

Karen Macías Cárdenas

Pronouns: they/them and she/her

Affiliation

Doctoral la Caixa INPhINIT Fellow at the Institute for Theoretical Physics (IFT) UAM-CSIC.

Research topics: Beyond the Standard Model physics with a focus on probing Dark Matter and neutrino phenomenology through the combination of particle physics, astrophysics and cosmology.

Advisors: David G. Cerdeño and Marina Cermeño.

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Education

Department of Physics, Engineering Physics and Astronomy. Queen's University, M.Sc. Astroparticle Physics, Kingston, Canada, 2021–2022

Thesis: A Global Analysis of Scalar Dark Matter-neutrino interactions at the 1-loop level. Advisor: Aaron Vincent.

Facultad de Ciencias. Universidad Autonoma de Baja California (UABC), 2015–2020
B.Sc. Physics, Ensenada, Mexico.

Research Internships and Visits

Perimeter Institute for Theoretical Physics, Host: Matheus Hostert. Short term visitor, Waterloo, Canada. October 2022

Niels Bohr Institute and the DARK Cosmology Centre, Advisors: Irene Tamborra and Enrico Ramirez-Ruiz. AstroNu group. Topic: Astrophysical neutrinos from choked GRBs, Copenhagen, Denmark. 2019 - 2020

Universidad de Guanajuato (UG), Advisor: Luis Arturo Ureña López. Cosmology group. Topic: Quintessence as a Dark Energy model, Guanajuato, Mexico. 2018 - 2019

Fellowships and Awards

Doctoral INPhINIT Fellowship (2023-2026), The "la Caixa" Foundation.

Fellowship to carry out a doctorate in the fields of health and life sciences, technology, physics, engineering and mathematics in Spain or Portugal at accredited centres of excellence.

CAP Best Student Oral Presentation – Division of Theoretical Physics, Canadian Association of Physicists (CAP) Congress 2022.

Plus an honourable mention for CAP Overall Student Presentation.

The John N. Bahcall Physics Award 2019, Fully funded research internship at the NBI and the DARK Cosmology Centre. June-August, 2019..

Funded by Dr. Enrico Ramírez Ruiz (UCSC), Dr. Neta Bahcall (Princeton) and the Hertel Foundation.

CONACYT's Research Assistantship 'SNI Level III' Fellowship, Internship at the Cosmology Group of the University of Guanajuato. February-May, 2019.

Fellowship from the National Council of Science and Technology (CONACyT) for a Research Assistantship with a 'SNI Level III' researcher: Dr. Luis Ureña.

Teaching Experience

Theoretical Particle Physics, *September-December 2023*, Teaching Assistant, 60 hrs. ICTP-PWF-Physics Latam.

ASTR 102: Stars, Galaxies and the Universe, *January-April 2022*, Teaching Assistant, 60 hrs. Queen's University.

PHYS 117/119 Laboratory: Introductory Physics, *September-December 2021*, Teaching Assistant, 60 hrs. Queen's University.

ASTR 101: The Solar System, *January-April & September-December 2021*, Teaching Assistant, 180 hrs. Queen's University.

Vector Calculus, *February-May 2018*, Teaching Assistant, 60 hrs. Universidad Autonoma de Baja California.

Publications

Submitted Articles

K. M. Cárdenas, G. Mohlabeng and A. C. Vincent, "Boxed in from all sides: a global fit to loop dark matter and neutrino masses" [[arXiv:2411.03470](https://arxiv.org/abs/2411.03470) [hep-ph]].

Thesis and Dissertation

Master's Thesis: A global analysis of scalar Dark Matter-neutrino interactions at the 1-loop level, KM Cardenas, Thesis, 2022.

Conferences and Workshops

Invited talks

University of Guelph (Canada): October 2022, Dr. Liliana Caballero's research group.

Parallel Talks

TAUP 2023, A global analysis of Dark Matter-neutrino interactions. University of Vienna, August 28- September 1, 2023. Vienna, Austria.

TeVPA 2022, Dark Matter-neutrino interactions through a one-loop diagram. Queen's University, August 8-12, 2022. Kingston, Canada.

Canadian Association of Physicists (CAP) Congress 2022, Dark Matter-neutrino interactions through a one-loop diagram. McMaster University, June 5-10, 2022. Hamilton, Canada.

Posters

International Conference Dark Matter and Stars: Multimessenger probes of Dark Matter and Modified Gravity, A global analysis of Dark Matter-neutrino interactions. Instituto Tecnico de Lisboa, May 3-5, 2023. Lisbon, Portugal.

Workshops and Summer Schools

International School of Physics "Enrico Fermi". Course 212 -Neutrino Physics, Astrophysics and Cosmology in collaboration with the International School in AstroParticle Physics (ISAPP), Varenna, Italy. Villa Monastero, July 2023.

PhD Summer School on Neutrinos "Here, There & Everywhere", Online. Niels Bohr Institute (NBI), July 2021.

