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PROFESSIONAL APPOINTMENTS

Niels Bohr Institute	**Associate Professor**	Sept 2018 - present
- University of Copenhagen	**Assistant Professor**	Sept 2013 - Sept 2018
The Pennsylvania State University	**Postdoctoral Research Associate**	Jun 2009 - Aug 2013
	Research Assistant	Nov 2008 - May 2009

EDUCATION

University College London	**Ph.D., Physics**	2010
University of Minnesota-Duluth	**M.S., Physics**	2005
Rensselaer Polytechnic Institute	**B.S., Physics**	2002

RESEARCH & INSTITUTIONAL RESPONSIBILITIES

IceCube Experiment
2008 - present

• *Publication Committee* member 2017-2021

Review IceCube journal articles and conference proceedings as part of a internal pre-submission process. The committee provides recommendations to the collaboration and paper authors regarding best practices.

• *Low-energy & Neutrino Oscillation working group* co-convenor 2014-2017

In addition to the low-energy work (partially detailed below), I oversaw all physics analysis and publications related to neutrino oscillation: tau neutrino appearance, muon neutrino disappearance, sterile neutrino searches, Lorentz invariance, neutrino mass ordering, etc. This covered ≈ 20 active analyzers at 11 different international universities.

• *Low-energy working group* co-convenor 2012-2014

Responsible for the data quality, Monte Carlo simulation tools, and initial background rejection and reconstruction techniques related to all physics analyses at neutrino energies $< \mathcal{O}(300)$ GeV.

• *Simulation Coordination Committee* representative 2012-2014

Prioritize and allocate the IceCube collaboration-wide computer resources which produce Monte Carlo simulation.

• *Institution Leader* of the Niels Bohr Institute to the IceCube Board 2013-present

Lead all IceCube-DeepCore-Upgrade research and responsibilities at NBI.

• *Tau Neutrino Appearance*: Use neutrino angle and energy information to look for $\nu_\mu \rightarrow \nu_\tau$ oscillation in the DeepCore detector, to measure the amount of ν_τ in the 3^{rd} mass eigenstate, $|U_{\tau 3}|^2$.

PINGU & IceCube Upgrade
2010 - present

• The goal of the Precision IceCube Next Generation Upgrade (PINGU) is to infill the DeepCore sub-array and lower the neutrino energy threshold to $\mathcal{O}(1)$ GeV while maintaining a multi-megaton fiducial volume. The PINGU effort has led to funding of a PINGU-like extension known as the 'IceCube Upgrade' planned for 2025/26 with the primary goal of a sub-10% precision on tau neutrino appearance. My group leads the simulation, reconstruction, event selection, and analysis efforts for the IceCube-Upgrade to enhance the DeepCore neutrino oscillation searches.

MINOS Experiment
1999 - 2008

• Ph.D. Thesis: "*MINOS sterile neutrino search*".

• Master Thesis: "*An overview of the Main Injector Neutrino Oscillation Search, the Rack Protection System and methods to degauss a large iron calorimeter particle detector*".

PROFESSIONAL ACTIVITIES

• Lecturer at the 2020 *Young Experimentalists and Theorists Institute School* (YETI 2020)

• Organizer and host of the *IceCube-Upgrade Simulation and Reconstruction Workshop* in 2018

• Convenor of the 'Tau Neutrino Studies' working group at the 2017 *Viet Nus workshop* focusing on neutrino challenges and limitations

• Guest Lecturer at the 2016 Niels Bohr International Academy Ph.D. school *Neutrinos Underground and in the Heavens II*

• Organizer and host of the 2015 Autumn IceCube collaboration meeting in Copenhagen

• Reviewer for French National Research Agency (ANR) – 2015, 2021

• Reviewer for UK Science and Technology Facilities Council (STFC) – 2021

• Lecturer at the 2015 *Nordic Winter School on Cosmology and Particle Physics*

• Lecturer at the 2014 Niels Bohr International Academy Ph.D. school *Neutrinos Underground and in the Heavens*

• Board member of the *Discovery Center for Particle Physics* at the Niels Bohr Institute 2014-2019

• Organizer of the 2014 *Astroparticle Neutrino Physics in Antarctica Workshop* hosted at the Niels Bohr Institute

• Chair or member of 6 Ph.D. thesis committees.

