

Shunsaku Horiuchi

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Research Interests

Dark matter: multi-messenger astrophysical probes of particle dark matter
Supernovae: neutrino, cosmic ray, and gamma ray signatures

Appointments

2020 –	Associate Professor	Virginia Tech
2022 –	Visiting Scientist	Kavli IPMU
2021 – 2022	Project Associate Professor	Kavli IPMU
2014 – 2020	Assistant Professor	Virginia Tech
2012 – 2014	JSPS Fellow & McCue Fellow	University of California, Irvine
2009 – 2012	CCAPP Postdoctoral Fellow	The Ohio State University

Education

2005 – 2009	Ph.D., Physics	University of Tokyo
2001 – 2005	B.A., M.A., M.Sci., Natural Science	University of Cambridge

Selected Publications

Excluding those within large ($\gtrsim 10$ persons) collaborations.

90. Mori, K., Takiwaki, T., Kotake, K., **Horiuchi, S.**, 2024, *Two-dimensional models of core-collapse supernova explosions assisted by heavy sterile neutrinos*, submitted
89. Heston, S., **Horiuchi, S.**, Shirai, S., 2024, *Constraining neutrino-DM interactions with Milky Way dwarf spheroidals and supernova neutrinos*, submitted
88. Song, D., Eckner, C., Gordon, C., Calore, F., Macias, O., Abazajian, K., **Horiuchi, S.**, Kaplinghat, M., Pohl, M., 2024, *Robust inference of the Galactic centre gamma-ray excess spatial properties*, accepted for publication in MNRAS
87. Chauhan, G., **Horiuchi, S.**, Huber, P., Shoemaker, I., 2024, *Probing the Sterile Neutrino Dipole Portal with SN1987A and Low-Energy Supernovae*, submitted
86. Todarello, E., Regis, M., Bianchini, F., Singal, J., Branchini, E., Cowie, F., Heston, S., **Horiuchi, S.**, Lucero, D., Offringa, A., 2023, *Constraints on the origin of the radio synchrotron background via angular correlations*, accepted for publication in MNRAS
85. Kinugawa, T., **Horiuchi, S.**, Takiwaki, T., Kotake, K., 2023, *Fate of supernova progenitors in massive binary systems*, submitted

84. Carpio, J., Ekanger, N., Bhattacharya, M., Murase, K., **Horiuchi, S.**, 2023, *Quasithermal GeV neutrinos from neutron-loaded magnetized outflows in core-collapse supernovae: spectra and light curves*, submitted
83. Ekanger, N., **Horiuchi, S.**, Nagakura, H., Reitz, S., 2024, *Diffuse supernova neutrino background with up-to-date star formation rate measurements and long-term multidimensional supernova simulations*, Phys.Rev.D **109** (2024) 2, 023024
82. Chauhan, G., **Horiuchi, S.**, Huber, P., Shoemaker, I., 2023, *Low-Energy Supernovae Bounds on Sterile Neutrinos*, submitted. arXiv:2309.05860
81. Healy, S., **Horiuchi, S.**, Colomer, M., Milisavjevic, D., Tseng, J., Bergin, F., Weil, K., Tanaka, M., 2024, *Red Supergiant Candidates for Multimessenger Monitoring of the Next Galactic Supernova*, Mon.Not.Roy.Astron.Soc. **529** 3630
80. Ando, S., Ekanger, N., **Horiuchi, S.**, Koshi, Y., 2023, *Diffuse neutrino background from past core-collapse supernovae*, Proceedings of the Japan Academy, Series B, vol. 99, issue 10, pp. 460-479 [invited review article]
79. Mori, K., Takiwaki, T., Kotake, K., **Horiuchi, S.**, 2023, *Multi-messenger signals of heavy axionlike particles in core-collapse supernovae: 2D simulations*, Phys.Rev.D **108** (2023) 6, 063027
78. Ekanger, N., Bhattacharya, M., **Horiuchi, S.**, 2023, *Nucleosynthesis in outflows of compact objects and detection prospects of associated kilonovae*, Mon.Not.Roy.Astron.Soc. **525** (2023) 2040
77. Heston, S., Kehoe, E., Yudai, S., **Horiuchi, S.**, 2023, *Timing coincidence search for supernova neutrinos with optical transient surveys*, Phys.Rev.D **107** (2023) 12, 123034
76. Cowie, F., Offringa, A., Gehlot, B., Singal, J., Heston, S., **Horiuchi, S.**, Lucero, D., 2023, *Diffuse Sources, Clustering and the Excess Anisotropy of the Radio Synchrotron Background*, Mon.Not.Roy.Astron.Soc. **523** (2023) 4, 5034-5046
75. Bhattacharya, M., Carpio, J., Murase, K., **Horiuchi, S.**, 2023, *High-energy neutrino emission from magnetised jets of rapidly rotating protomagnetars*, Mon.Not.Roy.Astron.Soc. **521** 2391
74. Mori, K., Moriya, T., Takiwaki, T., Kotake, K., **Horiuchi, S.**, Blinnikov, S., 2023, *Light Curves and Event Rates of Axion Instability Supernovae*, Astrophys.J. **943** 1, 12
73. Roach, B., Rosslund, S., Ng, K., Perez, K., Beacom, J., Grefenstette, B., **Horiuchi, S.**, Krivonos, R., Wik, D., 2023, *Long-exposure NuSTAR constraints on decaying dark matter in the Galactic halo*, Phys.Rev.D **107** 2, 023009
72. Ekanger, E., **Horiuchi, S.**, Kotake, K., Sumiyoshi, K., 2022, *Impact of late-time neutrino emission on the Diffuse Supernova Neutrino Background*, Phys.Rev.D **106** 4, 043026
71. Ziegler, J., Edwards, T., Suliga, A., Tamborra, I., **Horiuchi, S.**, Ando, S., Freese, K., 2022, *Non-Universal Stellar Initial Mass Functions: Large Uncertainties in Star Formation Rates at $z \approx 2-4$ and Other Astrophysical Probes*, Mon.Not.Roy.Astron.Soc. **517**, 2471
70. Crocker, R., Macias, O., Mackey, D., Krumholz, M., Ando, S., **Horiuchi, S.**, Baring, M., Gordon, C., Venville, T., Duffy, A., Yang, R., Aharonian, F., Hinton, J., Song, D., Ruiter, A., Filipovic, M., 2022, *Gamma-ray emission from the Sagittarius dwarf spheroidal galaxy due to millisecond pulsars*, Nature Astron. **6**, 1317
69. Zimmer, F., Macias, O., Ando, S., Crocker, R., **Horiuchi, S.**, 2022, *The Andromeda Gamma-Ray Excess: Background Systematics of the Millisecond Pulsars and Dark Matter Interpreta-*

