

Education

- 2012–2015 **University of Wisconsin at Madison**,
PhD. in Physics.
- 2009–2012 **Pontificia Universidad Católica del Perú**,
M. Sc. in Physics.
- 2004–2008 **Pontificia Universidad Católica del Perú**,
Ba. Sc. in Physics.

Professional Experience

- Jul. 2020 – **Assistant Professor**, HARVARD UNIVERSITY.
Ongoing Department of Physics, Faculty of Arts and Sciences
- Oct. 2015 – **Postdoctoral Research Associate**, MASSACHUSETTS INSTITUTE OF TECHNOLOGY.
Jul. 2020 Researcher in Professor Janet Conrad's group.
- Jul. 2012 – **Research Assistant**, UNIVERSITY OF WISCONSIN - MADISON.
Aug. 2015 Research assistant under the supervision of Professor Francis Halzen.
- Mar. 2010 – **Research Assistant**, PONTIFICIA UNIVERSIDAD CATÓLICA DEL PERÚ.
Jul. 2012 Research assistant under the supervision of Professor Alberto Gago.
- Mar. 2010 – **Teacher**, COLEGIO SANTA MARGARITA.
Dec. 2010 High school physics teacher.
- Mar. 2007 – **Teaching Assistant**, PONTIFICIA UNIVERSIDAD CATÓLICA DEL PERÚ.
Dec. 2011 Teaching assistant in undergraduate courses.

Awards and Fellowships

- 2021 International Union of Pure and Applied Physics Young Scientist Prize in Astroparticle Physics for “fundamental experimental and phenomenological contributions to neutrino physics through IceCube.”
- 2021 Sloan Research Fellow (awarded 75,000 US\$).
- 2020 IceCube Collaboration Impact Award for “for key contributions in the development of a suite software tools used broadly in IceCube analyses, and his leading efforts in the advancement of diversity, equity and inclusion within the collaboration.”
- 2017 American Physical Society Division of Astroparticle Physics thesis award finalist.
- 2015–2020 Wisconsin IceCube Particle Astrophysics Center (WIPAC) Honorary Fellow.
- 2011 Fermilab Theory Group Latin American Fellow.
- 2007–2008 Scholarships to spend a summer semesters at *Instituto de Matemática Pura e Aplicada* (IMPA).
- 2006 Scholarships for outstanding performance in physics to continue his undergraduate and graduate studies in physics at *Pontificia Universidad Católica del Perú*.

Collaboration Leadership, Community Involvement, and Outreach

- Oct. 2018 – **Beyond the Standard Model Working Group Technical Leader**, ICECUBE COLLABORATION.
ongoing
- May 2017 – **IceCube Diversity Taskforce Member**, ICECUBE COLLABORATION.
ongoing
- 2021 – **IAIFI Affiliate Member**, NSF AI Institute for Artificial Intelligence and Fundamental Interactions.
ongoing
- 2022 – 2023 **Severo Ochoa Associate**, *Institute of Theoretical Physics in Madrid (IFT) visiting scientist supported by the Severo Ochoa Excellence Grant (SO).*

2020, 2021 **Judge, ENVISION: Female STEM competition.**

ENVISION is a semester-long research competition that encourages female high school students interested in STEM to apply their scientific knowledge in an area of their interest. Competitors must work in groups of four or less to write a research proposal.

2016 **El Universo es Tuyo, ICECUBE COLLABORATION SPANISH MASTER CLASS.**
Outreach activity for Spanish speakers.

