

# CURRICULUM VITAE

Ian Padilla-Gay 

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## ACADEMIC POSITIONS

03/2023- **Postdoctoral Research Associate**  
present Elementary Particle Physics, Theory Group  
SLAC National Accelerator Laboratory and Stanford University, Menlo Park, United States  
Supervisors: Thomas G. Rizzo and Alexander Friedland, Senior Scientists

## EDUCATION

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

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

08/2017- **Master of Science (MSc) in Theoretical Physics**  
06/2019 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- **Bachelor of Science (BSc) in Physics**  
02/2017 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

- 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

## SCHOOLS AND PHD COURSES

- 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
- 04/2021 **Fundamentals of High-Energy Astrophysics and Particle Astrophysics**  
PhD course, University of Copenhagen, Denmark

- 10/2020    **Introduction to University Pedagogy**  
PhD course, University of Copenhagen, Denmark
- 02/2020    **Compact Objects For All - Workshop**  
Lund Observatory, Lund, Sweden
- 01/2020    **Responsible Conduct Research**  
PhD course, University of Copenhagen, Denmark
- 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 of the following courses at the University of Copenhagen:

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

## COMPUTER SKILLS

Advanced   Python, TensorFlow, Fortran90, C, C++, Mathematica, MatLab, Bash, OpenMP, MPI, L<sup>A</sup>T<sub>E</sub>X

## EXTRACURRICULAR ACTIVITIES

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

## REFEREES

The following senior scientists are familiar with my academic trajectory and current research activity:

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

## ORIGINAL RESEARCH PAPERS

The following papers follow the convention that the authors appear according to their contribution to the publication, except for publication **JHEP11(2021)079** which follows the alphabetical order convention:

1. **Ian Padilla-Gay**, Irene Tamborra, Georg G. Raffelt  
*Neutrino Fast Flavor Pendulum. II. Collisional Damping*  
**Phys. Rev. D** **106**, 103031 (2022), [arXiv:2209.11235](https://arxiv.org/abs/2209.11235) [hep-ph].
2. **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](https://arxiv.org/abs/2109.14627) [astro-ph.HE].
3. **Ian Padilla-Gay**, Shashank Shalgar  
*Fast flavor conversion of neutrinos in presence of matter bulk velocity*  
Submitted to **Phys. Rev. D**, [arXiv:2108.00012](https://arxiv.org/abs/2108.00012) [astro-ph.HE].
4. Dipankar Das, P.M. Ferreira, António P. Morais, **Ian Padilla-Gay**, Roman Pasechnik, J. Pedro Rodrigues  
*A three Higgs doublet model with symmetry-suppressed flavour changing neutral currents*  
**JHEP11(2021)079**, [arXiv:2106.06425](https://arxiv.org/abs/2106.06425) [hep-ph]
5. **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](https://arxiv.org/abs/2009.01843) [astro-ph.HE]
6. Shashank Shalgar, **Ian Padilla-Gay**, Irene Tamborra  
*Neutrino propagation hinders fast pairwise flavor conversions*  
**JCAP06(2020)048**, [arXiv:1911.09110](https://arxiv.org/abs/1911.09110) [astro-ph.HE]

## CONFERENCE PROCEEDINGS

7. 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](https://doi.org/10.1088/1742-6596/1030/1/012008)
8. **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>
9. **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>