- tions, Mon.Not.Roy.Astron.Soc. **516**, 4469
68. Baum, S., Capozzi, F., **Horiuchi, S.**, 2022, *Rocks, Water and Noble Liquids: Unfolding the Flavor Contents of Supernova Neutrinos*, Phys.Rev.D **106** 12, 123008
 67. Ekanger, E., Bhattacharya, M., **Horiuchi, S.**, 2022, *Systematic exploration of heavy element nucleosynthesis in protomagnetar outflows*, Mon.Not.Roy.Astron.Soc. **513**, 405
 66. Mori, K., Takiwaki, T., Kotake, K., **Horiuchi, S.**, 2022, *Shock revival in core-collapse supernovae assisted by heavy axionlike particles*, Phys.Rev.D **105** 6, 063009
 65. Bhattacharya, M., **Horiuchi, S.**, Murase, K., 2022, *On the synthesis of heavy nuclei in protomagnetar outflows and implications for ultra-high energy cosmic rays*, Mon.Not.Roy.Astron.Soc. **514**, 6011
 64. Offringa, A., Singal, J., Heston, S., **Horiuchi, S.**, Lucero, D., 2021, *Measurement of the anisotropy power spectrum of the radio synchrotron background*, Mon.Not.Roy.Astron.Soc. **509**, 114
 63. Siegert, T., Crocker, R. M., Macias, O., Panther, F. H., Calore, F., **Horiuchi, S.**, Song, D., and Tomsick, J. A., 2021, *Galactic positrons from old stars in the bulge: measurement of propagation length*, Mon.Not.Roy.Astron.Soc.Lett. **509**, L11
 62. Macias, O., van Leijen, H., Song, D., Ando, S., **Horiuchi, S.**, 2021, *Cherenkov Telescope Array sensitivity to the putative millisecond pulsar population responsible for the Galactic center excess*, Mon.Not.Roy.Astron.Soc. **506** 1741
 61. Tapia-Arellano, N. & **Horiuchi, S.**, 2021, *Measuring solar neutrinos over gigayear timescales with paleo detectors*, Phys.Rev.D **103** 12, 123016
 60. Song, D., Macias, O., **Horiuchi, S.**, Crocker, R., Nataf, D., 2021, *Evidence for inverse Compton emission from globular clusters*, Mon.Not.Roy.Astron.Soc. **507**, 5161
 59. **Horiuchi, S.**, Kinugawa, T., Takiwaki, T., Kotake, K., 2021, *Binary interactions enhance the Diffuse Supernova Neutrino Background*, Phys.Rev.D **103** 4, 043003
 58. Tabrizi, Z. & **Horiuchi, S.**, 2021, *Flavor Triangle of the Diffuse Supernova Neutrino Background*, JCAP **05**, 011
 57. Zaizen, M., **Horiuchi, S.**, Takiwaki, T., Kotake, K., Yoshida, Y., Umeda, H., Cherry, J. F., 2021, *Three-flavor collective neutrino conversions with multi-azimuthal-angle instability in an electron-capture supernova model*, Phys.Rev.D **103** 6, 063008
 56. Nataf, D. M., **Horiuchi, S.**, Costa, G., Wyse, R. F. G., Ting, Y-S, Crocker, R., Federrath, C., 2020, *The Predicted Properties of Helium-Enriched Globular Cluster Progenitors at High Redshift*, Mon.Not.Roy.Astron.Soc. **496**, 3222
 55. Abazajian, K. N., **Horiuchi, S.**, Kaplinghat, M., Keeley, R. E., Macias, O., 2020, *Strong constraints on thermal relic dark matter from Fermi-LAT observations of the Galactic Center*, Phys.Rev.D **102** 4, 043012
 54. Cherry, J. F., Fuller, G. M., **Horiuchi, S.**, Kotake, K., Takiwaki, T., Fischer, T., 2020, *Time of Flight and Supernova Progenitor Effects on the Neutrino Halo*, Phys.Rev.D **102** 2, 023022
 53. Shirasaki, M., Macias, O., Ando, S., **Horiuchi, S.**, Yoshida, Y., 2020, *Cross Correlation of the Extragalactic Gamma-ray Background with Thermal Sunyaev-Zel'dovich Effect in the Cosmic Microwave Background*, Phys.Rev.D **101** 10, 103022
 52. Zaizen, M., Cherry, J. F., Takiwaki, T., **Horiuchi, S.**, Kotake, K., Umeda, H., Yoshida, Y., 2020, *Neutrino halo effect on collective neutrino oscillation in iron core-collapse supernova*