2020-2022 **Particle Physics Community Planning Exercise (a.k.a. "Snowmass").**

- Editor and main contributor in: WHITE PAPER ON LIGHT STERILE NEUTRINO SEARCHES AND RELATED PHENOMENOLOGY and NEW PHYSICS WITH ASTROPHYSICAL NEUTRINO FLAVOR.
- Contributor to the following *White Papers*: QUANTUM COMPUTING FOR DATA ANALYSIS IN HIGH-ENERGY PHYSICS, HIGH-ENERGY AND ULTRA-HIGH-ENERGY NEUTRINOS, TAU NEUTRINOS IN THE NEXT DECADE: FROM GEV TO EEV, and THE PHYSICS OF LIGHT RELICS.
- Contributor to the following *Letters Of Interest*: OPPORTUNITIES AND SIGNATURES OF NON-MINIMAL HEAVY NEUTRAL LEPTONS, NuSTE: GLOBAL LIGHT STERILE NEUTRINO FITS, BSM NEUTRINO OSCILLATION SEARCHES WITH 1-100 TEV ATMOSPHERIC NEUTRINOS AT ICECUBE, COSMIC NEUTRINO PROBES OF FUNDAMENTAL PHYSICS, NEUTRINO NON-STANDARD INTERACTIONS, NEUTRINOS AS PROBES FOR LORENTZ AND CPT SYMMETRY, LETTER OF INTEREST ON DARK MATTER PHYSICS WITH THE ICECUBE NEUTRINO OBSERVATORY, AN ANDEAN DEEP-VALLEY DETECTOR FOR HIGH-ENERGY TAU NEUTRINOS, NEW PHYSICS WITH ASTROPHYSICAL NEUTRINO FLAVOR, OBSERVING THE HIGH-ENERGY SUN, ICECUBE AND ICECUBE-GEN: QUANTUM COMPUTING OPPORTUNITIES, and A COMPREHENSIVE EFT GLOBAL FIT IN THE NEUTRINO OSCILLATION EXPERIMENT.

Journal Referee.

Referee for JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS, JOURNAL OF HIGH ENERGY PHYSICS, EUROPEAN PHYSICAL JOURNAL C, INTERNATIONAL JOURNAL OF MODERN PHYSICS A, MODERN PHYSICS LETTERS A, PHYSICS LETTERS B, and PHYSICAL REVIEW LETTERS

Grant Review.

Referee for NATIONAL SCIENCE FOUNDATION and FWF AUSTRIAN SCIENCE FUND

Workshop and Conference Organizations.

co-organizer of ICEDUNE Workshop, 2021

Member of the American Physical Society.

Teaching Experience

International Schools and Workshops

Aug. 2021 **International Neutrino Summer School**, Geneva, Switzerland.

Invited lecturer on high-energy neutrino particle astrophysics.

May. 2021 **Standard model Extension Summer School**, Bloomington, Indiana, USA.

Invited lecturer experimental searches for Lorentz symmetry violation with neutrinos.

Aug. 2019 **ICTP-SFAIR School on High-Energy Astrophysics**, São Paulo, Brazil.

Invited lecturer on high-energy neutrino physics. Developed course syllabus and practical exercises.

Undergraduate Level Teaching

Sept. 2021 – **Harvard University**, Cambridge, MA, USA.

Dec. 2021 Main lecturer of Elementary Particle Physics (PHYS145). Instructor evaluation: N/A.

Jan. 2021 – **Harvard University**, Cambridge, MA, USA.

May. 2021 Main lecturer of Electricity and Magnetism (PHYS15b). Instructor Evaluation: 4.51/5.00

Mar. 2007 – **Pontificia Universidad Católica del Perú**, Lima, Peru.

Dec. 2011 Teaching assistant in the General Science Studies, General Humanity Studies, and Science and Engineering departments. In these departments I was a teaching assistant of the following classes:

- In General Science Studies: Calculus 2, Calculus 4, General Physics 2, and Introduction to University Physics;
- In Science and Engineering: Probability, Probability and statistics, Computational techniques in physics, and Elementary particles;
- In General Humanity Studies: Cosmology and Introduction to experimental sciences.

High School Level Teaching

Mar. 2010 – **Colegio Santa Margarita**, Lima, Peru.

Dec. 2010 Was responsible of general physics for two senior high school classes of thirty students each. Designed syllabus of lectures, evaluations, and laboratory classes.

