15. **“The First Data Release of the Sloan Digital Sky Survey”**
K. Abazajian *et al.* [SDSS Collaboration]
Astron. J. **126**, 2081 (2003) [arXiv:astro-ph/0305492]
14. **“Neutrino mass and dark energy from weak lensing”**
K. N. Abazajian and S. Dodelson
Phys. Rev. Lett. **91**, 041301 (2003) [arXiv:astro-ph/0212216]
13. **“Telling Three from Four Neutrinos with Cosmology”**
K. N. Abazajian
Astropart. Phys. **19**, 303 (2003) [arXiv:astro-ph/0205238]
12. **“Bulk QCD thermodynamics and sterile neutrino dark matter”**
K. N. Abazajian and G. M. Fuller
Phys. Rev. D **66**, 023526 (2002) [arXiv:astro-ph/0204293]

11. **“Stringent constraints on cosmological neutrino antineutrino asymmetries from synchronized flavor transformation”**
K. N. Abazajian, J. F. Beacom and N. F. Bell
Phys. Rev. D **66**, 013008 (2002) [arXiv:astro-ph/0203442]
10. **“SDSS J124602.54+011318.8: A Highly Luminous Optical Transient at $z=0.385$ ”**
D. E. Vanden Berk *et al.* [SDSS Collaboration]
Astrophys. J. **576**, 673 (2002) [arXiv:astro-ph/0111054]
9. **“Direct detection of warm dark matter in the X-ray”**
K. Abazajian, G. M. Fuller and W. H. Tucker
Astrophys. J. **562**, 593 (2001) [arXiv:astro-ph/0106002]
8. **“Testing the Cosmic Coincidence Problem and the Nature of Dark Energy”**
N. Dalal, K. Abazajian, E. E. Jenkins and A. V. Manohar
Phys. Rev. Lett. **87**, 141302 (2001) [arXiv:astro-ph/0105317]
7. **“Sterile neutrino hot, warm, and cold dark matter”**
K. Abazajian, G. M. Fuller and M. Patel
Phys. Rev. D **64**, 023501 (2001) [arXiv:astro-ph/0101524]
6. **“The cosmological bulk neutrino catastrophe”**
K. Abazajian, G. M. Fuller and M. Patel
Phys. Rev. Lett. **90**, 061301 (2003) [arXiv:hep-ph/0011048]
5. **“New connection between central engine weak physics and the dynamics of gamma-ray burst fireballs”**
J. Pruet, K. Abazajian and G. M. Fuller
Phys. Rev. D **64**, 063002 (2001) [arXiv:astro-ph/0009144]
4. **“Can a large neutron excess help solve the baryon loading problem in gamma ray burst fireballs?”**
G. M. Fuller, J. Pruet and K. Abazajian
Phys. Rev. Lett. **85**, 2673 (2000) [arXiv:astro-ph/0004313]
3. **“The increase to the primordial He-4 yield in the two-doublet four-neutrino mixing scheme”**
K. Abazajian, G. M. Fuller and X. Shi
Phys. Rev. D **62**, 093003 (2000) [arXiv:astro-ph/9908081]
2. **“Neutrino-mixing-generated lepton asymmetry and the primordial He-4 abundance”**
X. D. Shi, G. M. Fuller and K. Abazajian
Phys. Rev. D **60**, 063002 (1999) [arXiv:astro-ph/9905259]
1. **“Optimization of J_c of YBCO thin films prepared by photo-assisted MOCVD through statistical robust design”**
P. C. Chou, Q. Zhong, K. Abazajian, A. Ignatiev, Q. L. Li, C. Y. Wang, E. E. Deal and J. G. Chen
Physica C: Superconductivity, **254**, 93 (1995)

Proceedings (unrefereed)

1. **“Massive Neutrinos and the Halo Model of Large Scale Structure”**
E. Switzer, K. Abazajian, S. Dodelson, S. Habib and K. Heitmann.
Nucl. Phys. Proc. Suppl. **143**, 571 (2005).
Proceedings of the XXIst International Conference on Neutrino Physics and Astrophysics.