- model of a 9.6 solar mass star*, JCAP **06**, 0411
51. Roach, B. M., Ng, K. C. Y., Perez, K., Beacom, J. F., **Horiuchi, S.**, Krivonos, R., Wik, D. R., 2020, *NuSTAR Tests of Sterile-Neutrino Dark Matter: New Galactic Bulge Observations and Combined Impact*, Phys.Rev.D **101** 10, 103011
 50. Sasaki, H., Takiwaki, T., Kawagoe, S., **Horiuchi, S.**, Ishidoshiro, K., 2020, *Detectability of Collective Neutrino Oscillation Signatures in the Supernova Explosion of a $8.8 M_{\odot}$ star*, Phys.Rev.D. **101** 6, 063027
 49. Song, D., Macias, O., **Horiuchi, S.**, 2019, *Inverse-Compton emission from Millisecond Pulsars in the Galactic bulge*, Phys.Rev.D **99** 123020
 48. Macias, O., **Horiuchi, S.**, Kaplinghat, M., Gordon, C., Crocker, R. M., Nataf, D. M., 2019, *Strong Evidence that the Galactic Bulge is Shining in Gamma Rays*, JCAP **09**, 042
 47. Ng, K. C. Y., Roach, B. M., Perez, K., Beacom, J. F., **Horiuchi, S.**, Krivonos, R., Wik, D. R., 2019, *New Constraints on Sterile Neutrino Dark Matter from NuSTAR M31 Observations*, Phys.Rev.D **99** 083005.
 46. Ammazzalorso, S., Fornengo, N., **Horiuchi, S.**, Regis, M., 2018, *Characterizing the local gamma-ray Universe via angular cross-correlations*, Phys.Rev.D **98** no.10, 103007
 45. Hashimoto, D., Nishizawa, A. J., Shirasaki, M., Macias, O., **Horiuchi, S.**, Tashiro, H., Oguri, M., 2018, *Measurement of redshift dependent cross correlation of HSC clusters and Fermi gamma rays*, Mon.Not.Roy.Astron.Soc. **484**, 5256
 44. Shirasaki, M., Macias, O., **Horiuchi, S.**, Yoshida, Y., Lee, C. H., Nishizawa, A., 2018, *The correlation of extragalactic gamma-rays with cosmic matter density distributions from weak-gravitational lensing*, Phys.Rev.D **97** no.12, 123015
 43. Zhang, B. T., Murase, K., Kimura, S. S., **Horiuchi, S.**, Meszaros, P., 2018, *Low-luminosity gamma-ray bursts as the sources of ultrahigh-energy cosmic ray nuclei*, Phys.Rev.D **97** no.8, 083010
 42. Wang, W-Y, Cherry, J. F., **Horiuchi, S.**, Strigari, L. E., 2017, *Bounds on Resonantly-Produced Sterile Neutrinos from Phase Space Densities of Milky Way Dwarf Galaxies*, arXiv:1712.04597, submitted to Phys.Rev.D
 41. **Horiuchi, S.**, Sumiyoshi, K., Nakamura, K., Fischer, T., Summa, A., Takiwaki, T., Janka, H. T., Kotake, K., 2018, *Diffuse Supernova Neutrino Background from extensive core-collapse simulations of $88-100M_{\odot}$ - $100M_{\odot}$ progenitors*, Mon.Not.Roy.Astron.Soc. **475**, 1363
 40. Nikrant, A., Laha, R., **Horiuchi, S.**, 2018, *Robust measurement of supernova ν_e spectra with future neutrino detectors*, Phys.Rev.D **97**, 023019
 39. Canac, N. E., Abazajian, K. N., Tajima, T., Ebisuzaki, T., **Horiuchi, S.**, 2020, *Observational Signatures of Gamma Rays from Bright Blazars and Wakefield Theory*, Mon.Not.Roy.Astron. Soc. **493**, 2229
 38. **Horiuchi, S.**, Kneller, J., 2018, *What can be learned from a future supernova neutrino detection?*, J.Phys.G **45** no. 4, 043002 [Invited review article]
 37. **Horiuchi, S.**, Nakamura, K., Takiwaki, T., Kotake, K., 2017, *Estimating the core compactness of massive stars with Galactic supernova neutrinos*, J.Phys.D **44** no.11, 114001
 36. Cherry, J. F., **Horiuchi, S.**, 2017, *Closing in on Resonantly Produced Sterile Neutrino Dark Matter*, Phys.Rev.D **95**, 083015
 35. Macias, O., Gordon, C., Crocker, R., Coleman, B., Paterson, D., **Horiuchi, S.**, Pohl, M.,