Invited Seminars and Talks

- 2022 QUEEN'S UNIVERSITY AT KINGSTON, Kingston, Ontario, Canada.
Colloquia
- 2021 COLUMBIA UNIVERSITY, New York City, New York, USA; KAVLI INSTITUTE FOR THEORETICAL PHYSICS, Santa Barbara, California, USA
Seminars
- 2021 HARVARD-SMITHSONIAN CENTER FOR ASTROPHYSICS, Cambridge, Massachusetts, USA.
Colloquia
- 2021 OHIO STATE UNIVERSITY, Columbus, Ohio, USA; VIRGINIA TECH, Blacksburg, Virginia, USA; KING'S COLLEGE LONDON, London, UK; KAVLI IPMU, Kashiwa, Japan; BOGAZICI UNIVERSITY, Istanbul, Turkey.
Seminars
- 2020 CASE WESTERN RESERVE UNIVERSITY, Cleveland, Ohio, USA; PABNA UNIVERSITY OF SCIENCE AND TECHNOLOGY, Pabna, Bangladesh.
Colloquia
- 2020 MICHIGAN STATE UNIVERSITY, East Lansing, Michigan, USA.
Seminars
- 2019 SUNGKYUNKWAN UNIVERSITY, Seoul, Korea; UNIVERSIDADE ESTADUAL PAULISTA AND ICTP-SAIFR, Sao Paulo, Brazil.
Colloquia
- 2019 UNIVERSITÉ LIBRE DE BRUXELLES, Brussels, Belgium; LOS ALAMOS NATIONAL LABORATORY, Los Alamos, NM, USA; FERMI LAB LPC PHYSICS FORUM, Batavia, IL, USA; DURHAM UNIVERSITY, Durham, UK; HARVARD, Cambridge, MA, USA; MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, MA, USA; RUTGERS UNIVERSITY, New Brunswick, NJ, USA; PONTIFICIA UNIVERSIDAD CATÓLICA DEL PERÚ, Lima, Peru.
Seminars
- 2019 INVISIBLE NETWORK, Europe.
Webinars
- 2018 NIELS BOHR INSTITUTE, Copenhagen, Denmark.
Seminars
- 2017 MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, MA, USA; WAYNE STATE UNIVERSITY, Detroit, MI, USA; FERMI LAB THEORY GROUP, Batavia, IL, USA; DESY-ZEUTHEN, Berlin, Germany.
Seminars
- 2016 UNIVERSITY OF WASHINGTON, Seattle, WA, USA; BROOKHAVEN NATIONAL LABORATORY, Upton, NY, USA; INSTITUTO DE FÍSICA CORPUSCULAR, Valencia, Spain; YALE WRIGHT LABORATORY, New Haven, CT, USA; CALIFORNIA INSTITUTE OF TECHNOLOGY, Pasadena, CA, USA; COLUMBIA UNIVERSITY, New York City, NY, USA; UNIVERSITY OF MICHIGAN AT ANN ARBOR, Ann Arbor, MI, USA; SLAC NATIONAL ACCELERATOR LABORATORY, Menlo Park, CA, USA; NORTHWESTERN UNIVERSITY, Evanston, IL, USA; OHIO STATE UNIVERSITY, Columbus, OH, USA.
Seminars
- 2016 LATIN AMERICAN WEBINARS ON PHYSICS, America.
Webinars
- 2015 HARVARD, Cambridge, MA, USA; MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, MA, USA; PENNSYLVANIA STATE UNIVERSITY, College Park, PA, USA.
Seminars

Conferences and Workshops

Invited Plenary Talks

- Sep. 2021 **nuFACT**, Cagliari, Italy.
- Sep. 2021 **NuTau2021**, Brookhaven National Laboratory, USA.
- Aug. 2018 **TeVPA2018**, Berlin, Germany.

Plenary Talks

- May 2019 **Eight Meeting on CPT and Lorentz Symmetry**, Bloomington, IN, USA.
- Aug. 2018 **nuFACT**, Blacksburg, VA, USA.
- Jun. 2017 **Rencontre du Vietnam**, Quy Nhon, Vietnam.
- Jun. 2016 **Seventh Meeting on CPT and Lorentz Symmetry**, Bloomington, IN, USA.

Invited Parallels

- Jul. 2021 **Sterile Neutrino Search at Underground Detectors**, Institute for Basic Science, Korea.
- Apr. 2021 **American Physical Society April Meeting**, Online format, USA.
- Mar. 2021 **Workshop on Interplay of Neutrino and Dark matter Experiments and Exotic Searches**, Nagoya, Japan.
- Oct. 2019 **Neutrino Platform Week**, CERN, Geneva, Switzerland.
- Sep. 2019 **NEPLES**, KIAS, Seoul, Korea.
- Jun. 2019 **Rencontres de Blois**, Blois, France.
- Jun. 2019 **Workshop on Non-standard Interactions in Neutrino Experiments**, St. Louis, MO, USA.
- Jun. 2018 **PANE**, ICTP, Trieste, Italy.
- Mar. 2017 **PINS**, SLAC, Menlo Park, CA, USA.
- Jan. 2017 **American Physical Society April Meeting**, District of Columbia, USA.
- Sep. 2016 **TeVpa**, CERN, Geneva, Switzerland.
- Apr. 2016 **American Physical Society April Meeting**, Salt Lake City, Utah, USA.

