

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, October 2022
Host: Matheus Hostert. Short term visitor, Waterloo, Canada.

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

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

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.

Teaching Experience

Theoretical Particle Physics, *September-December 2023*, Teaching Assistant, 60 hrs. ICTP Physics Without Frontiers and 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 loopy 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

Instituto de Fisica Corpuscular (IFIC). *Dark matter, neutrino masses, and queer science.* Flavourful Physics Workshop. February 2025, Spain.

University of Guelph. Seminar for Dr. Liliana Caballero's research group. October 2022, Canada.

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
- Over 10 years of experience in science communication and more than a dozen public talks.

Outreach and Equity, Diversity & Inclusion (EDI) Efforts

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

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

Astronomical experiments: the universe is your laboratory: (Instructor). Planification and instruction of a week-long course organized by **Clubes de Ciencia Mexico** for high school and undergraduate students. August 4-11, 2024. Ensenada, Mexico.

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

Scientific thought through astroparticle physics: (*El pensamiento científico desde las astropartículas*) (Invited). Mexican Academy of Sciences. February, 2022.

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