

Yonatan F. Kahn, Ph.D.

CONTACT INFORMATION	McLennan Physical Laboratories MP1111 60 St. George St., Toronto, ON M5S 1A7, Canada	<i>E-mail:</i> yf.kahn@utoronto.ca <i>Website:</i> kahn-group.physics.utoronto.ca
RESEARCH INTERESTS	High-energy theoretical physics, artificial intelligence/machine learning • Dark matter searches with condensed matter systems and quantum sensors • Physics-inspired theory and applications of machine learning and artificial intelligence	
POSITIONS	Assistant Professor, Department of Physics University of Toronto Toronto, ON, Canada Appointments: • Faculty affiliate, Vector Institute for Artificial Intelligence • Affiliate, Perimeter Institute for Theoretical Physics • Affiliate member, Superconducting Quantum Materials and Systems Center (SQMS) 2.0 at Fermilab	December 2024 – present
	Assistant Professor, Department of Physics University of Illinois Urbana-Champaign (UIUC) Urbana, IL USA Appointments: • UIUC sole PI, Superconducting Quantum Materials and Systems Center (SQMS) at Fermilab – Co-Lead, Quantum Physics and Sensing focus area • Core Faculty, Illinois Center for Advanced Studies of the Universe (ICASU) • Member, Illinois Quantum Information Science and Technology Center (IQUIST) • Faculty Affiliate, NCSA Center for Artificial Intelligence Innovation (CAII)	August 2019 – December 2024
	Postdoctoral Fellow Kavli Institute for Cosmological Physics (KICP), University of Chicago Chicago, IL USA	August 2018 – August 2019
	Postdoctoral Research Associate Princeton University Princeton, NJ USA	September 2015 – August 2018
EDUCATION	Massachusetts Institute of Technology Cambridge, MA USA Ph.D., Physics, June 2015 • Thesis title: <i>Forces and Gauge Groups Beyond the Standard Model</i> • Advisor: Jesse Thaler • Thesis committee: Jesse Thaler, Allan Adams, Christoph Paus	September 2010 – June 2015
	University of Cambridge Cambridge, UK Certificate of Advanced Study in Mathematics, June 2010 • Completed Part III of the Mathematical Tripos in Applied Mathematics and Theoretical Physics	October 2009 – June 2010

- Graduated with Distinction (highest honors in the Part III program)
- Essay topic: *From Topological Strings to Matrix Models*

Northwestern University
Evanston, IL USA

September 2004 – June 2009

- B.A., Physics and Mathematics, June 2009 (summa cum laude, Phi Beta Kappa)
- Senior thesis: *Models of Dark Matter and the INTEGRAL 511 keV Line*
 - Senior thesis advisor: Tim Tait
 - Awarded departmental honors and Outstanding Senior Thesis
- B.Mus., Horn Performance, June 2009

HONOURS AND AWARDS

Connaught New Researcher Award, University of Toronto	2025
W. Dale and Jeanne C. Compton Faculty Fellowship, UIUC	2024
Kavli Frontiers of Science Fellow, National Academy of Sciences	2022
J.J. and Noriko Sakurai Dissertation Award in Theoretical Particle Physics, APS	2016
Andrew M. Lockett III Memorial Fund Award for Graduate Research, MIT	2014
National Science Foundation Graduate Research Fellowship	2011–2014
Churchill Scholarship for study at the University of Cambridge	2009
Phi Beta Kappa Centennial Prize for highest overall GPA, Northwestern University	2009
Josephine de Kármán Fellowship	2008
Barry M. Goldwater Scholarship	2007

MENTORING

Postdoctoral researchers

- Benoît Assi (CIFAR AI Safety Fellow, joint w/Perimeter Institute) **2026–2031**
- Steven Ferrante (Schmidt AI in Science Fellow) **2026–2029**
- Ian Holst (McDonald Institute Theory Fellow, joint w/David Curtin) **2026–2029**
- Chanju Park (CIFAR AI Safety Fellow, joint w/Sebastian Jaimungal) **2026–2029**
- Carl Beadle (joint w/David Curtin) **2025–2028**
- Shashin Pavaskar **2023–2026**
 - IQIST Postdoctoral Scholar, 2024–2026
- Wen Han Chiu (joint w/Jessie Shelton) **2023–2026**
- Christian Boyd (joint w/Peter Abbamonte) **2022–2024**
 - Now: private industry, Boulder, CO
- Christina Gao (joint w/Roni Harnik at Fermilab) **2021–2024**
 - Now: assistant professor, Southern University of Science and Technology, Shenzhen, China
- Jan Schütte-Engel **2020–2023**
 - Now: RIKEN-Berkeley Fellow, UC Berkeley