2. **“The cosmological energy density of neutrinos from oscillation measurements”**
K. Abazajian
AIP Conf. Proc. **721**, 256 (2004) [arXiv:hep-ph/0312163]
Proceedings of 5th International Workshop on Neutrino Factories and Superbeams (NuFact 03), New York, New York, 5-11 Jun 2003
3. **“Gamma-ray burst afterglows”**
K. N. Abazajian
*In *La Thuile 2002, Results and perspectives in particle physics* 3-8*
Proceedings. Edited by Mario Greco. Frascaty, Italy, Istituto Naz. Fis. Nucl. (2002).
4. **“Are gamma-ray bursts signals of supermassive black hole formation?”**
K. Abazajian, G. M. Fuller and X. Shi
arXiv:astro-ph/9812287
Proceedings of International Conference on the Activity of Galaxies and Related Phenomena, Byurakan, Armenia, 17-21 Aug 1998
5. **“Active-sterile neutrino mixing in the early universe and primordial nucleosynthesis”**
K. Abazajian, X. D. Shi and G. M. Fuller
arXiv:astro-ph/9904052
Proceedings of American Physical Society (APS) Meeting of the Division of Particles and Fields (DPF 99), Los Angeles, CA, 5-9 Jan 1999
6. **“Baryon/anti-baryon inhomogeneity and big bang nucleosynthesis”**
K. Abazajian and G. M. Fuller
arXiv:astro-ph/9812288
Proceedings of 3rd International Symposium on Sources and Detection of Dark Matter in the Universe (DM 98), Santa Monica, CA, 18-20 Feb 1998

Reports, White Papers and Comments

1. **“Neutrinos”**
A. de Gouvea *et al.* [Intensity Frontier Neutrino Working Group Collaboration].
American Physical Society Division of Particles and Fields Community Summer Study Report (Snowmass)
arXiv:1310.4340 [hep-ex]
2. **“Dark Energy and CMB”**
S. Dodelson, K. Honscheid, K. Abazajian, J. Carlstrom, D. Huterer, B. Jain, A. Kim and D. Kirkby *et al.*.
American Physical Society Division of Particles and Fields Community Summer Study Report (Snowmass)
arXiv:1309.5386 [astro-ph.CO]
3. **“Light Sterile Neutrinos: A White Paper”**
K. N. Abazajian, M. A. Acero, S. K. Agarwalla, A. A. Aguilar-Arevalo, C. H. Albright, S. Antusch, C. A. Argüelles and A. B. Balantekin *et al.*.
arXiv:1204.5379 [hep-ph]
4. **“Comment on ‘Joint Anisotropy and Source Count Constraints on the Contribution of Blazars to the Diffuse Gamma-Ray Background’ ”**
J. P. Harding and K. N. Abazajian.
arXiv:1204.3870 [astro-ph.CO]

5. **“The Halo Model of Large Scale Structure for Warm Dark Matter”**
R. M. Dunstan, K. N. Abazajian, E. Polisensky, M. Ricotti.
arXiv:1109.6291 [astro-ph.CO]
6. **“The search for decaying Dark Matter”**
J. W. d. Herder, A. Boyarsky, O. Ruchayskiy, K. Abazajian, *et al.*
Science white paper submitted to the European Space Agency Fundamental Physics
Roadmap Advisory Team (FPR-AT)
arXiv:0906.1788 [astro-ph.CO]
7. **“Detection of Dark Matter Decay in the X-ray”**
K. N. Abazajian
Science white paper submitted to the Astro2010 Decadal Cosmology & Funda-
mental Physics Science Frontier Panel
arXiv:0903.2040 [astro-ph.CO]
8. **“Strong gravitational lensing probes of the particle nature of dark mat-
ter”**
L. A. Moustakas, K. N. Abazajian, *et al.*
Science white paper submitted to the Astro2010 Decadal Cosmology & Funda-
mental Physics Science Frontier Panel
arXiv:0902.3219 [astro-ph.CO]
9. **“Transformation induced nonthermal neutrino spectra and primordial
nucleosynthesis”**
K. Abazajian, X. Shi and G. M. Fuller
arXiv:astro-ph/9909320
10. **“Comments regarding ‘On neutrino-mixing-generated lepton asymme-
try and the primordial helium-4 abundance’ ”**
X. D. Shi, G. M. Fuller and K. Abazajian
arXiv:astro-ph/9909221

