

Kevin J. Kelly

Curriculum Vitae

PERSONAL DETAILS

Location Fermilab Theory Group
Address PO Box 500, MS 106, Batavia, IL 60510
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EMPLOYMENT

Postdoctoral Research Associate 2018-Present
Fermi National Accelerator Laboratory (Theory Group)

EDUCATION

PhD Physics 2013-2018
Northwestern University, Advisor: Prof. André de Gouvêa
BSc. Physics, Mathematics 2009-2013
University of Notre Dame, Summa Cum Laude. Advisor: Prof. Michael Hildreth

COMMUNITY SERVICE

Journal Referee
Physical Review Letters, Physical Review D, Journal of High Energy Physics
Snowmass 2021
Snowmass Early Career Convener: BSM with Neutrinos (NF03) & Neutrino Theory (TF11).
White-paper contribution on self-interacting neutrinos forthcoming.
Mini-Workshop on Neutrino Theory: Co-Organized.
Neutrino University 2019
Lecture series organizer, Fermilab, June-August 2019
Fermilab Undergraduate Lecture Series
Summer 2020, speaker: "Introduction to Particle Physics"
Fermilab Saturday Morning Physics
2019-2020 sessions: lectures on special relativity
KICP Lifelong Learning Institute
Outreach talks, October 2019
Hidden Sector Fixed Target Experiments at Fermilab Symposium
Organizer, Fermilab, September 2019
Physics Opportunities at the Near DUNE Detector Hall (PONDD) 2018
Organizer, Fermilab, December 2018
Physics & Astronomy Graduate Student Council
Northwestern University – Secretary (2016), Teaching Assistant Committee Head (2016-2017)
Society of Physics Students
University of Notre Dame - Vice President (2012-2013)

TEACHING EXPERIENCE

PHYS 135-1 Substitute Lecturer <i>Classical Mechanics, Northwestern University</i>	Oct.-Dec. '17
PHYS 412-2 Guest Lecturer <i>Graduate Quantum Mechanics, Northwestern University</i>	Mar. 2016
PHYS 135-3 Teaching Assistant <i>Modern Physics, Prof. Zosia Krusberg</i>	Spring 2018
PHYS 135-1 Teaching Assistant <i>Classical Mechanics, Prof. Zosia Krusberg</i>	Fall 2017
PHYS 135-3 Teaching Assistant <i>Modern Physics, Prof. Deborah Brown</i>	Spring 2017
PHYS 135-2 Teaching Assistant <i>Electricity & Magnetism, Prof. Deborah Brown</i>	Winter 2017
ASTRON 120 Teaching Assistant <i>Highlights of Astronomy, Prof. David Meyer</i>	Fall 2016
ASTRON 220 Teaching Assistant <i>Introduction to Astrophysics, Prof. David Meyer</i>	Spring 2016
PHYS 135-2 Teaching Assistant <i>Electricity & Magnetism, Prof. Deborah Brown</i>	Winter 2016
PHYS 135-1 Teaching Assistant <i>Classical Mechanics, Prof. Deborah Brown</i>	Fall 2015
PHYS 136-1,2,3 Laboratory Assistant <i>General Physics Laboratories, Prof. Arthur Schmidt</i>	Summer 2015
ASTRON 111 Teaching Assistant <i>Introduction to Astrobiology, Prof. David Meyer</i>	Spring 2015
ASTRON 101 Teaching Assistant <i>Modern Cosmology, Prof. Michael Smutko</i>	Winter 2015
ASTRON 120 Teaching Assistant <i>Highlights of Astronomy, Prof. David Meyer</i>	Fall 2014

HONORS AND AWARDS

Fermilab

Lab Directed R&D (LDRD) Award Co-Investigator: "Accelerator-based Dark Matter Initiatives at Fermilab"

Northwestern University

Weinberg College Outstanding Graduate Student Teacher Award (2015-2016), Physical Sciences

Fermilab Neutrino Physics Center (NPC) Scholar, Fall 2017

University of Notre Dame

Outstanding Physics Major Award, Notre Dame Department of Physics (Spring 2013)

George Kolettis Award in Mathematics (Spring 2013)

PUBLICATIONS

For a complete and up-to-date listing of publications, see my [InspireHEP profile \(link\)](#).

Note that publications as a member of the DUNE collaboration have been omitted from this list, but are available on my InspireHEP profile.

All arXiv numbers below are clickable and redirect to the given paper's abstract page.

31. **Heavy Axion Opportunities at the DUNE Near Detector** Kevin J. Kelly, Soubhik Kumar, Zhen Liu. Submitted for publication. arXiv:[2011.05995](#).