Ph.D. students

- Amirali Atrli **Ph.D. anticipated 2030**

- Ibrahim Elsharkawy **Ph.D. anticipated 2028**
 - NSERC Canada Graduate Research Scholarship – Doctoral
 - Connaught International Scholarship, University of Toronto
- Pedro Rivera Cardona (co-supervised w/Jessie Shelton) **Ph.D. anticipated 2028**
 - NSF Graduate Research Fellow, 2024–2027
 - Alfred P. Sloan Scholar, UIUC
- Hannah Day **Ph.D., 2026**
 - Inaugural Templeton Foundation TEX Fellow, 2024–2026
 - Now: Postdoc, Fields Institute for Mathematical Sciences, University of Toronto
- Ian Harris **Ph.D., 2026**
- Michael Wentzel **Ph.D., 2026**
 - NSF Graduate Research Fellow, 2022–2025
 - Now: Postdoc, LBNL
- Diana Forbes **Ph.D., 2024**
 - Now: Physics lecturer, Butler University
- Rachel Nguyen **Ph.D., 2024**
 - Mavis Future Faculty Fellow, UIUC, 2023–2024
 - NSF Graduate Research Fellow, 2020–2023
 - Now: Analyst, US Patent Office

M.Sc. students

- Luke James **M.Sc. 2026**

Undergraduate researchers

- Martha Yousif (co-supervised w/Miriam Diamond) **B.A. expected 2028**
- Matthew Feito **B.A. expected 2027**
- Harry Wang **B.A. expected 2027**
 - NSERC Undergraduate Student Research Award, 2026
- Jillian Escobar **B.A. 2026**
 - Now: Physics M.Sc. candidate, Perimeter Institute
- Alex Marinescu **B.A. 2026**
 - Now: Physics M.Sc. candidate, University of Toronto
- Yigal Teplitsky **B.A. 2026**
 - Now: Physics Ph.D. candidate, Princeton University
- Aarav Mande **B.Sc. 2025**
 - Now: Physics Ph.D. candidate, University of Wisconsin-Madison

- Abhinaya Sinha **B.Sc. 2024**
 - Robert E. Hetrick Outstanding Undergraduate Research Award, UIUC, 2024
 - Now: Physics Ph.D. candidate, University of Minnesota
- Zhongqi (Eric) Liang **B.Sc. 2022**
 - Now: Physics Ph.D. candidate, Stony Brook University
- Bashi Mandava **B.Sc. 2021**
 - Laura B. Eisenstein Award for Exceptional Women Physics Students, UIUC, 2021
 - Now: Physics Ph.D. candidate, UC Berkeley