Tri-Institute Summer School on Elementary Particles (TRISEP) 2021, Online. Perimeter Institute (PI) - SNOLAB - TRIUMF, June 2021, Group presentation: Light dark matter direct detection below the neutrino floor.

Kathmandu Astrophysics School (KAS) 2020, Online. International Astronomical Union (IAU) and The University of Melbourne, November 2020 - February 2021.

XVII Mexican Workshop on Particles and Fields, Guanajuato, Mexico. Mexican Society of Physics (SMF), October 2019.

Advancing Theoretical Astrophysics Summer School, Amsterdam, The Netherlands. University of Amsterdam and Vrije Universiteit Amsterdam, July 2019..

II Mesoamerican Workshop on Cosmology and Gravity, Chiapas, Mexico. Mesoamerican Centre for Theoretical Physics (MCTP), October 24-26, 2018.

IV Workshop on Numerical and Statistical Methods in Cosmology, Cuernavaca, Mexico. Instituto de Ciencias Fisicas (ICF-UNAM), July-August, 2018.

Service and Leadership

- Co-chair of GEndeR MINorities In Physics (GEMINI-P) at Queen's University. 2022.
- Communications Director of the McDonald Institute's Highly Qualified Personnel Advisory Committee (HQPAC). 2021-2022
- Member of the University Society of Physics of Ensenada (SUFE), 2019-2020
- Vice-president of UABC's School of Science Students' Society, 2018-2
- Member of Mexico's National Committee of the *International Association of Physics Students (IAPS)*, 2016-2019.
- International Association of Physics Students (IAPS) Ambassador in Mexico, 2016-2017.
- Member of the *Astronomical Society of Ensenada (SAE)* 2015-2016.
- Member of the *Youth Scientific Society (SCJ) in Ensenada*, 2014-2020.
 - President, 2016-2017.
 - Secretary, 2015-2016.

Outreach and Equity, Diversity & Inclusion (EDI) Efforts

Workshop: *(Invited) "Flavourful Physics Workshop"*. Organized by Comision de Igualdad y Diversidad (CID) at IFIC. February 3, 2025. Valencia, Spain.

Roundtable: *(Invited) "November 18: a call for LGTBQIA+ rights in STEM"*. Organized by Out in Space from the European Space Agency (ESA) and the Comision Mujer y Astronomia from the Spanish Society of Astronomy (SEA) at the European Space Astronomy Centre (ESAC). November 22, 2024. Madrid, Spain.

Workshop: (Invited) "*Girls SySTEM Workshop*" on behalf of GEMINI-P. Organized by Girls SySTEM Mentorship Program for Astronomy Month (online) May 31st, 2022.

Conference: (Invited) *El pensamiento científico desde las astropartículas* (Scientific thought through astroparticle physics). Academia Mexicana de Ciencias (Mexican Academy of Sciences) y el Consejo de Ciencia y Tecnología del Estado de Puebla. February, 2022.

Talk: (Organizer and speaker) *Trans-inclusivity in Journals' Name Change Policies*. GEMINI-P for the Department of Physics, Engineering Physics and Astronomy at Queen's, November, 2021.

Talk: *Astronomy 101*. Maywood DaVinci Middle School, 6th grade class. Skype a Scientist program. September, 2021.

Roundtable: (Invited) "*Diversity in research*". Organized by SE-Nano and SCJ for Science Pride Fest 2021 (online) June, 2021.

Article: Etienne, L., Hulme, K., & Lazore, C. (2021). Beyond the stars: Astrophysics in the bangtan universe. *The Rhizomatic Revolution Review* [20130613], (2). <https://ther3journal.com/issue-2/beyond-the-stars-astrophysics-in-the-bangtan-universe>

Symposium: *Let's Talk Astrophysics*. National congress across Canada for high school students. Organizing team of the coding session. Let's Talk Science. February, 2021.

Talk: (Invited) *Minorías sexo-genéricas en la comunidad científica* (Gender and sexual minorities in the sciences). Jornada Sinaloense del Conocimiento. Universidad Autonoma de Sinaloa. November, 2020.

Conference: (Invited) *El Universo hecho partículas* (A Universe made out of particles). "Science for All" organized by SAIA Tecnológico de Monterrey CCM to showcase LGBTQ+ Latinx scientists. November, 2020.

Podcast: (Invited) *Pride in the Space Sector: Karen Macias*. Preparing for Launch Podcast organized by UK Students for the Exploration and Development of Space (UKSEDS) June, 2020.

Roundtable: (Invited) "*Sexual and gender diversity in STEM*". Organized by Astrofisicos en Accion (online) June, 2020.

Conference: (Invited) *The LGBTQ+ community in the sciences*. Organized by SCJ, SE-Nano, Accion Cientifica and DiVU (online) June, 2020.

Conference: *Physics in a few numbers*. Organized by IAPS and SCJ, Ensenada, Mexico, April 15th, 2018.

Roundtable: (Invited) "*Someday I want to be...*" in commemoration of Women's Day, Caracol Science Museum, Ensenada, Mexico, March, 2018.