

CURRICULUM VITAE

Ian Padilla-Gay 

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ACADEMIC POSITIONS

03/2023-
present **Postdoctoral Research Associate**
Elementary Particle Physics Division, Theory Group
SLAC National Accelerator Laboratory and Stanford University, Menlo Park, United States

EDUCATION

08/2019-
10/2022 **PhD in Physics**
Niels Bohr Institute, University of Copenhagen, Denmark
Supervisor: Irene Tamborra, Full Professor
Thesis title: *Neutrino Flavor Conversion in Dense Astrophysical Environments* ([link](#))

04/2022-
05/2022 **Visitor at the Max Planck Institute for Physics**
Max Planck Institute for Physics (MPP), Munich, Germany
Principal Investigator: Georg G. Raffelt, Senior Scientist

08/2017-
06/2019 **Master of Science (MSc) in Theoretical Physics**
Lund University, Lund, Sweden
Supervisor: Roman Pasechnik, Senior Lecturer
Thesis title: *Phenomenology of a Three-Higgs Doublet Model with $U(1) \times Z_2$ symmetry in the fermionic and scalar sector* ([link](#))

08/2012-
02/2017 **Bachelor of Science (BSc) in Physics**
Division of Sciences, University of Guanajuato, León, México
Supervisor: Luis Ureña-López, Full Professor
Thesis topic: *Single-field models of inflation*

RESEARCH INTERESTS

Astro-particle physics, neutrino oscillations, compact binary mergers, nucleosynthesis in neutrino-dense environments, non-standard neutrino interactions, beyond the standard model scenarios, models with extended Higgs sectors, model-building

AWARDS

08/2017 **Lund University Global Scholarship, Sweden**
[The Global Scholarship](#) is a selective, merit-based scholarship to recognise top academic students from outside the EU/EEA

08/2014 **Baden-Württemberg-Stipendium, Germany**
[BW-Scholarship](#) recipient at Tübingen University (exchange) for the academic period 2014-2015

INVITED SEMINARS

- 03/2024 **Matter-neutrino Resonances in Neutron Star Merger Remnants**
Bay Area Particle Theory Seminars ([BAPTS](#))
San Francisco State University, San Francisco, United States
- 07/2023 **Neutrino flavor conversion in dense astrophysical environments**
3rd New Physics Opportunities at Neutrino Facilities ([website](#))
SLAC National Accelerator Laboratory, Menlo Park, United States
- 11/2022 **Neutrino fast flavor conversion and collisional damping**
Technische Universität München, [TUM Seminars](#), Munich, Germany
- 10/2022 **New developments on the physics of neutrino fast flavor conversion**
EMMI+IReNA Workshop "Remnants of neutron-star mergers – Connecting hydrodynamics models to nuclear, neutrino, and kilonova physics". Seminar, GSI, Darmstadt, Germany
- 05/2022 **New developments on the physics of neutrino fast flavor conversion**
Seminar (online), Max Planck Institute for Physics, Munich, Germany
- 11/2021 **New developments on the physics of neutrino fast flavor conversion**
Network for Neutrinos, Nuclear Astrophysics, and Symmetries
[N3AS Seminars](#) (online), UC Berkeley, United States
- 10/2020 **Fast neutrino conversions in binary neutron star merger remnants**
Seminar (online), Max Planck Institute for Physics, Munich, Germany
- 09/2020 **Neutrino flavor conversions in binary neutron star merger remnants**
Transient Tuesday discussion sessions at DARK, University of Copenhagen, Denmark

CONTRIBUTIONS TO CONFERENCES AND WORKSHOPS

- 05/2022 **Talk: New developments on the physics of neutrino fast flavor conversion**
Second EuCAPT Annual Symposium (online), CERN, Switzerland
- 09/2021 **Talk: Criteria for the occurrence of fast pairwise conversion of neutrinos**
New Directions in Neutrino Flavor Evolution in Astrophysical Systems
Institute of Nuclear Theory [Workshop](#) (online), University of Washington, United States
- 05/2021 **Talk: Neutrino flavor conversions in the remnants of binary neutron star mergers**
First EuCAPT Annual Symposium (online), CERN, Switzerland
- 06/2021 **Poster: Neutrino flavor conversions in the remnants of binary neutron star mergers**
The International Workshops on Weak Interactions and Neutrinos, University of Minnesota, United States
- 07/2020 **Poster: Neutrino flavor conversions in compact astrophysical objects**
The XXIX International Conference on Neutrino Physics and Astrophysics (online)
Fermi National Accelerator Laboratory, United States

WORKSHOPS & SCHOOLS

- 08/2024 **Aspen Center for Physics Summer Workshop**
Title: "Multi-messenger Transients from Binary Mergers and Stellar Explosions" ([website](#))
Aspen Center for Physics, Colorado, United States
- 08/2023 **51th SLAC Summer Institute 2023: Machine Learning Across the Frontiers** ([website](#))
SLAC and Stanford, Menlo Park, United States

- 08/2021 **CERN International Neutrino Summer School**
International Neutrino Summer School 2021 (online), CERN, Switzerland
- 02/2020 **Compact Objects For All - Workshop**
Lund Observatory, Lund, Sweden
- 08/2019 **NBIA & Los Alamos National Laboratory Workshop**
Neutrino Quantum Kinetics in Dense Environments.
Niels Bohr Institute, Copenhagen, Denmark
- 07/2018 **NBIA & DARK Summer School**
Multi-messenger from compact sources
Niels Bohr Institute, Copenhagen, Denmark.

