

MATHEUS HOSTERT

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EDUCATION

PhD in Theoretical Physics – Durham University, United Kingdom OCT. 2015 - SEP. 2019
Research at the Institute for Particle Physics Phenomenology (IPPP), Durham University.
Dissertation: *Hidden Physics at the Neutrino Frontier: Tridents, Dark Forces, and Hidden Particles*.
Dissertation Committee: Profs. David Cerd  o and Joachim Kopp.
Supervisor: Prof. Silvia Pascoli.

Bachelors degree in Physics – Federal University of Santa Catarina, Brazil MAR. 2011 - JUN. 2015
Year abroad at Durham University (SEPT. 2013 - SEPT. 2014) and honors course on advanced mathematics.

ACADEMIC POSITIONS

Joint Post-Doctoral Position OCT. 2019 - PRESENT
Researcher at the William I. Fine Theoretical Physics Institute, University of Minnesota, and the Perimeter Institute. Working with Prof. Maxim Pospelov on theories beyond the Standard Model, focusing on neutrinos and dark sectors.

FELLOWSHIPS AND AWARDS

Science without Borders PhD scholarship (SEPT. 2015): excellence-based Brazilian scholarship for a full PhD abroad.

Science without Borders Undergraduate scholarship (SEPT. 2013): excellence-based Brazilian scholarship for one year of undergraduate studies abroad.

Research poster awards: NuPhys 2017, NuPhys 2018, and Neutrino 2020.

ACADEMIC ENGAGEMENT

TRAINING AND RESEARCH PLACEMENTS

- **InvisiblesPLUS network**, August 2019: one month at Nevis Laboratories, Columbia University, working with Prof. Georgia S. Karagiorgi and Dr. Mark Ross-Lonergan on MicroBooNE.
- **InvisiblesPLUS network**, July 2019: one month at Lawrence Berkeley National Laboratory, point of contact: Prof. Christian Bauer.
- **InvisiblesPLUS network**, April to June 2018: two month placement at Fermilab, working with Prof. Pedro Machado.
- **Undergraduate research**, 2015: undergraduate research under the supervision of Profs. D  bora P. Menezes and Marcus E. B. Pinto studying symmetry non-restoration in quantum field theory.

- **IPPP summer student**, June to September 2014: undergraduate research on neutrino oscillations under the supervision of Prof. Silvia Pascoli.
- **Volunteer UG researcher**, 2013: volunteer undergraduate researcher under the supervision of Prof. Débora P. Menezes studying equations of state for stellar remnants.

EXPERIMENTAL COLLABORATIONS

- External **MicroBooNE** collaborator and one of the main analyzers in a search for neutrino-induced e^+e^- events.
- Member of the **Deep Underground Neutrino Experiment (DUNE)** collaboration.

TEACHING AND MENTORING

- **Durham University tutor**, 2016 to 2018: Led 2nd year physics students in problem classes on advanced classical mechanics and quantum theory.
- **UFSC tutor**, 2012 to 2013: Invited tutor teaching first year students university-wide on classical mechanics at Federal University of Santa Catarina (UFSC).

EVENT ORGANIZATION AND COMMUNITY ENGAGEMENT

- **Weak Interactions and Neutrinos 2021**: co-chair of local organizing committee for [WIN 2021](#).
- **Snowmass 2021**:
 - submitted a letter of intent ([LoI](#)) on “Opportunities and signatures of non-minimal Heavy Neutral Leptons” with over 113 endorsers.
 - convener for a chapter in the “New Physics Searches at Kaon and Hyperon Factories” white paper.
- **Young Theorists Forum 9, 10 and 11**: one of the main organizers for [YTF](#), a two day conference aimed at early career researchers in the UK.

SCIENCE OUTREACH

- **Celebrate Science 2018**: volunteer in regional [outreach event](#) for schools in County Durham.
- **Orkney Science Festival 2018**: volunteer in the [International Orkney Science Festival](#), visiting schools in remote islands of the Orkney archipelago in the north of Scotland.
- **Royal Society Summer Exhibition 2017 and 2018**: event organizer for the [modelling the invisible](#) exhibition on Monte-Carlo and Dark Matter searches; volunteer at the [ghosts in the universe](#) exhibition on neutrinos.
- **Pint of Science 2017**: event manager for local outreach event in County Durham.