FELLOWSHIPS AND
AWARDS

- *Outstanding Reviewer for the Journal The Dark Universe*, 2015
- *Distinguished Assistant Professor Award for Research*, University of California, Irvine Academic Senate, 2013
- *Outstanding Reviewer for the Journal of Astroparticle Physics*, 2013
- *Faculty with Greatest Impact on an Outstanding Graduating Senior*, University of California, Irvine, Physics Course 137, Introduction to Cosmology, Winter 2012
- *NSF CAREER Award: Cosmological Structure at Small Scales. from the Nature of Dark Matter and its Small-Scale Behavior to Galaxy Formation*, 2010-2015
- *Los Alamos National Laboratory Director’s Postdoctoral Fellow*, 2003
- *NASA Graduate Student Research Program Fellowship*, 1999-2001
- *University Honors in Physics*, University of Houston Honors College, 1996
- *Distinguished Honors Thesis in Physics*, University of Houston Honors College, 1996
- *National Merit Scholar*, University of Houston Honors College, 1992
- *Moody Foundation Scholar*, University of Houston Honors College, 1992

1. **Searching for Emission from Dark Matter in X-rays and Gamma-rays**
Galaxies & Cosmology Seminar, Harvard-Smithsonian Center for Astrophysics, September 27, 2016
2. **The Saga of Sterile Neutrino Dark Matter**
LNS Colloquium at the Massachusetts Institute for Technology, September 26, 2016
3. **Sterile Neutrino Dark Matter Interpretations of the 3.5 keV Line**
Mainz Institute for Theoretical Physics, Workshop on “The Energy Ladder of the Universe,” Mainz, Germany, June 8, 2016
4. **Sterile Neutrino Dark Matter: A Tale of Weak Interactions in a Strong-Coupling Epoch**
Karlsruhe Institute for Technology Joint Seminar, Heidelberg, Tuebingen and the KIT, Karlsruhe, Germany, June 7, 2016
5. **Sterile Neutrino Dark Matter Interpretations of the 3.5 keV Line**
Max Planck Institute for Kernphysik Seminar, Heidelberg, Germany, June 6, 2016
6. **Dark Matter and the 3.5 keV Signal**
Invited Presentation at the American Physical Society April Meeting, Division of Particles & Fields, Salt Lake City, Utah, April 18, 2016
7. **Toward the End Game for Absolute Neutrino Mass via Cosmology?**
Texas A&M University Mitchell Institute for Fundamental Physics & Astronomy Seminar, April 14, 2016
8. **Sterile Neutrino Candidates for the 3.5 keV Line**
Sources and Detection of Dark Matter and Dark Energy in the Universe, UCLA, February 18, 2016
9. **Neutrino Mass from Cosmology & Astrophysics**
Invited Presentation at the Amherst Center for Fundamental Interactions Workshop on Neutrino Mass: From the Terrestrial Laboratory to the Cosmos, December 14, 2015
10. **Indirect Dark Matter Searches**
Invited Colloquium at Northwestern University Physics & Astronomy Department, November 6, 2015
11. **Dark Matter Detections in Photons Split by a Million in Energy: Implications of X-ray lines and Gamma-ray Bumps**
Invited Seminar at the Amherst Center for Fundamental Interactions, October 16, 2015
12. **Neutrinos as Dark Matter**
Invited Lecture at the Stanford Linear Accelerator Center Summer Institute, August 19, 2015
13. **Neutrino Mass: Cosmological Data Impacts**
Invited review talk for the Department of Energy Nuclear Science Advisory Council Subcommittee on Neutrinoless Double Beta Decay, August 17, 2015
14. **Sterile Dark Matter Cosmological Neutrinos**
Invited Presentation at the Institute for Nuclear Theory Conference in Program 15-2a: Neutrino Astrophysics & Fundamental Properties, June 17, 2015