- 2018, *Discovery of Gamma-Ray Emission from the X-shaped Bulge of the Milky Way*, Nature Astron. no. 5, 387-392
34. Perez, K., Ng, K., Beacom, J., Hersh, C., **Horiuchi, S.**, Krivonos, R., 2017, *(Almost) Closing the Sterile Neutrino Dark matter Window with NuSTAR*, Phys.Rev.D **95**, 123002
 33. Ankowski, A., Beacom, J., Benhar, O., Chen, S., Cherry, J., Cui, Y., Friedland, A., Botella, I., Haghghat, A., **Horiuchi, S.** (corresponding author), Huber, P., Kneller, J., Laha, R., Li, S., Link, J., Lovato, A., Macias, O., Mariani, C., Mezzacappa, A., O'Connor, E., O'Sullivan, E., Rubbia, A., Scholberg, K., Takeuchi, T., 2016, *Supernova Physics at DUNE*, arXiv:1608.07853
 32. Shirasaki, M., Macias, O., **Horiuchi, S.**, Shirai, S., Yoshida, Y., 2016, *Cosmological constraints on dark matter annihilation and decay: Cross-correlation analysis of the extragalactic gamma-ray background and cosmic shear*, Phys.Rev.D **94**, 063522
 31. **Horiuchi, S.**, Kaplinghat, M., Kwa, A., 2016, *Investigating the Uniformity of the Excess Gamma rays towards the Galactic Center Region*, JCAP **11**, 053
 30. **Horiuchi, S.**, Macias, O., Restrepo, D., Rivera, A., Zapata, O., Silverwood, H., 2016, *The Fermi-LAT gamma-ray excess at the Galactic Center in the singlet-doublet fermion dark matter model*, JCAP **03**, 048
 29. Nakamura, K., **Horiuchi, S.**, Tanaka, M., Hayama, K., Takiwaki, T., Kotake, K., 2016, *Multi-messenger signals of long-term core-collapse supernova simulations: synergetic observation strategies*, Mon.Not.Roy. Astron.Soc. **461**, 3296
 28. Bozek, B., Boylan-Kolchin, M., **Horiuchi, S.**, Garrison-Kimmel, S., Abazajian, K. N., Bullock, J. S., 2016, *Resonant Sterile Neutrino Dark Matter in the Local and High-z Universe*, Mon.Not.Roy.Astron.Soc. **459**, 1489
 27. **Horiuchi, S.**, Bozek, B., Abazajian, K. N., Boylan-Kolchin, M., Bullock, J. S., Garrison-Kimmel, S., Onorbe, J., 2016, *Properties of Resonantly Produced Sterile Neutrino Dark Matter Subhalos*, Mon.Not.Roy.Astron.Soc. **456**, 4346
 26. Shirasaki, M., **Horiuchi, S.**, Yoshida, Y., 2015, *Cross-Correlation of the Extragalactic Gamma-ray Background with Luminous Red Galaxies*, Phys.Rev.D **92**, 123540
 25. Ng, K. C. Y., **Horiuchi, S.**, Gaskins, J., Smith, M., Preece, R., 2015, *Improved Limits on Sterile Neutrino Dark Matter using Full-Sky Fermi-GBM Data*, Phys.Rev.D **92**, 043503 [Selected Editors' Suggestion]
 24. Abazajian, K. N., Canac, N., **Horiuchi, S.**, Kaplinghat, M., Kwa, A., 2015, *Discovery of a New Galactic Center Excess Consistent with Upscattered Starlight*, JCAP **07**, 013
 23. **Horiuchi, S.**, Nakamura, K., Takiwaki, T., Kotake, K., Tanaka, M., 2014, *The red supergiant and supernova rate problems: implications for core-collapse physics*, Mon.Not.Roy. Astron.Soc.Lett. **445**, L99
 22. Bell, N. F., **Horiuchi, S.**, Shoemaker, I. M., 2015, *Annihilating Asymmetric Dark Matter*, Phys.Rev.D **91**, 023505
 21. Garrison-Kimmel, S., **Horiuchi, S.**, Abazajian, K. N., Bullock, J. S., Kaplinghat, M., 2014, *Running with BICEP2: Implications for Small-Scale Problems in CDM*, Mon.Not. Roy.Astron.Soc. **444**, 961
 20. Shirasaki, M., **Horiuchi, S.**, Yoshida, Y., 2014, *Cross-Correlation of Cosmic Shear and Extragalactic Gamma-ray Background: Constraints on the Dark Matter Annihilation Cross-Section*, Phys.Rev.D **90**, 063502