PUBLICATIONS

1. B. Barker, J. Epstein, L. James, Y. Kahn, E. Peterson, A. Prabhu, T. Trickle, and S. Watkins. 2026. “First-principles upper bounds on dark matter-electron scattering rates from condensed matter sum rules.” Submitted to *Phys. Rev. Lett.* [arXiv:2608.05282].
2. I. Lavie, N. Levi, and Y. Kahn. 2026. “Statistical Properties of Training & Generalization.” Submitted to *SciPost Physics Community Reports*. [arXiv:2606.20299].
3. Z. Bogorad, I. Elsharkawy, Y. Kahn, A. Larkoski, and N. Levi. 2026. “Generative models on phase space.” [arXiv:2604.02415]. Submitted to *PRX Intelligence*.
4. C. Blanco, J. Foster, Y. Kahn, and B. Lillard. 2025. “Statistics of Daily Modulation in Dark Matter Direct Detection Experiments.” Submitted to *Phys. Rev. D*. [arXiv:2602.15947].
5. I. Harris and Y. Kahn. 2025. “Stringent Constraints on Gravitational Wave Signatures of Dark Electromagnetism in Neutron Star Binaries.” *Phys. Rev. D* **D113** (2026) 055008. [arXiv:2511.19586].
6. Y. Kahn, M. Wentzel, and N. Yunes. 2025. “Effects of Lighter-than-QCD Axions on Neutron Star Tidal Deformability.” Submitted to *Phys. Rev. D*. [arXiv:2511.13812].
7. H. Day, R. Harnik, Y. Kahn, S. Pavaskar, and K. Zhou. 2025. “Quantum Calculations of the Cavity Shift in Electron Magnetic Moment Measurements.” *JHEP* **03** (2025) 038. [arXiv:2511.07514].
8. I. Elsharkawy and Y. Kahn. 2025. “Contrastive Normalizing Flows for Uncertainty-Aware Parameter Estimation.” Submitted to *PRX Intelligence*. [arXiv:2505.08709].
9. I. Elsharkawy, Y. Kahn, and B. Hooberman. 2025. “Uncertainty Quantification from Ensemble Variance Scaling Laws in Deep Neural Networks.” *Machine Learning: Science and Technology* **6** (2025) 035040. [arXiv:2503.05938].
10. C. Owen, A. Tucker, Y. Kahn, and N. Yunes. 2025. “Constraining dark-sector effects using gravitational waves from compact binary inspirals.” *Phys. Rev. D* **D111** (2025) 124042. [arXiv:2503.04916].
11. A. Berlin and Y. Kahn. 2024. “New Technologies for Axion and Dark Photon Searches.” *Annual Review of Nuclear and Particle Science* **75** (2025) 83–108. [arXiv:2412.08704].
12. D. Forbes, Y. Kahn, and R. Nguyen. 2024. “Exotic Particles at the DUNE Near Detector from Charged Pion Scattering.” *Phys. Rev. D* **D110** (2024) 095029. [arXiv:2407.14648].
13. Y. Kahn and J. Perez-Rios. 2024. “Measuring the molecular Migdal effect with neutron scattering on diatomic gases.” *Phys. Rev. D* **D110** (2024) 092012. [arXiv:2403.08866].
14. J. Batson and Y. Kahn. 2023. “Scaling Laws in Jet Classification.” *SciPost Phys. Core* **8**, 034 (2025). [arXiv:2312.02264].
15. Y. Kahn, J. Schütte-Engel, and T. Trickle. 2023. “Searching for High Frequency Gravitational Waves with Phonons.” *Phys. Rev. D* **D109** (2024) 096023. [arXiv:2311.17147].
16. C. Cesarotti, Y. Kahn, G. Krnjaic, D. Rocha, and J. Spitz. 2023. “New μ Forces From ν_μ Sources.” *Phys. Rev. D* **D110** (2024) 055032. [arXiv:2311.10829].