15. **Dark Matter Detections in Photons Split by a Million in Energy: Implications of X-ray lines and Gamma-ray Bumps**
Invited Seminar at the CalTech Theoretical AstroPhysics Including Relativity and Cosmology Center, April 10, 2015
16. **Implications of the Candidate Dark Matter Decay Line at 3.5 keV**
Invited Texas A&M University Mitchell Institute for Fundamental Physics & Astronomy Seminar, February 12, 2015
17. **Implications of the Candidate Dark Matter Decay Line at 3.5 keV**
Invited Astrophysics Seminar at UC San Diego, January 28, 2015
18. **Signals and degeneracies of the primordial power spectrum: Neutrinos & Inflation**
Invited Plenary Talk at the Cosmology with the CMB and its Polarization Workshop, Fine Theoretical Physics Institute, University of Minnesota, January 14, 2015
19. **Implications of the Candidate Dark Matter Decay Line at 3.5 keV**
Invited Presentation at the University of California Institute for Nuclear, Particle Astrophysics and Cosmology Workshop, Asilomar, California, December 4, 2014
20. **Implications of the Candidate Dark Matter Decay Line at 3.5 keV**
Invited Fermilab Center for Particle Astrophysics Seminar, Batavia, Illinois, October 6, 2014
21. **The First Moments after the Big Bang**
Invited Presentation to the TEC7 CEO Group, August 27, 2014
22. **Cosmology of Massive Neutrinos**
Invited Divisional Seminar, Argonne National Laboratory, June 11, 2014
23. **Intensity and Anisotropy of the Diffuse Gamma-Ray Background**
Invited presentation, High-Energy Messengers Workshop, Kavli Institute for Cosmological Physics, June 2014
24. **Dark matter indirect detection signals and constraints**
First Anti-Deuteron Workshop, UCLA, June 2014
25. **Dark Matter Detections in Photons Split by a Million in Energy: Implications of X-ray Lines and Gamma-ray Bumps**
University of Maryland Department of Physics Seminar, April 2014
26. **Cosmological and Astrophysical Implications of Sterile Neutrinos**
Invited presentation, American Physical Society April 2014 Conference, Savannah, Georgia
27. **Gamma-ray Signals and X-ray Signals** Panelist, Dark Matter in Southern California Workshop, California Institute of Technology, April 2014
28. **Cosmological Hot, Warm and Cold Dark Matter**
Colloquium at the Kavli Institute for Particle Astrophysics & Cosmology, Stanford University and SLAC, September 2013
29. **Neutrino Physics from the Cosmic Microwave Background and Large Scale Structure**
invited presentation at the American Physical Society Community Summer Study "Snowmass on the Mississippi," University of Minnesota, August 2013