19. Abazajian, K. N., Canac, N., **Horiuchi, S.**, Kaplinghat, M., 2014, *Astrophysical and Dark Matter Interpretations of the Extended Gamma-Ray Emission from the Galactic Center*, Phys.Rev.D **90**, 023526】
18. **Horiuchi, S.**, Humphrey, P. J., Onorbe, J., Kaplinghat, M., 2014, *Sterile neutrino dark matter bound from galaxies of the Local Group*, Phys.Rev.D **89**, 025017
17. Lacki, B., **Horiuchi, S.**, Beacom, J. F., 2014, *The Star-Forming Galaxy Contribution to the Cosmic MeV and GeV Gamma-Ray Background*, Astrophys.J. **786**, 40
16. Ng, K. C. Y., Laha, R., Campbell, S., **Horiuchi, S.**, Dasgupta, B., Murase, K., Beacom, J. F., 2014, *Resolving Small-Scale Dark Matter Structures Using Multi-Source Indirect Detection*, Phys.Rev.D **89**, 083001
15. Laha, R., Beacom, J. F., Dasgupta, B., **Horiuchi, S.**, Murase, K., 2013, *Demystifying the PeV Cascades in IceCube: Less (Energy) is More (Events)* Phys.Rev.D **88**, 043009
14. **Horiuchi, S.**, Beacom, J. F., Bothwell, M., Thompson, T. A., 2013, *Effects of stellar rotation on star formation rates and comparison to CCSN rates*, Astrophys.J. **769**, 113
13. Kashiyama, K., Murase, K., **Horiuchi, S.**, Gao, S., Meszaros, P., 2013, *High energy neutrino and gamma ray transients from relativistic supernova shock breakout*, Astrophys.J.Lett. **769**, L6
12. Laha, R., Ng, K. C. Y., Dasgupta, B., **Horiuchi, S.**, 2013, *Galactic Center Radio Constraints on Gamma-Ray Lines from Dark Matter Annihilation*, Phys.Rev.D **87**, 043516
11. **Horiuchi, S.**, Murase, K., Ioka, K., Meszaros, P., 2012, *The survival of nuclei in jets associated with core-collapse supernovae*, Astrophys.J. **753**, 69
10. **Horiuchi, S.**, Beacom, J. F., Kochanek, C. S., Prieto, J. L., Stanek, K. Z., Thompson, T. A., 2011, *The cosmic core-collapse supernova rate does not match the massive-star formation rate*, Astrophys.J. **738**, 154
9. Metzger, B. D., Giannios, D., **Horiuchi, S.**, 2011, *Heavy nuclei synthesized in Gamma-Ray Bursts outflows as the source of UHECRs*, Mon.Not.Roy.Astron.Soc. **415**, 2495
8. Takami, H., **Horiuchi, S.**, 2011, *The Production of Ultra High Energy Cosmic Rays during the Early Epochs of Radio-loud AGN*, Astropart.Phys. **34**, 749
7. **Horiuchi, S.** & Beacom, J. F., 2010, *Revealing Type Ia supernova physics with cosmic rates and nuclear gamma rays*, Astrophys.J. **723**, 329-341
6. Dasgupta, B., Fischer, T., **Horiuchi, S.**, Liebendorfer, M., Mirizzi, A., Sagert, I., Schaffner-Bielich, J., 2010, *Detecting the QCD phase transition in the next Galactic supernova neutrino burst*, Phys.Rev.D **81**, 103005
5. **Horiuchi, S.**, Beacom, J. F., Dwek, E., 2009, *The Diffuse Supernova Neutrino Background is detectable in Super-Kamiokande*, Phys.Rev.D **79**, 083013
4. **Horiuchi, S.**, Suwa, Y., Takami, H., *et. al.*, 2008, *Nonthermal neutrinos from supernovae leaving a magnetar*, Mon.Not.Roy.Astron.Soc. **391**, 1893
3. **Horiuchi, S.** & Ando, S., 2008, *High-energy neutrinos from reverse shocks in choked and successful relativistic jets*, Phys.Rev.D **77**, 063007
2. Yuksel, H., **Horiuchi, S.**, Beacom, J. F., *et. al.*, 2007, *Neutrino Constraints on the Dark Matter Total Annihilation Cross Section*, Phys.Rev.D **76**, 123506
1. **Horiuchi, S.** & Ando, S., 2006, *Dark matter annihilation from intermediate-mass black holes:*