Parallel Talks

- May. 2020 **Phenomenology 2020 Symposium**, Pittsburgh, PA, USA.
- Oct. 2019 **PPNT**, Uppsala, Sweden.
- Aug. 2017 **TeVpa**, Columbus, Ohio, USA.
- Jul. 2017 **VietNus**, Quy Nhon, Vietnam.
- May 2017 **IPA**, Madison, WI, USA.
- Jan. 2017 **American Physical Society April Meeting**, District of Columbia, USA.
- Dec. 2016 **Astroparticle Physics at Ecuador**, Quito, Ecuador.
- Sep. 2016 **TeVpa**, Geneva, Switzerland.
- Aug. 2016 **International Conference of High-Energy Physics**, Chicago, IL, USA.
- Sep. 2015 **Very Large Volume Neutrino Telescope**, Rome, Italy.
- Jun. 2015 **Weak Interactions and Neutrinos**, Heidelberg, Germany.
- Mar. 2012 **PASI: Exploring the Terascale and Beyond**, Buenos Aires, Argentina.

Poster Presentations

- Jun. 2020 **Neutrino**, Chicago, IL, USA.
- Jul. 2019 **36th International Cosmic-Ray Conference**, Madison, WI, USA.
- Jul. 2018 **Neutrino**, Heidelberg, Germany.
- Jul. 2016 **Neutrino**, London, UK.
- Jun. 2015 **Invisibles**, Madrid, Spain.
- Dec. 2010 **VII Simposio Latinoamericano de Física de Altas Energías**, Valparaiso, Chile.

Advising And Mentoring

Postdoctoral Fellows

- Dr. Alfonso Garcia Soto**, *Marie Skłodowska-Curie Fellow*, 05/2021-present.
- Dr. Ivan Martinez Soler**, 10/2021-ongoing.

Visiting Postdoctoral Fellows

- Dr. Ali Kheirandish**, *Pennsylvania State University*, 07/2020-present.

Former Postdoctoral Fellows

- Dr. Rui An**, 12/2020-3/2021, Now machine learning engineer at Hiretual.

Graduate Students at Harvard

- Mr. Nicolo Foppiani**, *fifth-year student, Physics*, Co-advisor with Professor Roxanne Guenette.
- Ms. Barbara Skrzypek**, *fourth-year student, Physics*, Primary Advisor.

Ms. Diyaselis Delgado, *second-year student, Physics*, Primary Advisor.

Ms. Julia Book, *second-year student, Physics*, Currently co-advisor with Professor Roxanne Guenette, but transitioning to primary advisor.

Mr. Miaochin (Andy) Jin, *first-year student, Physics*, Primary Advisor.

Mr. Pavel Zhelnin, *first-year student, Physics*, Primary Advisor.

Visiting Graduate Students at Harvard

Mr. Ibrahim Safa, *fifth-year student, University of Wisconsin at Madison*, Co-advisor with Professor Francis Halzen.

Mr. Jeffrey Lazar, *fifth-year student, University of Wisconsin at Madison*, Co-advisor with Professor Francis Halzen.

Undergraduate Research Advises

Mr. Tommaso Serafin, *Spring 2022*.

Mr. Juan Castillo, *Summer and fall of 2021*, HCRP awardee and Prize Fellow.

Mr. Jeffrey Kwan, *Summer of 2021 – on going*, HCRP awardee and Prize Fellow.

Mr. Santiago Giner, *Summer of 2021 – on going*, HCRP awardee and Prize Fellow.

Mr. Josh Villareal, *Spring 2021*, Accepted in PhD programs at MIT, MSU, UCSB, among others..

Mr. Oswaldo Vazquez, *Fall 2020 and Spring 2021*, HCRP awardee.

Visiting Undergraduate Research Advises

Mr. Pablo Castaño, *Fall 2020 and Spring 2021*, University of California - Berkeley.