17. C. Blanco, I. Harris, Y. Kahn, and A. Prabhu. 2023. “Constraining Dark Matter-Proton Scattering from Molecular Cloud Ionization.” *Phys. Rev.* **D110** (2024) 035006. [arXiv:2311.00740].
18. H. Day, Y. Kahn, and D. Roberts. 2023. “Feature Learning and Generalization in Deep Networks with Orthogonal Weights.” *Machine Learning: Science and Technology* **6** (2025) 035027. [arXiv:2310.07765].
19. J. Foster, C. Gao, W.P. Halperin, Y. Kahn, A. Mande, M. Nguyen, J. Schütte-Engel, and J.W. Scott. 2023. “The statistics and sensitivity of axion wind detection with the homogeneous precession domain of superfluid helium-3.” *Phys. Rev.* **D110** (2024) 115020. [arXiv:2310.07791].
20. D. Curtin, Y. Kahn, R. Nguyen. 2023. “Dark Photons from Charged Pion Bremsstrahlung at Proton Beam Experiments.” *Phys. Rev.* **D108** (2023) 095039. [arXiv:2305.19309].
21. A. Berlin, D. Blas, R. Tito D’Agnolo, S.A.R. Ellis, R. Harnik, Y. Kahn, J. Schütte-Engel, and M. Wentzel. 2023. “MAGO 2.0: Electromagnetic Cavities as Mechanical Bars for Gravitational Waves.” *Phys. Rev.* **D108** (2023) 084058. [arXiv:2303.01518].
22. C. Boyd, Y. Hochberg, Y. Kahn, E.D. Kramer, N. Kurinsky, B.V. Lehmann, and T.C. Yu. 2022. “Directional detection of dark matter with anisotropic response functions.” *Phys. Rev.* **D108** (2023) 015015. [arXiv:2212.04505].
23. D. Forbes, C. Herwig, Y. Kahn, G. Krnjaic, C. Mantilla Suarez, N. Tran, and A. Whitbeck. 2022. “New Searches for Muonphilic Particles at Proton Beam Dump Spectrometers.” *Phys. Rev.* **D107** (2023) 116026. [arXiv:2212.00033].
24. J.N. Benabou, J.W. Foster, Y. Kahn, B.R. Safdi, and C.P. Salemi. 2022. “Lumped-element axion dark matter detection beyond the magnetoquasistatic limit.” *Phys. Rev.* **D108** (2023) 035009. [arXiv:2211.00008].
25. D. Adams, D. Baxter, H. Day, R. Essig, and Y. Kahn. 2022. “Measuring the Migdal Effect in Semiconductors.” *Phys. Rev.* **D107** (2023) L041303. [arXiv:2210.04917].
26. Y. Hochberg, Y. Kahn, R. Leane, S. Rajendran, K. Van Tilburg, T.-T. Yu, and K.M. Zurek. 2022. “New approaches to dark matter detection.” *Nature Rev. Phys.* 2022.
27. C. Gao, W.P. Halperin, Y. Kahn, M. Nguyen, J. Schütte-Engel, and J.W. Scott. 2022. “Axion wind detection with the homogeneous precession domain of superfluid helium-3.” *Phys. Rev. Lett.* **129** (2022) 21, 211801. [arXiv:2208.14454].
28. C. Blanco, I. Harris, Y. Kahn, B. Lillard, and J. Perez-Rios. 2022. “The Molecular Migdal Effect.” *Phys. Rev.* **D106** (2022) 115015. [arXiv:2208.09002].
29. P. Abbamonte, D. Baxter, Y. Kahn, G. Krnjaic, N. Kurinsky, B. Mandava, and L.K. Wagner. 2022. “Revisiting the Dark Matter Interpretation of Excess Rates in Semiconductors.” *Phys. Rev.* **D105** (2022) 123002. [arXiv:2202.03436].
30. A. Berlin, D. Blas, R. Tito D’Agnolo, S.A.R. Ellis, R. Harnik, Y. Kahn, and J. Schütte-Engel. 2021. “Detecting High-Frequency Gravitational Waves with Microwave Cavities.” *Phys. Rev.* **D105** (2022) 116011. [arXiv:2112.11465].
31. R. Capdevilla, D. Curtin, Y. Kahn, and G. Krnjaic. 2021. “Systematically Testing Singlet Models for $(g - 2)_\mu$.” *JHEP* **04** (2022) 129. [arXiv:2112.08377].
32. N. Fernandez, Y. Kahn, and J. Shelton. 2021. “Freeze-in, glaciation, and UV sensitivity for light mediators.” *JHEP* **07** (2022) 044. [arXiv:2111.13709].
33. Y. Kahn and T. Lin. 2021. “Searches for light dark matter using condensed matter systems.” *Rep. Prog. Phys.* **85** (2022) 6, 066901. [arXiv:2108.03239].
34. C. Blanco, Y. Kahn, B. Lillard, and S.D. McDermott. 2021. “Dark Matter Daily Modulation with Anisotropic Organic Crystals.” *Phys. Rev.* **D104** (2021) 036011. [arXiv:2103.08601].
35. J. Batson, C.G. Haaf, Y. Kahn, and D. Roberts. 2021. “Topological Obstructions to Autoencoding.” *JHEP* **04** (2021) 280. [arXiv:2102.08380].