Selected Conference Talks (invited only)

64. 01/2024, *Mineral Detection of Neutrinos and Dark Matter 2024*, online
63. 12/2023, *Sixth Joint Meeting of the Nuclear Physics Divisions of the APS and JPS*, Waikoloa, USA
62. 08/2023, *New Evolution of Multi-Messenger Astrophysics*, Penn State, USA
61. 06/2023, *Particle Physics and Cosmology 2023*, IBS, South Korea
60. 05/2023, *International Conference on Supernova Neutrino Detection*, Gran Sasso National Laboratory, Italy
59. 02/2022, *Kobayashi-Maskawa Institute for the Origin of Particles and the Universe Winter School*, online
58. 09/2022, *NNN 2022*, Hida, Japan
57. 09/2022, *The 2nd DM-Net International Symposium*, Heidelberg, Germany
56. 08/2022, *Supernova Brainstorm Workshop 2022*, Wroclaw, Poland
55. 07/2022, *Multi-messenger Study of Heavy Dark Matter*, YITP, Japan
54. 04/2022, *Symposium on Gravitational wave physics and astronomy: Genesis*, YITP, Japan
53. 03/2022, *Neutrinos as a Portal to New Physics and Astrophysics*, KITP, USA
52. 09/2021, *The Physical Society of Japan Autumn Conference*, online
51. 08/2021, *Multimessenger Study of Heavy Dark Matter*, online
50. 06/2021, *Materia Oscura en Colombia Workshop*, online
49. 05/2021, *SNEWS 2021 Meeting*, online
48. 12/2020, *Snowmass: workshop on supernova and early universe neutrinos*, online
47. 01/2020, *Recontres du Vietnam: Theory meeting experiments*, Vietnam
46. 12/2019, *32nd Rironkon Symposium*, NAOJ, Japan
45. 12/2019, *TeV Particle Astrophysics 2019*, Sydney, Australia
44. 10/2019, *New Horizons in Galactic Center Astronomy and Beyond*, Tokyo, Japan
43. 07/2019, *Lepton-Nucleon Scattering*, Elba, Italy
42. 05/2019, *Fifty One Ergs 2019*, North Carolina State University, USA
41. 03/2019, *32rd Neutrino Workshop*, ICRR, Tokyo
40. 10/2018, *8th Fermi Symposium*, Baltimore, USA
39. 10/2018, *Joint IPMU-KEK-IPPP-Duham-KIAS workshop: Beyond the BSM*, Japan
38. 10/2018, *Genesis*, Toyama, Japan
37. 09/2018, *Neutrino Oscillation Workshop 2018*, Ostuni, Italy
36. 09/2018, *Anisotropic Universe*, Torino, Italy
35. 04/2018, *DM: paradigm confirmation or shift?*, KITP, USA
34. 02/2018, *Pacific 2018*, Hokkaido, Japan
33. 06/2017, *Fifty One Ergs 2017*, Oregon State University, USA