30. **Intimate Relationship Between Sterile Neutrino Dark Matter and ΔN_{eff} .**
Kevin J. Kelly, Manibrata Sen, Yue Zhang. Submitted for publication. arXiv:[2011.02487](#).
29. **Current and Future Neutrino Oscillation Constraints on Leptonic Unitarity**
Sebastian A. R. Ellis, Kevin J. Kelly, Shirley Weishi Li.
Accepted for publication in **JHEP**. arXiv:[2008.01088](#).
28. **Back to (Mass-)Square(d) One: The Neutrino Mass Ordering in Light of Recent Data**
Kevin J. Kelly, Pedro A. N. Machado, Stephen J. Parke, Yuber F. Perez-Gonzalez, Renata Zukanovich Funchal.
Submitted for publication. arXiv:[2007.08526](#).
27. **Origin of Sterile Neutrino Dark Matter via Vector Secret Neutrino Interactions**
Kevin J. Kelly, Manibrata Sen, Walter Tangarife, Yue Zhang.
Phys. Rev. **D101** (2020) no. 11, 115031. arXiv:[2005.03681](#).
26. **Leptonic Unitarity Triangles**
Sebastian A.R. Ellis, Kevin J. Kelly, Shirley Weishi Li.
Accepted for publication in Phys. Rev. **D**. arXiv:[2004.13719](#).
25. **Searches for Decays of New Particles in the DUNE Multi-Purpose Near Detector**
Jeffrey M. Berryman, André de Gouvêa, Patrick J. Fox, Boris J. Kayser, Kevin J. Kelly, Jennifer L. Raaf.
JHEP 02 (2020) 174. arXiv:[1912.07622](#).
24. **Prospects of Measuring Oscillated Decay-at-Rest Neutrinos at Long Baselines**
Roni Harnik, Kevin J. Kelly, Pedro A.N. Machado.
Phys. Rev. **D101** (2020) no. 3, 033008. arXiv:[1911.05088](#).
23. **White Paper on New Opportunities at the Next-Generation Neutrino Experiments (Part 1: BSM Neutrino Physics and Dark Matter)**
C.A. Argüelles et. al. (incl. Kevin J. Kelly)
arXiv:[1907.08311](#).
22. **Neutrino Non-Standard Interactions: A Status Report**
P.S. Bhupal Dev, K.S. Babu, Peter B. Denton, Pedro A.N. Machado et. al. (incl. Kevin J. Kelly)
SciPost Phys. Proc. 2 (2019) 001. arXiv:[1907.00991](#).
21. **Constraining the Self-Interacting Neutrino Interpretation of the Hubble Tension**
Nikita Blinov, Kevin J. Kelly, Gordan Z. Krnjaic, Samuel D. McDermott.
Phys. Rev. **Lett.** **123** (2019) no. 19, 191102. arXiv:[1905.02727](#).
20. **Physics with Beam Tau-Neutrino Appearance at DUNE**
André de Gouvêa, Kevin J. Kelly, G.V. Stenico, Pedro Pasquini.
Phys. Rev. **D100** (2019) no. 1, 016004. arXiv:[1904.07265](#).
19. **Sub-GeV Atmospheric Neutrinos and CP-Violation in DUNE**
Kevin J. Kelly, Pedro A.N. Machado, Iván Martinez-Soler, Stephen J. Parke, Yuber F Perez-Gonzalez.
Phys. Rev. **Lett.** **123** (2019) no. 8, 081801. arXiv:[1904.02751](#).
18. **Hunting On- and Off-Axis for Light Dark Matter with DUNE-PRISM**
Valentina De Romeri, Kevin J. Kelly, Pedro A.N. Machado.
Phys. Rev. **D100** (2019) no. 9, 095010. arXiv:[1903.10505](#).
17. **Mono-Neutrino at DUNE: New Signals From Neutrinophilic Thermal Dark Matter**
Kevin J. Kelly, Yue Zhang.
Phys. Rev. **D99** (2019) no. 5, 055034. arXiv:[1901.01259](#).
16. **Proton Fixed-Target Scintillation Experiment to Search for Minicharged Particles**
Kevin J. Kelly, Yu-Dai Tsai.
Phys. Rev. **D100** (2019) no. 1, 015043. arXiv:[1812.03998](#).

