

## MATHEUS HOSTERT

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### ACADEMIC POSITIONS

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#### Joint Post-Doctoral Position

OCT. 2019 - PRESENT

Researcher at the William I. Fine Theoretical Physics Institute, University of Minnesota, and the Perimeter Institute.

### EDUCATION

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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.

### FELLOWSHIPS AND AWARDS

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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: Neutrino 2020, NuPhys 2018, and NuPhys 2017.

### ACADEMIC ENGAGEMENT

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#### TRAINING AND RESEARCH PLACEMENTS

- **InvisiblesPLUS network**, 2019: one month at Nevis Laboratories, Columbia University, working with Prof. Georgia S. Karagiorgi and Dr. Mark Ross-Lonergan on MicroBooNE.
- **InvisiblesPLUS network**, 2019: one month at Lawrence Berkeley National Laboratory, point of contact: Prof. Christian Bauer.
- **InvisiblesPLUS network**, 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**, 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. D  bora 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 collaborations for the future experimental projects DUNE,  $\nu$ STORM, and IsoDAR.

## TEACHING AND MENTORING

- **Student mentoring:** currently mentors three PhD students in on-going projects: Asli Abdullahi (Durham University), Daniele Massaro (Univeristy of Bologna), and Nicolò Foppiani (Harvard University).
- **Graduate tutor**, 2016 to 2018: led 2nd year physics students in problem classes on advanced classical mechanics and quantum theory.
- **Undergraduate tutor**, 2012 to 2013: invited tutor for university-wide program mentoring first year students at Federal University of Santa Catarina (UFSC).

## COMMUNITY ENGAGEMENT

- **Co-chair:** of the workshop on Weak Interactions and Neutrinos (WIN) 2021.
- **Convener:** for the IceDune workshop.
- **Snowmass 2021:** main author of a letter of intent on “Opportunities and signatures of non-minimal Heavy Neutral Leptons” with over 113 endorsers.
- **Snowmass white paper editor:** for the NF02 subgroup white paper on sterile neutrinos, and for the “New Physics Searches at Kaon and Hyperon Factories” white paper.
- **Local organizer:** one of the main event organizers for Young Theorists Forums 9, 10, and 11, 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.

## PUBLICATIONS

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### Peer-reviewed publications:

1. “*A Dark Seesaw Solution to Low Energy Anomalies: MiniBooNE, the muon ( $g-2$ ), and BaBar*”, A. Abdullahi, M. Hostert and S. Pascoli, 2007.11813, Phys. Lett. B 820 136531 (2021).
2. “*Pair production of dark particles in meson decays*”, M. Hostert, K. Kaneta and M. Pospelov, 2005.07102, submitted to Phys.Rev.D 102 055016 (2020).
3. “*Dark Neutrinos and a Three Portal Connection to the Standard Model*”, P. Ballett, M. Hostert, S. Pascoli, 1903.07589, Phys.Rev.D 101 115025 (2020), **citations: 30**.
4. “*Neutrino Non-Standard Interactions: A Status Report*”, 1907.00991, SciPost Phys.Proc. 2 (2019) 001.
5. “*White Paper on New Opportunities at the Next-Generation Neutrino Experiments (Part 1: BSM Neutrino Physics and Dark Matter)*”, 1907.08311, Reports on Progress in Physics, Volume 83, Number 12.
6. “*Testing New Physics Explanations of MiniBooNE Anomaly at Neutrino Scattering Experiments*”, C. Argüelles, M. Hostert and Y. Tsai, 1812.08768, Phys.Rev.Lett. 123 (2019) no.26, 261801, **citations: 41**.

7. “*Neutrino Masses from a Dark Neutrino Sector below the Electroweak Scale*”, P. Ballett, M. Hostert and S. Pascoli, 1903.07590, Phys.Rev.D 99 (2019) 091701, **citations: 26**.
8. “*Z' in neutrino scattering at DUNE*”, P. Ballett, M. Hostert, S. Pascoli, Y. F. Perez-Gonzalez, Z. Tabrizi and R. Z. Funchal, 1902.08579, Phys.Rev.D 100 (2019) 055012, **citations: 33**.
9. “*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, **citations: 27**.

#### Preprints:

1. “*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.
2. “*Constraints on Decaying Sterile Neutrinos from Solar Antineutrinos*”, M. Hostert and M. Pospelov, arXiv:2007.11813, submitted to Phys.Rev.D.