RESEARCH GRANTS

• Danish National Research Foundation: Center of Excellence – 'Discovery Center'
Partner, 2015-2019 – DKK 40M

• VILLUM FONDEN: Young Investigator Programme – 'Neutrinos on Ice'
Principal Investigator, 2016-2020 [proj. no. 13161] – DKK 4.91M

• CARLSBERG FOUNDATION: Semper Ardens: Accelerate – 'NuFront: Neutrinos at the Physics Frontier'
Principal Investigator, 2020-2025 [case no. CF19-0652] – DKK 4.5M

• Danmarks Frie Forskningfond (Independent Research Fund Denmark): Project 1 – 'Data-Driven Neutrino Discovery'
Principal Investigator, 2025-2028 – DKK 3.17M

ACADEMIC SUPERVISION

• Morton A. Medici (Ph.D. student) 2013-2017
- Ph.D. Thesis Topic: *Search for Dark Matter Annihilation in the Galactic Halo using IceCube*

• Michael J. Larson (Ph.D. student) 2014-2018
- Ph.D. Thesis Topic: *Tau Neutrino Appearance in IceCube-DeepCore*

• Étienne Bourbeau (Ph.D. student) 2017-2021
- Ph.D. Thesis Topic: *Tau Neutrino Appearance and Searches for Neutrino Multiplet Correlations with Galaxies of* $Z < 0.03$

• Tetiana Kozynets (M.Sc. and Ph.D. student) 2019-present
- Master Thesis Topic: *MCEq*
- Ph.D. Thesis Topic: *Atmospheric neutrino oscillations in IceCube-DeepCore and development of a non-unitary analysis framework*

• Master Students [19 Total]
- Eva Hansen (2015-2016), Mikkel Jensen (2016-2018), Mia-Louise Nielsen (2018-2019), Thomas Halberg (2018-2019), Ida Storehaug (2018-2019), Kasper Pedersen (2020-2021), Sofus Stray (2020-2021), Jonathan Jegstrup (2020-2021), Martin Ravn (2021-2022), Marc Jacquart (EPFL/NBI 2022), Linea Hedemark (2022-2023), Jorge González (2022-2023), Amalie Albrechtsen (2022-2023), Moust Holmes (2022-2023), Johann Ioannou-Nikolaides (ERASMUS+/LMU-Munich/NBI 2023-2024), Simon Thor (KTH-Stockholm/NBI 2024), Simon Ørgaard (2024-present), Frederikke Rasmussen (2024-present), Jack Parkinson (2024-present)

• Bachelor Students [14 Total]
- Hans R. L. Larsen (2014), Itaakara Robertson (2015), Christopher Nielsen (2016), Leif Rasmussen & Christian Skjellerup (2017), Jon Søndergaard (2019), Marie Hansen (2019), Amalie Albrechtsen (2020), Mikkel Jensen & Jonas Jensen (2020), Linea Hedemark (2021), Clotilde Prætorius (2023), Simon Hilding-Nørkjær (2024), Jakob Frederiksen (2024)

• Thomas Stuttard (Postdoctoral Researcher) 2016-present

• James Mead (Postdoctoral Researcher) 2020-2022

CONFERENCES & INTERNATIONAL WORKSHOPS

19. *Global Neutrino Fits and Atmospheric Neutrinos*
Atmospheric Neutrinos: Experiments and Phenomenology - IFIC, Valencia, Spain -

December 5, 2024.