15. **Dark Tridents at Off-Axis Liquid Argon Neutrino Detectors**
André de Gouvêa, Patrick J. Fox, Roni Harnik, Kevin J. Kelly, Yue Zhang.
JHEP 1901 (2019) 001. arXiv:[1809.06388](#).
14. **Multimessenger Astronomy and New Neutrino Physics**
Kevin J. Kelly, Pedro A.N. Machado.
JCAP 1810 (2018) no.10, 048. arXiv:[1808.02889](#).
13. **Shining light on the mass scale and nature of neutrinos with $e\gamma \rightarrow e\nu\bar{\nu}$**
Jeffrey M. Berryman, André de Gouvêa, Kevin J. Kelly, Michael Schmitt.
Phys. Rev. **D98** (2018) no.1, 016009. arXiv:[1805.10294](#).
12. **Matter Density Profile Shape Effects at DUNE**
Kevin J. Kelly, Stephen J. Parke.
Phys. Rev. **D98** (2018) no.1, 015025. arXiv:[1802.06784](#).
11. **Lepton-Number-Charged Scalars and Neutrino Beamstrahlung**
Jeffrey M. Berryman, André de Gouvêa, Kevin J. Kelly, Yue Zhang.
Phys. Rev. **D97** (2018) no.7, 075030. arXiv:[1802.00009](#).
10. **Neutrino versus antineutrino oscillation parameters at DUNE and Hyper-Kamiokande experiments**
André de Gouvêa, Kevin J. Kelly.
Phys. Rev. **D96** (2017) no.9, 095018. arXiv:[1709.06090](#).
9. **Dark Matter and Neutrino Mass from the Smallest Non-Abelian Chiral Dark Sector**
Jeffrey M. Berryman, André de Gouvêa, Kevin J. Kelly, Yue Zhang.
Phys. Rev. **D96** (2017) no.7, 075010. arXiv:[1706.02722](#).
8. **Searches for new physics at the Hyper-Kamiokande experiment**
Kevin J. Kelly.
Phys. Rev. **D95** (2017) no.11, 115009. arXiv:[1703.00448](#).
7. **Lepton-number-violating searches for muon to positron conversion**
Jeffrey M. Berryman, André de Gouvêa, Kevin J. Kelly, Andrew Kobach.
Phys. Rev. **D95** (2017) no.11, 115010. arXiv:[1611.00032](#).
6. **False Signals of CP-Invariance Violation at DUNE**
André de Gouvêa, Kevin J. Kelly.
arXiv:[1605.09376](#).
5. **Imperfect mirror copies of the standard model**
Jeffrey M. Berryman, André de Gouvêa, Daniel Hernández, Kevin J. Kelly.
Phys. Rev. **D94** (2016) no.3, 035009. arXiv:[1605.03610](#).
4. **Large extra dimensions at the Deep Underground Neutrino Experiment**
Jeffrey M. Berryman, André de Gouvêa, Kevin J. Kelly, O.L.G. Peres, Zahra Tabrizi.
Phys. Rev. **D94** no.3, 033006. arXiv:[1603.00018](#).
3. **Non-standard neutrino interactions at DUNE**
André de Gouvêa, Kevin J. Kelly.
Nucl. Phys. **B908**, 318 (2016). arXiv:[1511.05562](#).
2. **Sterile neutrino at the Deep Underground Neutrino Experiment**
Jeffrey M. Berryman, André de Gouvêa, Kevin J. Kelly, Andrew Kobach.
Phys. Rev. **D92** (2015) no.7, 073012. arXiv:[1507.03986](#).
1. **CP-invariance violation at short-baseline experiments in 3+1 neutrino scenarios**
André de Gouvêa, Kevin J. Kelly, Andrew Kobach.
Phys. Rev. **D91** (2015) no.5, 053005. arXiv:[1412.1479](#).

SEMINARS

BSM PANDEMIC Seminar

Remote, November 2020

“Neutrino Oscillations: Where we are, where we’re going”

University of Pittsburgh High-Energy Physics Seminar

Remote, November 2020

University of Wisconsin High-Energy/Cosmology Seminar

Remote, November 2020

University of Minnesota High Energy Physics Seminar

Remote, October 2020

“Heavy Neutrinos and Where to Find Them”

Korea Institute for Advanced Study High Energy Physics Seminar

Remote, July 2020

“Self-Interacting Neutrinos, The Hubble Tension, and Sterile Neutrino Dark Matter”

SLAC Elementary Particle Physics Seminar

Remote, June 2020

“Leptonic Unitarity from Neutrino Oscillations: Current & Future Status”

Brookhaven National Lab High Energy Theory Seminar

Remote, May 2020

“Dark Sector Decays in the DUNE Multipurpose Near Detector”

Lawrence Berkeley National Lab Particle Physics Seminar

Berkeley, CA, December 2019

Texas A&M Mitchell Institute High Energy Seminar

College Station, TX, December 2019

“New Physics Searches at the DUNE Near Detector”

Argonne National Lab Theory Seminar

Argonne, IL, April 2019

Fermilab Theory Seminar

Batavia, IL, March 2019

Fermilab Neutrino Seminar Series

Batavia, IL, January 2018

“How much does matter matter at DUNE?”