36. C.P. Salemi *et al.* 2021. “The search for low-mass axion dark matter with ABRACADABRA-10cm.” *Phys. Rev. Lett.* **127** (2021) 8, 081801. [arXiv:2102.06722].
37. R. Capdevilla, D. Curtin, Y. Kahn, and G. Krnjaic. 2021. “No-Lose Theorem for Discovering the New Physics of $(g - 2)_\mu$ at Muon Colliders.” *Phys. Rev.* **D105** (2022) 015028. [arXiv:2101.10334].
38. Y. Hochberg, Y. Kahn, N. Kurinsky, B.V. Lehmann, T.C. Yu, and K.K. Berggren. 2021. “Determining Dark Matter-Electron Scattering Rates from the Dielectric Function.” *Phys. Rev. Lett.* **127** (2021) 15, 151802. [arXiv:2101.08263].
39. Y. Kahn, G. Krnjaic, and B. Mandava. 2020. “Dark Matter Detection with Bound Nuclear Targets: The Poisson Phonon Tail.” *Phys. Rev. Lett.* **127** (2021) 8, 081804. [arXiv:2011.09477].
40. J. Foster, Y. Kahn, R. Nguyen, N. Rodd, and B. Safdi. 2020. “Dark Matter Interferometry.” *Phys. Rev.* **D103** (2021) 076018 (**Editors’ Suggestion**). [arXiv:2009.14201].
41. R. Capdevilla, D. Curtin, Y. Kahn, and G. Krnjaic. 2020. “Discovering the Physics of $(g - 2)_\mu$ at Future Muon Colliders.” *Phys. Rev.* **D103** (2021) 075028. [arXiv:2006.16277].
42. C. Dessert, J. Foster, Y. Kahn, and B. Safdi. 2020. “Systematics in the XENON1T data: the 15-keV anti-axion.” *Phys. Dark Univ.* **34** (2021) 100870. [arXiv:2006.16220].
43. J. Foster, Y. Kahn, O. Macias, Z. Sun, R. Eatough, V. Kondratiev, W. Peters, C. Weniger, and B. Safdi. 2020. “Green Bank and Effelsberg Radio Telescope Searches for Axion Dark Matter Conversion in Neutron Star Magnetospheres.” *Phys. Rev. Lett.* **125** (2020) 17, 171301. [arXiv:2004.00011].
44. N. Kurinsky, D. Baxter, Y. Kahn, and G. Krnjaic. 2020. “A Dark Matter Interpretation of Excesses in Multiple Direct Detection Experiments.” *Phys. Rev.* **D102** (2020) 015017. [arXiv:2002.06937].
45. C. Blanco, J.I. Collar, Y. Kahn, and B. Lillard. 2020. “Dark Matter-Electron Scattering from Aromatic Organic Targets.” *Phys. Rev.* **D101** (2020) 056001. [arXiv:1912.02822].
46. L. Lancaster, C. Giovanetti, P. Mocz, Y. Kahn, M. Lisanti, and D. Spergel. 2019. “Dynamical Friction in a Fuzzy Dark Matter Universe.” *JCAP* **01** (2020) 001. [arXiv:1909.06381].
47. D. Baxter, Y. Kahn, and G. Krnjaic. 2019. “Electron Ionization via Dark Matter-Electron Scattering and the Migdal Effect.” *Phys. Rev.* **D101** (2020) 076014 (**Editors’ Suggestion**). [arXiv:1908.00012].
48. PTOLEMY Collaboration (M.G. Betti *et al.*). 2019. “Neutrino Physics with the PTOLEMY project.” *JCAP* **07** (2019) 047. [arXiv:1902.05508].
49. Z. Bogorad, A. Hook, Y. Kahn, and Y. Soreq. 2019. “Probing ALPs and the Axiverse with Superconducting Radiofrequency Cavities.” *Phys. Rev. Lett.* **123** (2019) 2, 021801. [arXiv:1902.01418].
50. J. Ouellet *et al.* 2018. “Design and Implementation of the ABRACADABRA-10 cm Axion Dark Matter Search.” *Phys. Rev.* **D99** (2019) 052012. [arXiv:1901.10652].
51. J. Ouellet *et al.* 2018. “First Results from ABRACADABRA-10 cm: A Search for Sub- μ eV Axion Dark Matter.” *Phys. Rev. Lett.* **122** (2019) 8, 121802. [arXiv:1810.12257].
52. J. Jordan, Y. Kahn, G. Krnjaic, M. Moschella, and J. Spitz. 2018. “Severe Constraints on New Physics Explanations of the MiniBooNE Excess.” *Phys. Rev. Lett.* **122** (2019) 8, 081801 (**Editors’ Suggestion**). [arXiv:1810.07185].
53. J. Jordan, Y. Kahn, G. Krnjaic, M. Moschella, and J. Spitz. 2018. “Signatures of Pseudo-Dirac Dark Matter at High-Intensity Neutrino Experiments.” *Phys. Rev.* **D98** (2018) 075020. [arXiv:1806.05185].
54. A. Hook, Y. Kahn, B. Safdi, and Z. Sun. 2018. “Radio Signals from Axion Dark Matter Conversion in Neutron Star Magnetospheres.” *Phys. Rev. Lett.* **121** (2018) 24, 241102. [arXiv:1804.03145].