INVITED SEMINARS AND CONFERENCE PRESENTATIONS

1. **McGill University** (Canada): 05/21, invited seminar.
2. **ETH, Zurich** (Switzerland): 04/21, invited seminar.
3. **C3P, UCLouvain** (Belgium): 04/21, invited seminar.
4. **American Physics Society April Meeting** (USA): 04/21, parallel talk.
5. **Carleton University** (Canada): 04/21, invited seminar.
6. **University of California Santa Cruz** (USA): 03/21, invited seminar.
7. **Neutrino Seminar, Fermilab** (USA): 03/21, invited seminar.
8. **XIX International Workshop on Neutrino Telescopes** (Italy): 02/21, parallel talk.
9. **Snowmass Dark Sector Studies at High Intensities Frontier** (USA): *New signatures and opportunities with dark neutrino sectors*, invited talk.

10. **3rd South American Dark Matter Workshop** (ICTP, São Paulo): 10/20, contributed talk.
11. **CAHEP** (Central American meeting of High Energy Physics, Cosmology and High Energy Astrophysics): 11/20, invited plenary talk.
12. **PIKIMO 9** (Kentucky, USA): 10/20, contributed seminar.
13. **Snowmass Baryon and Lepton Number Violating Processes workshop** (USA): 10/20, invited talk.
14. **Snowmass Theory of neutrino physics mini-workshop** (USA): *Opportunities and signatures of non-minimal HNLs*, 09/20.
15. **Snowmass Neutrino Frontier 03 kick-off meeting** (USA): 09/20, invited talk.
16. **ICHEP 2020** (Prague, Czech Republic): 07/20, contributed poster and short talk.
17. **Neutrino 2020** (University of Chicago, USA): 06/20, award winning poster and short talk.
18. **JGU Theorie Palaver** (Mainz, Germany): 06/20, invited seminar.
19. **Phenomenology Symposium 2020** (Pittsburgh, USA): 05/20, invited [parallel talk](#).
20. **Brookhaven Neutrino Theory Virtual Seminars** (BNL, USA): 05/20, [invited talk](#).
21. **Fermilab Theory Seminar** (FNAL, USA): 02/20, invited seminar.
22. **NuPhys 2019** (London, UK): 12/19, invited plenary talk.
23. **CERN Neutrino Platform Week 2019:** (CERN, Switzerland): *A Light Dark Neutrino Sector*, invited plenary talk, [10.5281/zenodo.3509916](https://doi.org/10.5281/zenodo.3509916).
24. **Columbia University** (New York, USA): *A light dark neutrino sector*, invited seminar.
25. **μ BooNE Collaboration:** *A light dark neutrino sector*, invited seminar.
26. **Invisibles Workshop 2019** (Valencia, Spain): *A light dark neutrino sector*, [PhD forum talk](#).
27. **Neutrino Theory Network Workshop, Washington U.** (St Louis, USA): *New physics in rare neutrino processes*, [invited talk](#).
28. **IFIC, Valencia** (Valencia, Spain): *A light dark neutrino sector*, [invited seminar](#).
29. **Prospects of Neutrino Physics, IPMU** (Tokyo, Japan): *New physics in rare neutrino processes*, [invited plenary talk](#).
30. **Queen Mary University of London** (London, UK): *A light dark neutrino sector*, [invited seminar](#).
31. **NuPhys2018** (London, UK): *A Ligh Dark Neutrino Sector*, award-winning poster presentation.
32. **PONDD** (FNAL, USA): *New physics in neutrino scattering*, [invited plenary talk](#).
33. **Max-Planck-Institut für Kernphysik** (Heidelberg, Germany): *Rare neutrino scattering probing new physics*, [invited seminar](#).
34. **Neutrino Oscillation Workshop 2018** (Brindisi, Italy): *Neutrino trident production at near detectors*, [invited parallel talk](#).
35. **NuFact 2018** (Virginia, USA): *Neutrino tridents at DUNE*, [invited parallel talk](#).
36. **Near detector workshop 2018** (CERN, Switzerland): Near detector physics with neutrino experiments, see [invited plenary talk](#).
37. **Perimeter Institute** (Waterloo, Canada, 2018): *Current status of short-baseline oscillations*, invited seminar.
38. **Phenomenology Symposium 2018** (Pittsburgh, USA): *Leptophilic Z' s in neutrino scattering*, [invited parallel talk](#).
39. **Fermilab Theory Seminar** (FNAL, USA): *Neutrino trident production at near detectors*, [invited seminar](#).