32. 05/2017, *NEUCOS 2017*, DESY, Germany
31. 03/2017, *Neutrinos: the quest for a new physics scale*, CERN
30. 02/2017, *30 years from SN1987A and the future*, University of Tokyo, Japan
29. 01/2017, *American Physical Society April Meeting*, Washington DC, USA
28. 12/2016, *8th Symposium on Large TPCs for Low Energy Rare Events*, Paris, France
27. 12/2016, *Fifth AMON Workshop*, Penn State University, USA
26. 08/2016, *38th International Conference on High Energy Physics*, Chicago, USA
25. 06/2016, *Multi-messenger Approaches to CRs: Origins and Space Frontiers*, Penn State University, USA
24. 06/2016, *Lepton-Nucleon Scattering XIV*, Elba, Italy
23. 03/2016, *The Astronomical Society of Japan Spring Conference*, Tokyo, Japan
22. 01/2016, *The Second Supernova Neutrino Workshop*, Toyama, Japan
21. 12/2015, *Gamma rays and Dark Matter 2015*, Obergurgl, Austria
20. 06/2015, *Particle Physics and Cosmology 2015*, Deadwood, South Dakota, USA
19. 06/2015, *Neutrino Astrophysics and Fundamental Properties*, Institute for Nuclear Theory, University of Washington, USA
18. 05/2015, *Astrophysics with Hyper-Kamiokande*, Kobe University, Japan
17. 05/2015, *DM Searches with the EGB*, University of Tokyo, Japan
16. 12/2014, *Present and Future Neutrino Physics*, KITP, USA
15. 04/2014, *APS April Meeting*, Savanna, USA
14. 02/2014, *Cosmic Neutrino PeVatron*, Chiba, Japan
13. 12/2013, *Multi-Messengers from Core-Collapse Supernovae*, Fukuoka, Japan
12. 11/2013, *MACROS*, Institut d'Astrophysique de Paris, France
11. 11/2013, *NNN 2014*, Kavli IPMU, Japan
10. 09/2013, *PACIFIC 2013*, Moorea, French Polynesia
9. 04/2013, *Second PANDA Symposia series: Wide-field astronomy*, Xi'an, China
8. 01/2013, *Dark Matter in Southern California*, Caltech, USA
7. 08/2012, *International Open Meeting for the Hyper-Kamiokande Project*, Kavli IMPU, Japan
6. 08/2012, *GeV Neutrino workshop*, Ohio State University, USA
5. 04/2011, *CCAPP Symposium*, Ohio State University, USA
4. 02/2011, *SnowPAC 2011*, Snowbird, USA
3. 12/2010, *NNN 2010*, Toyama, Japan
2. 10/2009, *CCAPP Inaugural Symposium*, Ohio State University, USA
1. 06/2009, *Dark side of the Universe*, University of Melbourne, Australia

Mentoring

Postdoc mentoring: 8 total

- 2023 – Gonzalo Herrera
- 2022 – Garv Chauhan
- 2020 – 2021 Francesco Capozzi (→ Faculty at University of L’Aquila)
- 2020 – 2021 Mukul Bhattacharya (→ Eberly Research Fellow at Penn State University)
- 2020 – 2021 Zahra Tabrizi (→ NTN Research Fellow at Northwestern University)
- 2019 – 2022 Natalia Tapia (→ Postdoct at University of Utah)
- 2015 – 2018 Oscar Macias (→ Faculty at San Francisco State University)
- 2015 – 2017 John Cherry (→ Postdoct at University of South Dakota)

Graduate mentoring: 15 total

- 2023 – Xioalin Qi (Virginia Tech)
- 2023 – Andrew Caruso (Virginia Tech)
- 2021 – Sarah Healy (Virginia Tech)
- 2020 – Sean Heston (Virginia Tech)
- 2019 – Nick Ekanger (Virginia Tech)
- 2018 – 2021 Varun Mathur (Virginia Tech, with Ian Shoemaker)
- 2018 – 2021 Tommy Lam (Virginia Tech → Belle II)
- 2016 – 2021 Deheng Song (Virginia Tech → YITP, Japan)
- 2016 – 2019 Chris Castillo (Virginia Tech, with Duncan Farrah → finance)
- 2015 – 2017 Jonathan Baker (Virginia Tech → defense)
- 2013 – 2016 Anna Kwa (UC Irvine, with Manoj Kaplinghat → data science)
- 2013 – 2015 Nicolas Canac (UC Irvine, with Kevork Abazajian → data science)
- 2011 – 2015 Nathan Griffith (Ohio State University, with Amy Connolly → defense)
- 2011 – 2013 Ranjan Laha (Ohio State University, with John Beacom → Stanford University)
- 2010 – 2015 Kenny Ng (Ohio State University, with John Beacom → Weizmann Institute)