Mr. Pratik Kafle, *Summer 2021*, Reed College.

Undergraduate Academic Advises

Mr. Jaiden Edelman.

Mr. Diego Panzardi Serra.

Professional Activities at Harvard

2022 **Member of the Natural Sciences Hoopes Prize Committee.**

2021-2022 **Member of the Graduate Admissions Committee, Department of Physics.**

Member of Ph.D. Committees at Harvard

Ms. Barbara Skrzypek, *Member of the Ph.D. qualifying committee working under my supervision.*

Mr. Shu-Fan Chen, *Member of the Ph.D. qualifying committee working with Professor Cora Dvorkin.*

Mr. Brendon Bullard, *Member of the Ph.D. qualifying committee working with Professor Masahiro Mori.*

Mr. Anthony Badea, *Member of the Ph.D. qualifying committee working with Professor John Huth.*

Ms. Betty Hu, *Member of the Ph.D. qualifying committee working with Professor Douglas Finkbeiner.*

Ms. Justina Yang, *Member of the Ph.D. qualifying committee working with Professor Douglas Finkbeiner.*

Grants

Fall 2021 Dean's Competitive Fund for Promising Scholarship, *Discovering Unexpected Patterns with Classical and Quantum Computers*, Period of performance: 01/2022 onwards, 37,500 USD.

Sloan Research Fellowship, Period of performance: 07/2021 to 07/2022, 75,000 USD.

Spring 2021 Dean's Competitive Fund for Promising Scholarship, *Opening New Window into the Universe in the Andes*, Period of performance: 07/2021 onwards, 50,000 USD.

Publication Record

My top-ten most cited publications where I had essential and significant contributions are:

Searches for Sterile Neutrinos with the IceCube Detector, PHYS. REV. LETTERS 117 071801, IceCube Collaboration, Preprint arXiv:1605.01990.

281 citations as of Feb. 18 of 2022.

Where Are We With Light Sterile Neutrinos?, PHYS. REPT. 884 (2020), A. Diaz, C.A. Argüelles, G. H. Collin, J. M. Conrad, and M. H. Shaevitz, Preprint arXiv:1906.00045.

134 citations as of Feb. 18 of 2022.

New Physics in Astrophysical Neutrino Flavor, PHYS. REV. LETTERS 115 161303, C.A. Argüelles, T. Katori, and J. Salvado, Preprint arXiv:1506.02043.

105 citations as of Feb. 18 of 2022.

First Constraints on the Complete Neutrino Mixing Matrix with a Sterile Neutrino, PHYS. REV. LETTERS 117 221801 (2016), G.H. Collin, C.A. Argüelles, J.M. Conrad, and M.H. Shaevitz, Preprint arXiv:1607.00011.

79 citations as of Feb. 18 of 2022.

Sterile Neutrino Fits to Short Baseline Data, NUCL. PHYS. B 908 (2016), G.H. Collin, C.A. Argüelles, J.M. Conrad, and M.H. Shaevitz, Preprint arXiv:1602.00671.

78 citations as of Feb. 18 of 2022.

A Simple Quantum Integro-Differential Solver (SQuIDS), COMPUT.PHYSIS.COMMUN. 196 (2015) 569-591, C.A. Argüelles, J. Salvado, and C. N. Weaver, Preprint arXiv:1412.3832.

78 citations as of Feb. 18 of 2022.

Neutrino Interferometry for High-Precision Tests of Lorentz Symmetry with IceCube, NATURE PHYSICS (2018), IceCube Collaboration, Preprint arXiv:1709.03434.

62 citations as of Feb. 18 of 2022.

The High-Energy Behavior of Photon, Neutrino and Proton Cross Sections, PHYS. REV. D92 (2015) NO.7, 074040, C.A. Argüelles, F. Halzen, L. Wille, M. Kroll, and M. H. Reno, Preprint arXiv:1504.06639.

57 citations as of Feb. 18 of 2022.

Solar Atmospheric Neutrinos and the Sensitivity Floor for Solar Dark Matter Annihilation Searches, JCAP 07 (2017) 024, C.A. Argüelles, G. de Wasseige, A. Fedynitch, and B. J. P. Jones, Preprint arXiv:1703.07798.

52 citations as of Feb. 18 of 2022.