55. Y. Kahn, G. Krnjaic, N. Tran, and A. Whitbeck. 2018. “M³: A New Muon Missing Momentum Experiment to Probe $(g - 2)_\mu$ and Dark Matter at Fermilab.” *JHEP* **09** (2018) 153. [arXiv:1804.03144].
56. P. Agnes *et al.* 2018. “Constraints on Sub-GeV Dark Matter-Electron Scattering from the DarkSide-50 Experiment.” *Phys. Rev. Lett.* **121** (2018) 11, 111303. [arXiv:1802.06998].
57. P. Agnes *et al.* 2018. “Low-mass Dark Matter Search with the DarkSide-50 Experiment.” *Phys. Rev. Lett.* **121** (2018) 8, 081307. [arXiv:1802.06994].
58. Y. Hochberg, Y. Kahn, M. Lisanti, K.M. Zurek, A.G. Grushin, R. Ilan, S.M. Griffin, Z.-F. Liu, S.F. Weber, and J.B. Neaton. 2017. “Detection of sub-MeV Dark Matter with Three-Dimensional Dirac Materials.” *Phys. Rev.* **D97** (2018) 015004. [arXiv:1708.08929].
59. E. Izaguirre, Y. Kahn, G. Krnjaic, and M. Moschella. 2017. “Testing Light Dark Matter Coannihilation With Fixed-Target Experiments.” *Phys. Rev.* **D96** (2017) 055007. [arXiv:1703.06881].
60. Y. Kahn, G. Krnjaic, S. Mishra-Sharma, and T.M.P. Tait. 2016. “Light Weakly Coupled Axial Forces: Models, Constraints, and Projections.” *JHEP* **05** (2017) 002. [arXiv:1609.09072].
61. Y. Hochberg, Y. Kahn, M. Lisanti, C.G. Tully, and K.M. Zurek. 2016. “Directional detection of dark matter with two-dimensional targets.” *Phys. Lett. B* **772** (2017), 239-246. [arXiv:1606.08849].
62. Y. Kahn, B.R. Safdi, and J. Thaler. 2016. “Broadband and Resonant Approaches to Axion Dark Matter Detection.” *Phys. Rev. Lett.* **117** (2016) 14, 141801. [arXiv:1602.01086].
63. Y. Kahn, D. Roberts, and J. Thaler. 2015. “The goldstone and goldstino of supersymmetric inflation.” *JHEP* **10** (2015) 001. [arXiv:1504.05958].
64. A. Anderson, P. Fox, Y. Kahn, and M. McCullough. 2015. “Halo-Independent Direct Detection Analyses Without Mass Assumptions.” *JCAP* **10** (2015) 10, 012. [arXiv:1504.03333].
65. Y. Kahn, G. Krnjaic, J. Thaler, and M. Toups. 2014. “DAE δ ALUS and Dark Matter Detection.” *Phys. Rev.* **D91** (2015) 055006. [arXiv:1411.1055].
66. P. Fox, Y. Kahn, and M. McCullough. 2014. “Taking Halo-Independent Dark Matter Methods Out of the Bin.” *JCAP* **10** (2014) 076. [arXiv:1403.6830].
67. Y. Kahn, M. McCullough, and J. Thaler. 2013. “Auxiliary Gauge Mediation: A New Route to Mini-Split Supersymmetry.” *JHEP* **11** (2013) 161. [arXiv:1308.3490].
68. Y. Kahn and J. Thaler. 2012. “Searching for an invisible A' vector boson with DarkLight.” *Phys. Rev.* **D86** (2012) 115012. [arXiv:1209.0777].
69. Y. Kahn and J. Thaler. 2012. “Locality in Theory Space.” *JHEP* **07** (2012) 007. [arXiv:1202.5491].
70. S. Malace, Y. Kahn, W. Melnitchouk, and C.E. Keppel. 2009. “Confirmation of Quark-Hadron Duality in the Neutron F_2 Structure Function.” *Phys. Rev. Lett.* **104** (2010) 102001. [arXiv:0910.4920].
71. Y. Kahn, W. Melnitchouk, and S. Kulagin. 2008. “New method for extracting neutron structure functions from nuclear data.” *Phys. Rev.* **C79** (2009) 035205. [arXiv:0809.4308].
72. Y. Kahn and M. Schmitt. 2008. “Electron-Dark Matter Scattering in an Evacuated Tube.” [arXiv:0806.2487].
73. Y. Kahn, M. Schmitt, and T.M.P. Tait. 2007. “Enhanced rare pion decays from a model of MeV dark matter.” *Phys. Rev.* **D78** (2008) 115002. [arXiv:0712.0007].
74. S. Heinemeyer, Y. Kahn, M. Schmitt, and M. Velasco. 2007. “An Experiment to Search for Light Dark Matter in Low-Energy ep Scattering.” [arXiv:0705.4056].