Undergraduate mentoring: 26 total

- 2024 – Aileen Aizenshtat (Virginia Tech)
- 2023 – Maria Carrillo (Virginia Tech)
- 2022 – 2023 Alex Drummond (Virginia Tech)
- 2021 Sami Reitz (Radford University), REU student
- 2020 – 2024 Zachary Hoelscher (Virginia Tech → Vanderbilt)
- 2020 – 2021 Nathan Rand (Virginia Tech)
- 2020 Emily Kehoe (Clarkson University → UCLA), REU student
- 2019 – 2020 Youyou Li (Virginia Tech → University of Copenhagen)
- 2019 Grace Dunleavy (Drake University), REU student
- 2018 – 2020 Lia Compton (Virginia Tech → Colorado State University)
- 2018 – 2019 Ahmad Abushaban (Virginia Tech → consulting)
- 2018 – 2019 Nick Ekanger (Virginia Tech → Virginia Tech)
- 2018 – 2019 Andrew Walker (Virginia Tech → Virginia Tech)
- 2018 Zeshen Li (Virginia Tech → Columbia University)
- 2018 Duncan Jones (Virginia Tech → industry)

2017 – 2018 Matthew La Rosa (Virginia Tech → industry)
 2017 – 2018 Kaiyang Zhang (Virginia Tech → industry)
 2017 Christian Gilbertson (Virginia Tech → Penn State University)
 2017 Joseph Weissman (Virginia Tech → industry)
 2017 Carlos Magana (Virginia Tech → education)
 2016 – 2017 Alex Nikrant (Virginia Tech → Virginia Tech)
 2016 George Lewandowski (Virginia Tech)
 2015 – 2017 Alex Gagliano (Virginia Tech → University of Illinois at Urbana-Champaign)
 2015 Bryan Calloway (Virginia Tech → Cornell University)
 2015 – 2016 Laura Wishart (Virginia Tech → Virginia Tech)
 2015 – 2016 Keegan Walkup (Virginia Tech → Virginia Tech)

Courses Taught

2024 PHYS 4654/5654: *Modern Cosmology*
 2023 PHYS 4664/5664: *Astroparticle Physics*
 2023 PHYS 5455: *Graduate quantum mechanics*
 2022 PHYS 4984/5984: *SS: Astroparticle Physics*
 2021 PHYS 4654/5654: *Modern Cosmology*
 2020 PHYS 4984/5984: *SS: Astroparticle Physics*
 2020 PHYS 4654/5654: *Modern Cosmology*
 2019 PHYS 4984/5984: *SS: Astroparticle Physics*
 2019 PHYS 4654/5654: *Modern Cosmology*
 2019 PHYS 4455: *Introduction to quantum mechanics Part I*
 2018 PHYS 4455, 4456: *Introduction to quantum mechanics Parts I & II*
 2017 PHYS 4455, 4456: *Introduction to quantum mechanics Parts I & II*
 2016 PHYS 4455, 4456: *Introduction to quantum mechanics Parts I & II*
 2015 PHYS 4455, 4456: *Introduction to quantum mechanics Parts I & II*

Selected Professional Service

2023 – 2024 Member of HHMI Inclusive Excellence team, Virginia Tech
 2023 – 2024 Organizer of topical workshop at the Mainz Institute for Theoretical Physics
 2023 – Seminar coordinator, Virginia Tech
 2023 International Scientific Council for workshop at Institut Henri Poincare
 2023 Panel Reviewer (NSF)
 2020, 2021 Panel Reviewer (Dean's Discovery Fund)
 2020 Panel Reviewer (DOE)
 2020 Panel Reviewer (Sloan Foundation)
 2019 International Advisory Committee for *SNEWS2.0 Workshop*
 2018 Co-organizer of NuFACT 2018, Virginia Tech
 2018 Member of advisor board of **OneVoice**
 2018 Panel Reviewer (NSF)
 2016 Organizer of *Supernova Physics at DUNE* workshop, Virginia Tech
 2016 Panel Reviewer (NASA)
 2015 Organizer of *Multi-messengers from core-collapse supernovae 2015*, Virginia Tech
 2014 – 2018 Seminar coordinator, Virginia Tech
 2014 Chair of *Supernovae and Gamma Ray Bursts* session, APS April meeting

- 2013 Co-organizer of *TeV Particle Astrophysics 2013*, UC Irvine
- 2012 Co-organizer of *Revealing Deaths of Massive Stars with GeV-TeV Neutrinos*, Ohio State University
- 2011 – 2012 Seminar coordinator, Ohio State University
- 2011 Co-organizer of *CCAPP Symposium: Unraveling the Nature of the Universe with Current and Future Datasets*, Ohio State University
- 2010 – 2012 Founder and organizer of *Astro Lunch*, Ohio State University
- 2009 – Referee for *Astrophysical Journal*, *Astrophysical Journal Letter*, *Astrophysical Journal Supplement*, *Physical Review D*, *Nature Physics*, *Physical Review Letters*, and *Monthly Notices of the Royal Astronomical Society*