30. **Neutrino Mass and Number from Cosmology**
invited presentation to the Cosmic Microwave Background and Large Scale Structure session Cosmic Frontiers Meeting, Stanford Linear Accelerator Center, March 2013
31. **Overview of Dark Matter Constraints from Gamma-ray Astrophysics**
invited presentation to the Indirect Detection of Dark Matter session Cosmic Frontiers Meeting, Stanford Linear Accelerator Center, March 2013
32. **Neutrino Mass and Number from Cosmology**
invited presentation to the Neutrino Mass session, Intensity Frontiers Meeting, Stanford Linear Accelerator Center, March 2013
33. **An Unexpected Journey: Detection of Dark Matter in the Galactic Center?**
Aspen Center for Physics Workshop, Closing in on Dark Matter? February 2013
34. **Indirect Detection Overview**
Dark Matter in Southern California Workshop, California Institute of Technology, January 2013
35. **Detection of Dark Matter in the Galactic Center?**
Colloquium at the Carnegie Observatory, Pasadena, California, January 2013
36. **Dark Matter Annihilation in the Galactic Center?**
Cosmology Initiative Seminar, Arizona State University, Tempe, Arizona, September 2012
37. **Update on Sterile Neutrino Dark Matter & Gamma-rays from the Galactic Center**
Plenary talk, Identification of Dark Matter, Chicago, July 2012
38. **Dark Matter Signals in the Gamma-ray**
Plenary talk, Snowbird Workshop on Dark Matter Observations through Gamma Rays (SnowDOG), March 2012
39. **Deviant Dark Matter**
University of California, Santa Cruz, Santa Cruz Institute for Particle Physics Seminar, March 2012
40. **Sterile Neutrino Dark Matter in the Near Field**
Plenary Presentation, Conference on Near Field Cosmology as a Probe of the Early Universe, Dark Matter and Gravity, Annapolis, Maryland, November 2011
41. **Uncovering the Nature of Dark Matter**
Colloquium Department of Physics & Astronomy, Cal State Los Angeles, October 2011
42. **Astrophysics Theory Review**
Plenary Presentation, Conference on Sterile Neutrinos at the Crossroads, Virginia Tech University, September 2011
43. **Astrophysical Indicators of the Nature of Dark Matter**
Colloquium, Brown University Department of Physics, March 2011
44. **Constraints and Forecasts for Gamma-ray Signals from Fermi-LAT**
Aspen Center for Physics Workshop on Direct and Indirect Searches for Dark Matter, February 2011

45. **Signals from and Constraints on Dark Matter by the Fermi-LAT Observatory**
Goddard Space Flight Center Workshop on Fermi Gamma Ray Space Telescope Science, November 2010
46. **Fermi-LAT and Gamma-Ray Constraints and Sensitivity to Dark Matter Signals**
Invited presentation at the Santa Fe Cosmology Workshop, July 2010
47. **Constraints on Dark Matter from Gamma-Ray Observations**
Invited presentation at the Workshop on Novel Searches for Dark Matter, The Ohio State University, July 2010
48. **Neutrinos and the Lyman- α forest**
Invited presentation at the Institute for Nuclear Theory Workshop on Neutrino Mass, University of Washington, February 2010
49. **Verification of Indirect Indications of the Nature of Dark Matter**
Department of Physics & Astronomy Seminar, University of Pennsylvania, January 2010
50. **Verification of Indirect Indications of the Nature of Dark Matter**
Department of Physics Seminar, Carnegie-Melon University, October 2009
51. **Cosmology from Small Scale Structure**
Department of Astronomy Colloquium, University of Maryland, May 2009
52. **Detection of Dark Matter in the X-ray**
Quantum 2 Cosmos III Conference, Arlie Center, Virginia, July 2008
53. **Chaos and Fractals in Lepton Number Generation in the Early Universe**
Neutrino Theory Workshop, University of Melbourne, Australia, June 2008
54. **Sterile Neutrino Dark Matter**
Santa Fe Cosmology Workshop, Santa Fe, New Mexico, July 2007
55. **Constraints on Sterile Neutrino Dark Matter**
Astrophysical Methods for Determining the Nature of Dark Matter Workshop, UC Irvine, California, March 2007
56. **Neutrinos and the Cosmos**
NuFact06, Irvine, California, August 2006
57. **Neutrino Mass Measurements from the Cosmic Microwave Background and the Sloan Digital Sky Survey**
American Physical Society April Meeting, 2006
58. **Sterile Neutrino Production and Perturbation Evolution**
Sterile Neutrinos in Astrophysics and Cosmology Conference, EPFL, Switzerland, March 2006
59. **Sterile Neutrino Dark Matter**
New Views of the Universe Symposium, The University of Chicago, December 2005
60. **Structure, Statistics and Information at All Cosmological Scales**
Max Planck Instituted for Astrophysics Colloquium, Garching, Germany, April 2005