CONFERENCE
PAPERS

1. I. Elsharkawy, B. Hooberman, and Y. Kahn. 2024. “Uncertainty Quantification From Scaling Laws in Deep Neural Networks.” *NeurIPS 2024 workshop “Machine Learning and the Physical Sciences.”*
2. Y. Kahn, S. Roy, J. Shelton, and V. Tiki. 2024. “Systematic Uncertainties and Data Complexity in Normalizing Flows.” *NeurIPS 2024 workshop “Machine Learning and the Physical Sciences.”*

PROCEEDINGS AND
WHITEPAPERS

1. M. Zhu *et al.* 2025. “Probing the Critical Point (CritPt) of AI Reasoning: a Frontier Physics Research Benchmark.” [arXiv:2509.26574].
2. P. Abbamonte *et al.* 2025. “SPLENDOR: a novel detector platform to search for light dark matter with narrow-gap semiconductors.” [arXiv:2507.17782].
3. M. Diamond *et al.* 2025. “Community Report from the 2025 SNOLAB Future Projects Workshop.” [arXiv:2507.11368].
4. C. Accettura *et al.* 2025. “The Muon Collider.” [arXiv: 2504.21417].
5. DMRadio collaboration (A. AlShirawi *et al.*). 2023. “Electromagnetic modeling and science reach of DMRadio-m³.” [arXiv:2302.14084].
6. C. Accettura *et al.* 2023. “Towards a Muon Collider.” *Eur. Phys. J. C* **83** (2023) 864. [arXiv:2303.08533].
7. S. Catterall *et al.* 2022. “Report of the Snowmass 2021 Theory Frontier Topical Group on Quantum Information Science.” Contribution to 2022 Snowmass Summer Study. [arXiv:2209.14839].
8. K.M. Black *et al.* 2022. “Muon Collider Forum Report.” Contribution to 2022 Snowmass Summer Study. [arXiv:2209.01318].
9. A. Berlin *et al.* 2022. “Searches for New Particles, Dark Matter, and Gravitational Waves with SRF Cavities.” Contribution to 2022 Snowmass Summer Study. [arXiv:2203.12714].
10. R. Essig, Y. Kahn, S. Knapen, A. Ringwald, and N. Toro. 2022. “Snowmass2021 Theory Frontier: Theory Meets the Lab.” Contribution to 2022 Snowmass Summer Study. [arXiv:2203.10089].
11. Y. Kahn, M.E. Monzani, K. Palladino, *et al.* 2022. “Snowmass2021 Cosmic Frontier: Modeling, statistics, simulations, and computing needs for direct dark matter detection.” Contribution to 2022 Snowmass Summer Study. [arXiv:2203.07700].
12. C. Aime *et al.* 2022. “Muon Collider Physics Summary.” Contribution to 2022 Snowmass Summer Study. [arXiv:2203.07256].
13. J. de Blas *et al.* 2022. “The physics case of a 3 TeV muon collider stage.” Contribution to 2022 Snowmass Summer Study. [arXiv:2203.07261].
14. D. Baxter *et al.* 2022. “Snowmass2021 Cosmic Frontier White Paper: Calibrations and backgrounds for dark matter direct detection.” Contribution to 2022 Snowmass Summer Study. [arXiv:2203.07623].
15. Y. Kahn *et al.* 2022. “Searching for axions and light-by-light scattering with superconducting RF cavities.” Proceedings of *SPIE OPTO 2022*. Proc. SPIE Int. Soc. Opt. Eng. **29** (2022) 12016.
16. M.G. Betti *et al.* 2018. “A Design for an Electromagnetic Filter for Precision Energy Measurements at the Tritium Endpoint.” *Prog. Part. Nucl. Phys.* **106** (2019), 120-131. [arXiv:1810.06703].
17. E. Baracchini *et al.* 2018. “PTOLEMY: A Proposal for Thermal Relic Detection of Massive Neutrinos and Directional Detection of MeV Dark Matter.” Submitted to the LNGS Scientific Committee. [arXiv:1808.01892].