Northwestern University

Evanston, IL, November 2017

“Independent Determination of Oscillation Parameters for Neutrinos and Antineutrinos”

University of Illinois at Chicago High Energy Physics Seminar

Chicago, IL, November 2017

“Chiral Gauge Theories for Dark Sector Construction”

Indiana University High Energy Physics Seminar

Bloomington, IN, March 2017

University of Notre Dame High Energy Physics Seminar

Notre Dame, IN, January 2017

Argonne National Lab Theory Seminar

Argonne, IL, January 2017

Fermilab Theory Seminar

Batavia, IL, September 2016

“New Physics Searches at DUNE”

Northwestern University

Evanston, IL, 2014-2016

“CP Violation from a Fourth Neutrino?”

“Sterile Neutrinos at DUNE”

“Non-Standard Neutrino Interactions”

CONFERENCE PRESENTATIONS

PIKIMO9

Remote conference, October 2020. Speaker: “Decays of Dirac and Majorana Heavy Neutral Leptons”

Snowmass 2021 Community Planning Meeting

Invited speaker, parallel session on dark sector searches.

Snowmass 2021 Neutrino BSM Kick-off

Invited speaker: “Dark Sectors at Neutrino Experiments”

New Perspectives 2020

Remote conference, August 2020. Speaker: “Leptonic Unitarity: Current and Future”

PROSPECT Oscillation Workshop

August 2020. Invited speaker: “Short-baseline/Long-baseline Oscillation Measurement Interplay: A Theorist’s Perspective”

Fermilab Users Meeting 2020

Remote conference, August 2020. Plenary Speaker: “Neutrino Theory Post-Nu2020”

Neutrino2020

Remote conference, June 2020. Poster Presented: “Searches for Dark Sector Mediators in the DUNE Multi-Purpose Near Detector.” Associated video available [here](#).

Neutrinos from the Lab to the Cosmos

Institute for Nuclear Theory, University of Washington, January 2020. Speaker: “New Neutrino Physics at Long-Baseline Experiments” Discussion leader: “Neutrinos and the Hubble Tension”

Precision Investigations in the Neutrino Sector (PINS) 2019

SLAC, July 2019. Speaker: “Sub-GeV Atmospheric Neutrinos and CP Violation”

SBND Collaboration Meeting 2019

Ann Arbor, June 2019. Remote speaker: “Missing Transverse Momentum Signatures in SBND”

Current Trends in Particle Theory (CTPT) 2019

Chicago, IL, June 2019

Fermilab New Perspectives Meeting 2019

Fermilab, 2019. Invited speaker: “Neutrino Theory in 10 Minutes”

New Directions in the Search for Light Dark Matter Particles

Fermilab, June 2019

NTN Workshop on Non-standard Neutrino Interactions

St. Louis, MO, May 2019. Speaker: “Light Dark Matter at DUNE”

DUNE Collaboration Meeting 2019

Fermilab, May 2019. Invited speaker: “Beyond the Standard Model Physics at the DUNE Near Detector”

LCTP Spring Neutrino Physics Symposium

Ann Arbor, MI, April 2019. Speaker: “Searches for Dark Matter with the DUNE Near Detector”

Discrete2018

Vienna, Austria, November 2018. Parallel session speaker: “Multimessenger Astronomy and New Neutrino Physics”

NuFact 2018

Blacksburg, VA, August 2018. Parallel session speaker: “Lepton-number-charged Scalars at DUNE”

Summer Institute for Neutrino Theory (SINT) 2017

Blacksburg, VA, July 2017

Pheno 2017

Pittsburgh, PA, May 2017. Parallel session speaker: “Lepton Number Violation and Muon-to-Positron Conversion”

Current Trends in Particle Theory (CTPT) 2017

Chicago, IL, March 2017. Poster presented: “Lepton Number Violation and Muon-to-Positron Conversion”

NuFact 2016

Quy Nhon, Vietnam, August 2016. Parallel session speaker: “New Physics Searches at DUNE”

Theoretical Advanced Summer Institute (TASI) 2016

Boulder, CO, June 2016

Nu@Fermilab

Batavia, IL, July 2015