TEACHING EXPERIENCE

I was a teaching assistant for the following courses at the University of Copenhagen:

- 11/2021-
01/2022 **Elementary Particle Physics (Master course)**
Course responsible: Oleg Ruchayskiy, Associate Professor
- 08/2021-
10/2021 **Analytical Mechanics (Bachelor course)**
Course responsible: Poul Henrik Damgaard, Full Professor
- 08/2020-
10/2020- **General Relativity and Cosmology (Master course)**
Course responsible: Troels Harmark, Associate Professor

PUBLIC OUTREACH

- 04/2021 **Oscilaciones de neutrinos en sistemas binarios de estrellas de neutrones**
Invited talk (online) for the Mexican Embassy in Denmark, Copenhagen, Denmark.

PROGRAMMING SKILLS

Advanced Python, Pandas, Tableau, TensorFlow, Fortran90, C, C++, Mathematica, MatLab, Bash, OpenMP, MPI, L^AT_EX

EXTRACURRICULAR ACTIVITIES

- 03/2023-
present **Elementary Particle Physics Seminars**
Organizer of the weekly theory **seminars** at SLAC, Menlo Park, United States
- 03/2020-
10/2022 **Transient Tuesday**
Organizer of the bi-weekly **seminars** on astrophysical transients at DARK, Niels Bohr Institute, Denmark

REFEREES

- Alexander Friedland, Senior Scientist** (alexfr@slac.stanford.edu)
Affiliation: SLAC National Accelerator Laboratory, Menlo Park, United States
- Irene Tamborra, Full Professor** (tamborra@nbi.ku.dk)
Affiliation: Niels Bohr International Academy & DARK, University of Copenhagen, Denmark
- Georg G. Raffelt, Senior Scientist** (raffelt@mppmu.mpg.de)
Affiliation: Max Planck Institute for Physics, Munich, Germany

ORIGINAL RESEARCH PAPERS

1. **Ian Padilla-Gay**, Shashank Shalgar, Irene Tamborra
Symmetry breaking due to multi-angle matter-neutrino resonance in neutron star mergers remnants
JCAP05(2024)037, [arXiv:2403.15532](#) [astro-ph].
2. Damiano F.G. Fiorillo, **Ian Padilla-Gay**, Georg G. Raffelt
Collisions and collective flavor conversion: Integrating out the fast dynamics
Phys. Rev. D **109**, **063021**, [arXiv:2312.07612](#) [hep-ph].
3. **Ian Padilla-Gay**, Irene Tamborra, Georg G. Raffelt
Neutrino fast flavor pendulum. II. collisional damping
Phys. Rev. D **106**, **103031 (2022)**, [arXiv:2209.11235](#) [hep-ph].
4. **Ian Padilla-Gay**, Irene Tamborra, Georg G. Raffelt
Neutrino flavor pendulum reloaded: The case of fast pairwise conversion
Phys. Rev. Lett. **128 (2022) 12**, **12**, [arXiv:2109.14627](#) [astro-ph.HE].
5. **Ian Padilla-Gay**, Shashank Shalgar
Fast flavor conversion of neutrinos in presence of matter bulk velocity
[arXiv:2108.00012](#) [astro-ph.HE].
6. Dipankar Das, P.M. Ferreira, António P. Morais, **Ian Padilla-Gay**, Roman Pasechnik, J. Pedro Rodrigues
A three Higgs doublet model with symmetry-suppressed flavor changing neutral currents
JHEP11(2021)079, [arXiv:2106.06425](#) [hep-ph]
7. **Ian Padilla-Gay**, Shashank Shalgar, Irene Tamborra
Multi-dimensional solution of fast neutrino conversions in binary neutron star merger remnants
JCAP01(2021)017, [arXiv:2009.01843](#) [astro-ph.HE]
8. Shashank Shalgar, **Ian Padilla-Gay**, Irene Tamborra
Neutrino propagation hinders fast pairwise flavor conversions
JCAP06(2020)048, [arXiv:1911.09110](#) [astro-ph.HE]

CONFERENCE PROCEEDINGS

9. V. M. Jaramillo-Pérez, **I. Padilla-Gay**, A. Diez-Tejedor, L. A. Ureña-López
Series solutions of single-field models of inflation,
2018 J. Phys.: Conf. Ser. **1030** 012008, DOI: [10.1088/1742-6596/1030/1/012008](#)
10. **Ian Padilla-Gay**, S. Shalgar, I. Tamborra. (2021, May 11)
Neutrino flavor conversions in binary neutron star merger remnants
XIX International Workshop on Neutrino Telescopes (Neutel 21), Padova, Italy (online)
Zenodo: <https://doi.org/10.5281/zenodo.4749280>
11. **Ian Padilla-Gay** (2020)
Neutrino Flavor Conversions in Compact Astrophysical Objects
The XXIX International Conference on Neutrino Physics (Neutrino 2020, online),
Zenodo: <https://doi.org/10.5281/zenodo.4122705>