Testing New Physics Explanations of the MiniBooNE Anomaly at Neutrino Scattering Experiments, PHYS.REV.LETT. 123 (2019) 26, 261801, C.A. Argüelles, M. Hostert, and Yu-Dai Tsai, Preprint arXiv:1812.028768.

49 citations as of Feb. 18 of 2022.

Peer-reviewed Publications

My ORCID is <https://orcid.org/0000-0003-4186-4182>. For a full publication list go to:

<http://inspirehep.net/search?p=exactauthor%3AC.A.Arguelles.1&sf=earliestdat>

Selected Publications in Particle Physics

MicroBooNE and the ν_e Interpretation of the MiniBooNE Low-Energy Excess, PREPRINT ARXIV:2111.10359, Carlos A. Argüelles, Ivan Esteban, Matheus Hostert, Kevin J. Kelly, Joachim Kopp, Ivan Martinez-Soler, and Yuber F. Perez-Gonzalez, Submitted to *Physical Review Letters*.

Contribution: Wrote code to evaluate the MiniBooNE likelihood, analysis tools, and wrote text.

Cascade Appearance Signatures of Sterile Neutrinos at 1-100 TeV, PREPRINT ARXIV:2111.08722, Benjamin R. Smithers, Ben Jones, Carlos A. Argüelles, and Janet Conrad, Submitted to *Physical Review D*.

Contribution: Guided graduate student.

Search for Quantum Gravity Using Astrophysical Neutrino Flavour with IceCube, PREPRINT ARXIV:2111.04654, IceCube Collaboration, Submitted to *Nature Physics*.

Contribution: Conceived idea, wrote analysis software, guided graduate students, and wrote text.

Sterile neutrinos with neutrino telescopes, *UNIVERSE* 7 (2021) 11, 426, Carlos A. Argüelles and Jordi Salvado, PREPRINT ARXIV:2111.03357.

Contribution: Equal contribution from all authors.

Lorentz symmetry and high-energy neutrino astronomy, *UNIVERSE* 2021, 7(12), 490, Carlos A. Argüelles and Teppei Katori, PREPRINT ARXIV:2109.13973.

Contribution: Equal contribution from all authors.

Heavy neutral leptons below the kaon mass at hodoscopic detectors, PREPRINT ARXIV:2109.03831, Carlos A. Argüelles, Nicolò Foppiani, Matheus Hostert, Submitted to the *Physical Review Letters*.

Contribution: Guided graduate students and wrote paper.

Closing the Neutrino BSM Gap: Physics Potential of Atmospheric Through-going Muons at DUNE, *PHYS. REV. D* 104, 092015, Austin Schneider, Barbara Skrzypek, Carlos A. Argüelles, Janet M. Conrad, PREPRINT ARXIV:2106.01508.

Contribution: Guided graduate students and wrote paper.

Explaining the MiniBooNE Excess Through a Mixed Model of Oscillation and Decay, *PHYS. REV. D* 104, 095005, Stefano Vergani, Nicholas W. Kamp, Alejandro Diaz, Carlos A. Argüelles, Janet M. Conrad, Mike H. Shaevitz, Melissa A. Uchida, PREPRINT ARXIV:2105.06470.

Contribution: Designed model, guided graduate students, and wrote paper.

Millicharged Particles from the Heavens: Single- and Multiple-Scattering Signatures, *JOURNAL OF HIGH ENERGY PHYSICS ARTICLE NUMBER:99* (2021), Carlos A. Argüelles, Kevin J. Kelly, Victor M. Muñoz, PREPRINT ARXIV:2104.13924.

Contribution: Wrote millicharged particle Monte Carlo, implemented Super-Kamiokande analysis, guided graduate students, and wrote paper.

An eV-scale sterile neutrino search using eight years of atmospheric muon neutrino data from the IceCube Neutrino Observatory, *PHYS. REV. LETTERS* 125, 141801 (2020), IceCube Collaboration, Preprint arXiv:2005.12942.

Contribution: One of the leading authors. Guided graduate students, wrote analysis framework, wrote paper, and developed Bayesian analysis.

Searching for eV-scale sterile neutrinos with eight years of atmospheric neutrinos at the IceCube neutrino telescope, *PHYS. REV. D* 102, 052009 (2020), IceCube Collaboration, PREPRINT ARXIV:2005.12943.