18. *$\mathcal{O}$(10-100) GeV Neutrino Astronomy*
Extragalactic and Galactic Neutrino Astronomy Workshop - Nordita, Stockholm, Sweden - July 15, 2024.

17. *IceCube Results*
LHC Days in Split - Split, Croatia - October 7, 2022.

16. *Neutrino Oscillations with IceCube and the IceCube Upgrade*
TeV Particle Astrophysics 2022(TeVPA) - Queen's University, Canada - August 8, 2022.

15. *Experimental techniques: IceCube atmospherics*
Workshop on Tau Neutrinos from GeV to EeV 2021 - Virtual/Online - September 29, 2021.

14. *IceCube - Particle Physics and Astrophysics on Ice*
Nordic Conference on Particle Physics - Skeikampen, Norway - January 3, 2020.

13. *IceCube and Gen2: Atmospheric and Oscillation Results and Status*
Next Generation Nucleon Decay and Neutrino Detectors (NNN17) - University of Warwick - October 27, 2017.

12. *Neutrino Physics with the PINGU Extension to IceCube*
TeV Particle Astrophysics 2016 (TeVPA) - CERN - September 12, 2016.

11. *Atmospheric neutrino results from IceCube/DeepCore and plans for PINGU*
The XXVII International Conference on Neutrino Physics and Astrophysics (Neutrino 2016) - Imperial College London - July 6, 2016.

10. *Neutrino Oscillation and Resolving the Neutrino Mass Ordering*
ICNFP2015: International Conference on New Frontiers in Physics - Kolymbari, Greece - August 29, 2015.

9. *Future Atmospheric Neutrino Experiments*
NuPhys2014: Prospects in Neutrino Physics - Queen Mary University of London - December 16, 2014.

8. *IceCube Results and PINGU Perspectives*
Neutrino Oscillation Workshop - Conca Specchiulla, Italy - September 12, 2014.

7. *Results from IceCube and Prospects for PINGU*
Interplay of Particle and Astroparticle Physics - Queen Mary University of London - August 19, 2014.

6. *Dark Matter Searches and Astrophysical Neutrinos in IceCube*
Origin of Mass 2014 - CP^3 Origins - May 22, 2014.

5. *PINGU: Resolving the Neutrino Mass Hierarchy at the South Pole*
New Directions in Neutrino Physics - Aspen Center for Physics - February 7, 2013.

4. *PINGU and O(1) GeV cross-sections*
Flux Measurement and Determination in the Intensity Frontier Era Neutrino Beams - University of Pittsburgh - December 7, 2012.

3. *IceCube, DeepCore, and PINGU*
Next Generation Nucleon Decay and Neutrino Detectors (NNN12) - Fermilab - October 5, 2012.

2. *IceCube-DeepCore*
Implications of Neutrino Flavor Oscillations (INFO11) - Santa Fe, New Mexico - June

7, 2011.

1. *IceCube Neutrino Telescope*
   23^{rd} International Workshop on Weak Interactions and Neutrinos (WIN'11) - Cape Town, South Africa - January 31, 2011.