61. **Massive Neutrinos in the New Cosmology**
Department of Physics Colloquium, University of British Columbia, March 2005
62. **Cosmology and Galaxy Formation from All-Scale Galaxy Clustering in the Sloan Digital Sky Survey**
Institute of Astronomy, ETH Zürich, Switzerland, October 2004
63. **Neutrino Clustering in Cold Dark Matter Halos**
Workshop on Neutrinos and the Early Universe, ECT*, Trento, Italy, October 2004
64. **Cosmology from the Deeply Nonlinear Regime: the SDSS Two-point Correlation Function**
Santa Fe Cosmology Workshop, July 2004
65. **The Galaxy Dark Matter Halo Occupation, Two-point Correlation, and Cosmology**
Aspen Winter 2003 Conference on Astrophysics, January 2004
66. **Neutrino Cosmology**
Physics Colloquium, New Mexico State University, October 2003
67. **Cosmological Measurements of Neutrino Parameters**
Weak Interactions and Neutrinos, Lake Geneva, Wisconsin, October 2003
68. **Precision Cosmological Measurement of Neutrino Mass**
Eleventh Lomonosov Conference on Elementary Particle Physics, Moscow State University, August 2003
69. **Massive Neutrinos in the New Cosmology**
Joint Experimental and Theoretical Physics Seminar, Fermi National Accelerator Laboratory, April 2003
70. **Sterile Neutrinos in Astrophysics and Cosmology**
Neutrino Conference, Kavli Institute for Theoretical Physics, March 2003
71. **Neutrino Cosmology**
Aspen Winter 2003 Conference on Particle Physics, January 2003
72. **Gamma-Ray Burst Afterglows**
Les Rencontres de Physique de la Vallée d'Aoste Conference, La Thuile, Italy, March 2002
73. **Precision Cosmological Measurements of Neutrino Mass**
Theoretical Particle Physics Seminar, University of California, Los Angeles, October 2003
74. **The Cosmological Energy Density of Neutrinos from Oscillation Measurements**
5th International Workshop on Neutrino Factories & Superbeams, Columbia University, New York, June 2003
75. **Neutrino Mass and Dark Energy from Weak Lensing**
Great Lakes Cosmology Workshop, Ann Arbor, Michigan, May 2003
76. **Massive Neutrinos in the New Cosmology**
Joint Experimental and Theoretical Physics Seminar, Fermilab, April 2003

- 77. **Sterile Neutrino Dark Matter**
Workshop on Neutrino News from the Lab and the Cosmos, Fermilab,
October 2002
- 78. **New Constraints on Neutrino Degeneracies**
Astrophysics Seminar, University of Notre Dame, September 2002
- 79. **Direct Detection of the Dark Matter in the X-ray**
Predictions of Cold Dark Matter on Small Scales Workshop, Center for Cosmo-
logical Physics, University of Chicago, August 2002
- 80. **Stringent Constraints on Cosmological Lepton Number from Solar Neu-
trinos**
Santa Fe Summer Cosmology Workshop, July 2002
Pheno 2002 Symposium, University of Wisconsin, Madison, April 2002
- 81. **Finding and Resolving Crises in Cold Dark Matter**
Aspen Workshop on Large Scale Structure in the Era of Large Surveys, Aspen
Center for Physics, June 2002
- 82. **Neutrino Cosmology**
Institute for Nuclear Theory Mini-workshop on Neutrino Physics, Program on
Nucleosynthesis, April 2002
- 83. **Making Dark Matter and Deriving Constraints with Neutrino Mixing
in the Early Universe**
Center for Cosmological Physics Seminar, University of Chicago, November 2001
- 84. **A Cosmic “Coincidometer”**
Cosmology Seminar, Department of Physics, University of California Davis, Oc-
tober 2001
- 85. **Direct Detection of Warm Dark Matter**
Theoretical Physics Seminar, Purdue University, September 2001
- 86. **Cold Neutrino Dark Matter**
Nuclear Physics Seminar, Lawrence Livermore National Laboratory,
February 2001
Theoretical Astrophysics Group Seminar, Fermilab, January 2001
Theoretical Physics Seminar, TRIUMF, Vancouver, January 2001