40. **NuPhys2017** (London, UK): *Smiting new physics with neutrino tridents*, award-winning poster presentation.
41. **UK High Energy Physics Forum 2017** (Abingdon, UK): *Searching for new physics with neutrino tridents*, poster presentation.
42. **Invisibles Workshop 2017** (Zurich, Switzerland): *Not-so-light-sterile neutrinos at ν STORM*, [PhD forum](#) and poster presentation.
43. **NuPhys 2016** (London, UK): *Exploring Decoherence and CP violation at ν STORM with eV scale steriles*, poster presentation followed by proceedings.

PUBLICATIONS

Peer-reviewed publications:

1. “Pair production of dark particles in meson decays”, M. Hostert, K. Kaneta and M. Pospelov, [arXiv:2005.07102](#), submitted to Phys.Rev.D 102 055016 (2020).
2. “Dark Neutrinos and a Three Portal Connection to the Standard Model”, P. Ballett, M. Hostert, S. Pascoli, [arxiv:1903.07589](#), Phys.Rev.D 101 115025 (2020).
3. “Neutrino Non-Standard Interactions: A Status Report”, [arXiv:1907.00991](#), *SciPost Phys.Proc.* 2 (2019) 001.
4. “White Paper on New Opportunities at the Next-Generation Neutrino Experiments (Part 1: BSM Neutrino Physics and Dark Matter)”, [arXiv:1907.08311](#), Reports on Progress in Physics, Volume 83, Number 12.
5. “Testing New Physics Explanations of MiniBooNE Anomaly at Neutrino Scattering Experiments”, C. Argüelles, M. Hostert and Y. Tsai, [arXiv:1812.08768](#), Phys.Rev.Lett. 123 (2019) no.26, 261801.
6. “Neutrino Masses from a Dark Neutrino Sector below the Electroweak Scale”, P. Ballett, M. Hostert and S. Pascoli, [arxiv:1903.07590](#), Phys.Rev.D 99 (2019) 091701.
7. “Z' in neutrino scattering at DUNE”, P. Ballett, M. Hostert, S. Pascoli, Y. F. Perez-Gonzalez, Z. Tabrizi and R. Z. Funchal, [arXiv:1902.08579](#), Phys.Rev.D 100 (2019) 055012.
8. “Neutrino trident scattering at near detectors”, P. Ballett, M. Hostert, S. Pascoli, Y. F. Perez-Gonzalez, Z. Tabrizi and R. Z. Funchal, [arXiv:1807.10973](#), JHEP 1901 (2019) 119.

Preprints:

1. “Feebly-Interacting Particles:FIPs 2020 Workshop Report”, Agrawal, Prateek et al, [arXiv:2102.12143](#).
2. “Novel multi-lepton signatures of dark sectors in light meson decays”, M. Hostert and M. Pospelov, [arXiv:2012.02142](#), to be submitted to Phys.Rev.D.
3. “Constraints on Decaying Sterile Neutrinos from Solar Antineutrinos”, M. Hostert and M. Pospelov, [arXiv:2007.11813](#), submitted to Phys.Rev.D.
4. “A Dark Seesaw Solution to Low Energy Anomalies: MiniBooNE, the muon ($g-2$), and BaBar”, A. Abdullahi, M. Hostert and S. Pascoli, [arXiv:2007.11813](#), submitted to Phys.Lett.B.

Non-peer reviewed publications

1. “Neutrino trident production at near detectors”, M. Hostert, PoS (NOW2018) 037. Proceedings from [NOW2018](#).
2. “Light Sterile Neutrinos at ν STORM: Decoherence and CP violation”, P. Ballett, M. Hostert and S. Pascoli, [arXiv:1705.09214](#), [NuPhys2016](#), ePrint Proceedings.