#### Non-peer reviewed publications

1. “*Feebly-Interacting Particles:FIPs 2020 Workshop Report*”, Agrawal, Prateek et al , arXiv:2102.12143.
2. “*Neutrino trident production at near detectors*”, M. Hostert, PoS (NOW2018) 037. Proceedings from NOW2018.
3. “*Light Sterile Neutrinos at  $\nu$ STORM: Decoherence and CP violation*”, P. Ballett, M. Hostert and S. Pascoli, arXiv:1705.09214, NuPhys2016, ePrint Proceedings.

## INVITED SEMINARS AND CONFERENCE PRESENTATIONS

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1. NuSTORM coll. meeting: 05/21, invited talk.
2. APS DPF meeting 2021 (USA): 05/21, parallel talk.
3. McGill University (Canada): 05/21, invited seminar.
4. ETH, Zurich (Switzerland): 04/21, invited seminar.
5. C3P, UCLouvain (Belgium): 04/21, invited seminar.
6. American Physics Society April Meeting (USA): 04/21, parallel talk.
7. Carleton University (Canada): 04/21, invited seminar.
8. University of California Santa Cruz (USA): 03/21, invited seminar.
9. **Neutrino Seminar, Fermilab (USA): 03/21, invited seminar.**
10. XIX International Workshop on Neutrino Telescopes (Italy): 02/21, parallel talk.
11. Snowmass Dark Sector Studies at High Intensities Frontier (USA): 10/20, invited talk.
12. 3rd South American Dark Matter Workshop (ICTP, São Paulo): 10/20, contributed talk.
13. **CAHEP (Central America): 11/20, invited plenary talk.**
14. PIKIMO 9 (Kentucky, USA): 10/20, contributed seminar.
15. Snowmass Baryon and Lepton Number Violating Processes workshop (USA): 10/20, invited talk.
16. Snowmass Theory of neutrino physics mini-workshop (USA): 09/20, invited talk.
17. Snowmass Neutrino Frontier 03 kick-off meeting (USA): 09/20, invited talk.
18. ICHEP 2020 (Prague, Czech Republic): 07/20, contributed poster and short talk.
19. **Neutrino 2020 (University of Chicago, USA): 06/20, award winning poster and short talk.**
20. JGU Theorie Palaver (Mainz, Germany): 06/20, invited seminar.
21. Phenomenology Symposium 2020 (Pittsburgh, USA): 05/20, invited parallel talk.

22. Brookhaven Neutrino Theory Virtual Seminars (BNL, USA): 05/20, invited talk.
23. Fermilab Theory Seminar (FNAL, USA): 02/20, invited seminar.
24. **NuPhys 2019 (London, UK): 12/19, invited plenary talk.**
25. **CERN Neutrino Platform Week 2019: (CERN, Switzerland): 08/19, invited plenary talk.**
26. Columbia University (New York, USA): 07/19, invited seminar.
27.  $\mu$ BooNE Collaboration: 07/19, invited talk.
28. Invisibles Workshop 2019 (Valencia, Spain): 05/19 PhD forum talk.
29. Neutrino Theory Network Workshop, Washington U. (St Louis, USA): invited talk.
30. IFIC, Valencia (Valencia, Spain): (05/19), invited seminar.
31. **Prospects of Neutrino Physics, IPMU (Tokyo, Japan): 04/19, invited plenary talk.**
32. Queen Mary University of London (London, UK): , invited seminar.
33. **NuPhys2018 (London, UK): 12/18 award-winning poster presentation.**
34. **PONDD (FNAL, USA) (12/18): invited plenary talk.**
35. Max-Planck-Institut für Kernphysik (Heidelberg, Germany): 11/18, invited seminar.
36. Neutrino Oscillation Workshop 2018 (Brindisi, Italy): 09/21, invited parallel talk.
37. NuFact 2018 (USA): 08/18, invited parallel talk.
38. **Near detector workshop 2018 (CERN, Switzerland) (06/18): invited plenary talk.**
39. Perimeter Institute (Canada): 06/18, invited seminar.
40. Phenomenology Symposium 2018 (Pittsburgh, USA): 05/18, invited parallel talk.
41. Fermilab Theory Seminar (FNAL, USA): 05/18, invited seminar.
42. **NuPhys2017 (London, UK): 12/18 award-winning poster presentation.**
43. UK High Energy Physics Forum 2017 (UK): 10/17, poster presentation.
44. Invisibles Workshop 2017 (Zurich, Switzerland): 06/17, PhD forum and poster presentation.
45. NuPhys 2016 (London, UK): 12/16 poster presentation and proceedings.