Contribution: One of the leading authors. Guided graduate students, wrote analysis framework, wrote paper, and developed Bayesian analysis.

Dark Matter Annihilation to Neutrinos, *REV. MOD. PHYS.* 93, 35007 (2021), C.A. Argüelles, A. Diaz, A. Kheirandish, A. Olivares-Del-Campo, I. Safa, and A. C. Vincent, Preprint arXiv:1912.09486.

Contribution: Reviewed constraints and experiments. Guided graduate students.

Searches for Atmospheric Long-Lived Particles, *JOURNAL OF HIGH ENERGY PHYSICS VOLUME 2020, ARTICLE NUMBER: 190* (2020), C.A. Argüelles, P. Coloma, P. Hernández, and V. Muñoz, Preprint arXiv:1910.12839.

Contribution: Wrote code to compute cosmic-ray air shower meson distributions and provided input on IceCube limitations and capabilities.

Combining Sterile Neutrino Fits to Short Baseline Data with IceCube Data, *PHYS. REV. D* 101, 055020 (2020), M.H. Moulai, C.A. Argüelles, G. Collin, J.M. Conrad, A. Diaz, and M. Shaevitz, Preprint arXiv:1910.13456.

Contribution: Guided graduate students and wrote the paper.

Where Are We With Light Sterile Neutrinos?, *PHYS.REPT.* 884 (2020), A. Diaz, C.A. Argüelles, G. Collin, J.M. Conrad, and M. Shaevitz, Preprint arXiv:1906.00045.

Contribution: Made general edits and paper writing. Mainly contributed in the sections related to: new statistical treatments, sterile neutrinos in non-accelerator sources, astrophysical neutrinos, and cosmology.

Testing New Physics Explanations of MiniBooNE Anomaly at Neutrino Scattering Experiments, *PHYS. REV. LETT.* 123, 261801, C.A. Argüelles, M. Hostert, and Y.-D. Tsai, Preprint arXiv:1812.08768.

Contribution: Developed phenomenology, guided graduate students, and performed part of the analysis.

Exploring a Nonminimal Sterile Neutrino Model Involving Decay at IceCube, PHYS. REV. D 97, 055017, Z. Moss, M. H. Moulai, C. A. Argüelles, and J. Conrad, Preprint arXiv:1711.05921.

Contribution: Developed phenomenology, guided graduate student and undergrad on analysis.

Neutrino Interferometry for High-Precision Tests of Lorentz Symmetry with IceCube, NATURE PHYSICS (2018), IceCube Collaboration, Preprint arXiv:1709.03434.

Contribution: Developed phenomenology, did analysis, and guiding graduate student on the analysis.

First Constraints on the Complete Neutrino Mixing Matrix with a Sterile Neutrino, PHYS. REV. LETTERS 117 221801 (2016), G.H. Collin, C.A. Argüelles, J.M. Conrad, and M.H. Shaevitz, Preprint arXiv:1607.00011.

Contribution: Integrated IceCube into the global fit. Determined the allowed range of extended PMNS matrix element parameters.

Searches for Sterile Neutrinos with the IceCube Detector, PHYS. REV. LETTERS 117 071801, IceCube Collaboration, Preprint arXiv:1605.01990.

Contribution: Paper associated with my thesis analysis; see thesis for detailed contributions.

Dark Gauge Bosons: LHC Signatures of Non-Abelian Kinetic Mixing, PHYS. LET. B 2017.04.037, C.A. Argüelles, X.-G. He, G. Ovanessian, T. Peng, and M. Ramsey-Musolf, Preprint arXiv:1604.00044.

Contribution: Implemented the model in MadGraph.

Sterile Neutrino Fits to Short Baseline Data, NUCL. PHYS. B908 (2016) 354-365, G.H. Collin, C.A. Argüelles, J.M. Conrad, and M.H. Shaevitz, Preprint arXiv:1607.00011.

Contribution: Guided graduate student.

The High-Energy Behavior of Photon, Neutrino and Proton Cross Sections, PHYS. REV. D92 (2015) NO.7, 074040, C.A. Argüelles, F. Halzen, L. Wille, M. Kroll, and M. H. Reno, Preprint arXiv:1504.06639.

Contribution: Performed the calculations described in the text in parallel with L. Wille and M. Kroll.