CONTRIBUTED
CONFERENCE
PRESENTATIONS

- 1. **Telling Three from Four Neutrinos with Cosmology**
COSMO-02, International Workshop on Particle Physics and the Early Universe,
Chicago, September 2002
- 2. **Sterile Neutrinos in the Early Universe**
NATO Advanced Study Institute 2000: Recent Developments in Particle Physics
and Cosmology, Cascais, Portugal, July 2000
- 3. **Neutrino Mixing in the Early Universe and the Two-doublet Neutrino
Mass Model**
Institute for Nuclear Theory Program on Low-Energy Neutrino Physics,
August 1999
- 4. **Active-Sterile Neutrino Mixing and Primordial Nucleosynthesis**
American Physical Society Meeting of the Division of Particles and Fields, Los
Angeles, California, January 1999

5. **Are Gamma-Ray Bursts Signals of Supermassive Black Hole Formation?**

International Conference on the Activity of Galaxies and Related Phenomena, Byurakan, Armenia, August 1998

6. **Baryon/Anti-Baryon Inhomogeneity and Big Bang Nucleosynthesis**

The 3rd International Symposium on Sources and Detection of Dark Matter in the Universe, Marina Del Rey, California, February 1998

GRANTS

- “Particle Physics and Cosmology in the LHC Era,” **Co-PI**, NSF Theoretical Physics Program, UCI #PHY-1620638, \$1,920,000
- “Particle Physics and Cosmology in the LHC Era,” **Co-I**, NSF Theoretical Physics Program, UCI #PHY-1316792, \$1,003,292 awarded
- “CAREER: Cosmological Structure at Small Scales. from the Nature of Dark Matter and its Small-Scale Behavior to Galaxy Formation,” **PI**, NSF CAREER Program Grant, 2010-2015, U. Maryland Grant #PHY-09-55415, UCI #PHY-1159224, \$399,999 awarded
- “Particle Physics and Cosmology Beyond the Standard Model,” **Co-PI**, NSF Theoretical Physics Program, U. Maryland Grant #PHY-0968854, \$1,145,000 awarded
- “Frontier Challenges in Neutrino Cosmology, Dark Energy and Dark Matter,” **PI**, NSF Theoretical Physics Program Grant #PHY-0757966, 2009-2011, \$75,000 awarded

REVIEWING
ACTIVITIES

Referee for the journals: *Physical Review Letters*, *Physical Review C*, *Physical Review D*, *Astrophysical Journal*, *Astrophysical Journal Letters*, *Astroparticle Physics*, *Physics Letters B*, *Journal of Cosmology & Astroparticle Physics*, *Journal of High Energy Physics*, *Monthly Notices of the Royal Astronomical Society*

TEACHING,
MENTORING,
& ADVISING

Courses Taught in the last five years

- Winter 2012: Physics 137, Introduction to Cosmology, enrollment: 12
- Spring 2012: Physics 145, High-Energy Astrophysics, enrollment: 12
- Winter 2013: Physics 137, Introduction to Cosmology, enrollment: 14
- Spring 2013: Physics 14, Physics of Energy & the Environment, enrollment: 45
- Fall 2013: Physics 14, Physics of Energy & the Environment, enrollment: 14
- Spring 2014: Physics 145, High-Energy Astrophysics, enrollment: 7
- Fall 2014: Physics 241B, (Graduate) Stellar Astrophysics, enrollment: 15
- Winter 2015: Physics 137, Introduction to Cosmology, enrollment: 14
- Spring 2015: Physics 241D, (Graduate) The Early Universe, enrollment: 15
- Fall 2015: Physics 113B, Quantum Physics II, enrollment: 15
- Winter 2016: Physics 137, Introduction to Cosmology, enrollment: 10
- Spring 2016: Physics 145, High-Energy Astrophysics, enrollment: 13
- Fall 2016: Physics 113B, Quantum Physics II, enrollment: 12; Physics 20D, enrollment: 40

Cal-Bridge California State University to University California Undergraduate to Graduate Bridge Program