INVITED COLLOQUIA & SEMINARS

30. *Big questions, small particles, and a gigaton of ice at the South Pole*
    Ole Rømer Colloquium - Aarhus University - October 25, 2023.
29. *Big questions, small particles, and a gigaton of ice at the South Pole*
    Physics Colloquium - Harvard University - September 26, 2022.
28. *IceCube and Neutrinos: Chasing Ghost Particles at the South Pole*
    Mathematics and Physics Seminar - Roskilde University - September 16, 2020.
27. *IceCube and Neutrinos: Chasing Ghost Particles at the South Pole*
    Kongsberg Science Forum - University of South-Eastern Norway - January 24, 2020.
26. *Fundamental Neutrino Physics with a Gigaton of Ice*
    Experimental Particle and Astro-Particle Physics Seminar - University of Zurich - May 28, 2018.
25. *Fundamental Neutrino Physics with a Gigaton of Ice*
    Particle Physics Seminar - University of Oxford - May 1, 2018.
24. *Neutrinos on Ice*
    Annual Meeting of the Danish Physical Society - Fænø Sund - May 22, 2017.
23. *Neutrinos on Ice*
    Oskar Klein Center Colloquium - University of Stockholm - February 21, 2017.
22. *Neutrinos on Ice: Using IceCube to Chase a Ghost Particle*
    Physics and Astronomy Colloquium - University of Southampton - October 10, 2014.
21. *Using the IceCube Neutrino Observatory to Study Inner and Outer Space*
    DTU Space Seminar - Technical University of Denmark - December 5, 2013.
20. *Connecting Inner and Outer Space: Astroparticle Physics Big and Small*
    Annual Meeting of the Danish Physical Society - University of Copenhagen - November 14, 2013.
19. *PINGU: Neutrino Hierarchy Determination at the South Pole*
    Intensity Frontier Department Physics Discussions - Fermilab - April 11, 2013.
18. *IceCube-DeepCore-PINGU: Neutrino Physics at the South Pole*
    Astro/Particle Seminar - University of Cincinnati - February 26, 2013.
17. *IceCube-DeepCore-PINGU: Neutrino Physics at the South Pole*
    Institute for Nuclear and Particle Astrophysics Seminar - Lawrence Berkeley National Laboratory - February 22, 2013.
16. *IceCube-DeepCore-PINGU: Neutrino Physics at the South Pole*
    Discovery Center Seminar - Niels Bohr Institute - February 20, 2013.
15. *IceCube-DeepCore-PINGU: Neutrino Physics at the South Pole*
    Nuclear/Particle Physics Seminar - University of Colorado at Boulder - February 11, 2013.
14. *IceCube-DeepCore-PINGU: Neutrino Physics at the South Pole*
    Laboratory for Particle Physics and Cosmology Seminar - Harvard University - December 12, 2012.
13. *IceCube-DeepCore-PINGU: Neutrino Physics at the South Pole*
    Lunchtime Seminar - Massachusetts Institute of Technology - December 11, 2012.
12. *Neutrinos at the South Pole*

Particle Physics Seminar - Universität Würzburg - September 27, 2012.

11. *IceCube-DeepCore-PINGU: Atmospheric Neutrino Physics at the South Pole*
Particle Physics Seminar - Brookhaven National Laboratory - September 6, 2012.
10. *Neutrino Oscillations at the South Pole*
Nuclear/Particle/Astro/Cosmo Forum - University of Wisconsin-Madison - February 27, 2012.
9. *IceCube-DeepCore-PINGU: Fundamental Neutrino Physics at the South Pole*
Nuclear Physics, Astronomy, and Astrophysics Joint Seminar - Stony Brook University - December 8, 2011.
8. *IceCube-DeepCore-PINGU: Neutrino Physics at the South Pole*
Physics Seminar - University of Minnesota-Duluth - November 15, 2011.
7. *IceCube-DeepCore: The biggest little neutrino detector at the South Pole*
Particle Seminar - Columbia University - March 9, 2011.
6. *DeepCore - Extending the energy reach of neutrinos in IceCube*
Physics and Astronomy Colloquium - University of Alabama - December 1, 2010.
5. *Neutrino Oscillations and (dis)appearance prospects for IceCube-DeepCore*
CCAPP Seminar - The Ohio State University's Center for Cosmology and AstroParticle Physics - October 19, 2010.
4. *Initial Sterile Neutrino results from MINOS*
New Perspectives - Fermilab - June 3, 2008.
3. *NuMI Muon Monitor Studies and First Results from the MINOS Sterile Neutrino Search*
HEP Astrophysics Seminar - Pennsylvania State University - May 15, 2008.
2. *NuMI Muon Monitor Studies and First Results from the MINOS Sterile Neutrino Search*
Neutrino Physics Seminar - Lawrence Berkeley National Laboratory - May 13, 2008.
1. *NuMI Muon Monitor Studies and First Results from the MINOS Sterile Neutrino Search*
Joint HEP Neutrino Physics Seminar - University of Wisconsin-Madison - April 25, 2008.