Searching for cavities of various densities in the Earth's crust with a low-energy electron-antineutrino beta-beam, MOD. PHYS. LETT. A30 (2015) NO. 29, 1550148, C.A. Argüelles, M. Bustamante, and A.M. Gago, Preprint arXiv:1201.6080.

Contribution: Implemented oscillations in the presence of cavities, performed the analysis, wrote paper text and made figures.

[Selected Publications in Astrophysics and Astroparticle Physics](#)

Tau Appearance from High-Energy Neutrino Interactions, PREPRINT ARXIV:2112.06937, Alfonso Garcia Soto, Pavel Zhelnin, Ibrahim Safa, and Carlos A. Argüelles, Submitted to *Physical Review Letters*.

Contribution: Guided graduate students and postdocs, analysis discussion, and wrote text.

The Future of High-Energy Astrophysical Neutrino Flavor Measurements, JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS 04 (2021) 054, Ningqiang Song, Shirley Weishi Li, Carlos A. Argüelles, Mauricio Bustamante, and Aaron C. Vincent, Preprint arXiv:2012.12893.

Contribution: Started the work, analysis discussion, and wrote text.

The IceCube high-energy starting event sample: Description and flux characterization with 7.5 years of data, PHYSICAL REVIEW D 104, 022002 (2021), IceCube Collaboration, Preprint arXiv:2011.03545.

Contribution: One of the leading authors. Guided graduate students, wrote analysis framework, design astrophysical model test, wrote paper, and developed Bayesian analysis.

Measurement of Astrophysical Tau Neutrinos in IceCube's High-Energy Starting Events, PREPRINT ARXIV:2011.03561, IceCube Collaboration, Submitted to *Physical Review Letters*.

Contribution: One of the leading authors. Guided graduate students, wrote analysis framework, and developed statistical analysis.

$\chi_{\text{ar}\nu}$: a tool for neutrino flux generation from WIMPs, JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS 10.1088/1475-7516/2020/10/043, Q. Liu, J. Lazar, C.A. Argüelles, A. Kheirandish, Preprint arXiv:2007.15010.

Contribution: Wrote dark matter capture calculation, improved treatment of nuSQUIDS solar neutrino propagation, guided graduate students, and edited paper.

Probe of Sterile Neutrinos Using Astrophysical Neutrino Flavor, JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS 10.1088/1475-7516/2020/02/015, C.A. Argüelles, K. Farrag, T. Katori, R. Khandelwal, S. Mandalia, J. Salvado, Preprint arXiv:1909.05341.

Contribution: Conceived idea, guided graduate students, and edited the paper.

Observing EeV neutrinos through the Earth: GZK and the anomalous ANITA events, JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS 2001 (2020) NO.01, 012, I. Safa, A. Pizzuto, C. Argüelles, F. Halzen, R. Hussain, A. Kheirandish, J. Vandenbroucke, Preprint arXiv:1909.10487.

Contribution: Developed structure of neutrino propagation algorithm and guided graduate students.

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Contribution: Wrote code that propagated neutrino fluxes through the Sun and wrote the discussion of oscillation physics and neutrino transport on the paper.

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Contribution: Initiated the idea, developed the phenomenology in collaboration with a theorist, and developed likelihood framework for the analysis.

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Contribution: Performed calculations detailed in the paper in parallel with V. Brdar.

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Contribution: Equal contributions from the three authors on this work.

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Contribution: Performed the calculations and analysis described in the paper.

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Contribution: Processed Cassini's raw data.

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Contribution: Performed the statistical analysis, made model comparison plots, and collaborated on article writing.

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Contribution: Developed algorithm and wrote package code.

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Contribution: Worked in original code design, guided graduate and undergraduate students, and wrote paper.

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Contribution: Worked in code design, wrote first implementation of LeptonWeighter, guided graduate students to improve and integrate the project in IceCube software, and maintains the code.

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Contribution: Updated version of the SQuIDS software. Worked on code and documentation.

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Contribution: Run the experiment and guided graduate students.

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Contribution: Participated in the likelihood construction, guided graduate student, and wrote sections of the paper.

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Contribution: Developed the phenomenology and performed parts of the calculation.

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Contribution: Estimated neutrino cross section uncertainties and collaborated in development of the nuFATE code.

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Contribution: Developed algorithm and wrote package code.