- Steering Committee Member and Mentor, 2014-present

Academic Advising

- Undergraduate Students: 4
- Graduate Students: 3

Graduate Research Advising, University of California, Irvine

- Ryan E. Keeley, 2014-
- Nicolas E. Canac, 2013-2016

Graduate Research Advising, University of Maryland

- Emil Polisensky, 2009-2014 (Member)
- J. Patrick Harding, 2008-2012 (Chair)
- Prateek Agrawal, 2009-2011 (co-advising with Z. Chacko)

Postdoctoral Research Advising

- Dr. Shunsaku Horiuchi 20012-2014
- Dr. Steve Blanchet, 2008-2010 (PI)

Cal-Bridge CSU-UC Undergraduate Program

- Cal State San Bernadino Undergraduate: Beverley Thackeray, 2013-2014

CAMPARE Undergraduate Program

- Cal State Fullerton Undergraduate: Alyssa Garcia, Summer 2014

Mentoring

- Eleanor Roosevelt High School Science Fair Student Advising and Mentoring: Julia Ruth

SERVICE

Professional

- Steering Committee, CSU-UC Cal-Bridge Undergraduate Program, 2014-present
- Organizer, Institute for Nuclear Theory Program: Neutrino Astrophysics and Fundamental Properties, June 2015
- Convener for the American Physical Society Community Summer Study, Neutrino Physics from the Cosmic Microwave Background and Large Scale Structure, 2013
- Organizer, *The 4th Neutrino Workshop*, Kavli Institute of Cosmological Physics, University of Chicago, May 2012
- Organizer, *Dark Matter Signatures in the Gamma Ray Sky*, University of Texas, Austin, May 2012
- Organizer, *Near Field Cosmology as a Probe of the Early Universe, Dark Matter and Gravity Conference*, Joint Space-Science Institute, University of Maryland, November 2011
- Organizer, *Sterile Neutrinos at the Crossroads Conference*, Blacksburg, Virginia, September 2011
- Organizer, *Aspen Winter Workshop*, Neutrino Physics and Astrophysics, 2007
- Organizer, *Santa Fe Cosmology Workshop*, Los Alamos National Laboratory, Santa Fe, 2003-2006
- Organizer, *Workshop on Neutrino News from the Lab and the Cosmos*, Fermilab, Oct. 2002

University Wide, UC Irvine

- Faculty Senate Council on Faculty Welfare, 2016-present
- Faculty Senate Committee on Rules and Jurisdiction, 2015-present
- Faculty Senate Divisional Senate Assembly Member, 2014-2016

- Lecture at two-hour class for the Osher Lifelong Learning Institute (OLLI) of the UC Irvine Extension on “Astrophysical Evidence for Dark Matter”, December 3, 2013

Campus, Departmental

- **University of California, Irvine**
 - Departmental search committee for Assistant Professor in plasma physics, 2013-14, 2014-15
 - Departmental committee for promotion to tenure (two), 2014-16
 - Executive Committee, UC Irvine Center for Cosmology, 2012-16
 - Departmental advancement and promotion committees (four), 2011-2016
- **University of Maryland, College Park**
 - Joint Space-Science Institute, Mini-Workshop Committee, 2010
 - Physics Council Executive Committee, 2009-2010
 - Physics Department Salary Committee, 2009-2010
 - Physics Department Graduate Admissions Committee, 2010
 - Organizer, *Advances in Theoretical and Observational Cosmology*, Maryland Center for Fundamental Physics Workshop, May 26-28 2010
 - Organizer, *Shedding Light on Dark Matter*, Maryland Center for Fundamental Physics Workshop, April 2009
 - Physics Department Elementary Particle Theory Faculty Search Committee, 2006-2007

Local Outreach

- Regular talks for the UC Irvine Astronomical Outreach Observatory, 2011-present
- Public Talk on “The History of the Universe” to Newport Beach/Irvine Rotary Club, July 9, 2015
- Public Talk on “The Largest Structures in the Universe” to Riverside Astronomical Society, July 20, 2013
- Public Talk on “The Largest Structures in the Universe” to 200 members of the Orange County Astronomers Club, April 13, 2013