OTHER PRESENTATIONS & OUTREACH

I am committed to science outreach and my group hosts events at KBH Kulturnatten, day-long workshops for high school students, contributions to museum art collections, walking tours at the 2019 BLOOM festival, evening lectures for Folkeuniversitet i København and Aalborg, and much more. With Assoc. Prof. Markus Ahlers, we organize topics, provide lectures, and host high school students doing their 'Studieretningsprojektet' (SRP) – research based project conducting during the final year of high school.

• *IceCube: Neutrinos at the South Pole*
Fysikstuderende i Danmark - Virtual/Online - April 22, 2021

• *Chasing Ghost Particles at the South Pole*
Akademiet for Talentfulde Unge - Virtual/Online - February 15, 2021

• *IceCube*
Danish National Astronomy Meeting - Odense, Denmark - June 17, 2014

• *Physics potential of the IceCube DeepCore detector*
Neutrino 2010 (poster session) - Athens, Greece - June 18, 2010.

• *Measurement of the NuMI Neutrino Flux using the Accompanying Muon Beam*
Users' Meeting (poster session) - Fermilab - June 6, 2007.

• *Flux from NuMI muon monitors*

The IOP Nuclear and Particle Physics Divisional Conference - University of Surrey, England - April 4, 2007.

Selected Publications

[1] R. Abbasi et al. First all-flavor search for transient neutrino emission using 3-years of IceCube DeepCore data. *JCAP*, 01:027, 2022. arXiv:2011.05096.

[2] M.G. Aartsen et al. Constraints on Neutrino Emission from Nearby Galaxies Using the 2MASS Redshift Survey and IceCube. *JCAP*, 07:042, 2020. arXiv:1911.11809.

[3] M. G. Aartsen et al. Measurement of Atmospheric Tau Neutrino Appearance with IceCube DeepCore. *Phys. Rev.*, D99(3):032007, 2019. arXiv:1901.05366.

[4] M. G. Aartsen et al. Multimessenger observations of a flaring blazar coincident with high-energy neutrino IceCube-170922A. *Science*, 361(6398):eaat1378, 2018. arXiv:1807.08816.

[5] M. G. Aartsen et al. Search for Neutrinos from Dark Matter Self-Annihilations in the center of the Milky Way with 3 years of IceCube/DeepCore. *Eur. Phys. J.*, C77(9):627, 2017. arXiv:1705.08103.

[6] M. G. Aartsen et al. Searches for Sterile Neutrinos with the IceCube Detector. *Phys. Rev. Lett.*, 117(7):071801, 2016. arXiv:1605.01990.

[7] M.G. Aartsen et al. Letter of Intent: The Precision IceCube Next Generation Upgrade (PINGU). 2014. arXiv:1401.2046.

[8] M.G. Aartsen et al. Measurement of the Atmospheric ν_e flux in IceCube. *Phys.Rev.Lett.*, 110:151105, 2013. arXiv:1212.4760.

[9] R. Abbasi et al. The Design and Performance of IceCube DeepCore. *Astropart.Phys.*, 35:615–624, 2012. arXiv:1109.6096.

[10] D. Jason Koskinen. IceCube-DeepCore-PINGU: Fundamental neutrino and dark matter physics at the South Pole. *Mod.Phys.Lett.*, A26:2899–2915, 2011.

[11] P. Adamson et al. Search for sterile neutrino mixing in the MINOS long baseline experiment. *Phys.Rev.*, D81:052004, 2010. arXiv:1001.0336.

[12] P. Adamson et al. Search for active neutrino disappearance using neutral-current interactions in the MINOS long-baseline experiment. *Phys.Rev.Lett.*, 101:221804, 2008. arXiv:0807.2424.

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