18. Y. Kahn for the ABRACADABRA Collaboration. 2018. “ABRACADABRA: A Broad-band/Resonant Search for Axions.” Proceeding of the *2nd International Conference on Microwave Cavities and Detectors for Axion Research*. Springer Proc. Phys. 211 (2018) 135-142.
19. M. Battaglieri *et al.* 2017. “US Cosmic Visions: New Ideas in Dark Matter 2017: Community Report”. [arXiv:1707.04591].
20. J. Alexander *et al.* 2016. “Dark Sectors 2016 Workshop: Community Report.” [arXiv:1608.08632].
21. S. Alekhin *et al.* 2015. “A Facility to Search for Hidden Particles at the CERN SPS: the SHiP Physics Case.” *Rept. Prog. Phys.* **79** (2016) 12, 124201. [arXiv:1504.04855].
22. Y. Kahn. 2014. “Unbinned halo-independent methods for emerging dark matter signals.” Proceedings of the *Interplay between Particle and Astroparticle Physics (IPA 2014) Workshop*, 18-22 August 2014, Queen Mary University of London. [arXiv:1411.4557].
23. Y. Kahn. 2013. “Searching for an invisible dark photon with DarkLight.” *AIP Conf. Proc.* **1563** (2013) 131-134.
24. R. Essig *et al.* 2013. “Dark Sectors and New, Light, Weakly-Coupled Particles.” Report of the Community Summer Study 2013 (Snowmass); New, Light, Weakly Coupled Particles (NLWCP) subgroup of the Intensity Frontier. [arXiv:1311.0029].
25. J. Balewski *et al.* 2013. “DarkLight: A Search for Dark Forces at the Jefferson Laboratory Free-Electron Laser Facility.” Contributed to the Community Summer Study 2013 (Snowmass); New, Light, Weakly Coupled Particles (NLWCP) subgroup of the Intensity Frontier. [arXiv:1307.4432].
26. Y. Kahn. 2009. “Extracting neutron structure functions in the resonance region.” *AIP Conf. Proc.* **1155** (2009) 52-60.

COLLOQUIA

- “Physics for AI for Physics”
 - UC Santa Cruz **May 2026**
 - York University **February 2026**
 - University of Toronto **February 2026**
- “Directional Detection of Light Dark Matter” **April 2026**
Kavli Institute for Cosmological Physics, University of Chicago
- “Quantum or Classical? Cavity Shifts in
Electron Magnetic Moment Measurements”, McMaster University **November 2025**
- “HEP for AI”
 - Joint Pitt-Carnegie Mellon Colloquium **March 2025**
- “Dark Matter Meets Condensed Matter”, McGill University **January 2024**
- “Dumb Machine Learning for Physics”, IAIFI **March 2023**
- “Dark Matter Meets Condensed Matter”
 - University of Alberta **December 2022**
 - University of Toronto (via Zoom) **September 2022**
- “Light-By-Light Scattering: The Last Frontier of Precision QED”
 - Center for Fundamental Physics, Northwestern University **February 2022**

- “Dark Matter Meets Condensed Matter”
 - Texas Tech (via Zoom) **October 2021**
 - University of Illinois at Urbana-Champaign (via Zoom) **September 2021**
 - University of Michigan (via Zoom) **March 2021**
- “Axions from the Lab to the Cosmos”
 - University of New Mexico (via Zoom) **September 2020**
 - Kavli Institute for Cosmological Physics, University of Chicago **October 2019**
 - University of Kentucky **October 2019**
- “Axion Dark Matter Detection: Direct and Indirect”
 - Northeastern University **March 2019**
 - Ohio State University **November 2018**
- “Searching for Dark Matter Beyond the WIMP”, Virginia Tech **February 2018**

SEMINARS

Lawrence Berkeley National Laboratory	May 2026
Chalmers University “GAPinDNN” seminar (via Zoom)	April 2025
Perimeter Institute	March 2025
UC Berkeley	June 2024
University of Virginia	April 2024
University of Toronto	March 2024
University of Maryland	February 2024
Princeton University “Dark Cosmos” seminar	November 2023
Yale University	November 2023
University of Utah	April 2023
Columbia University	March 2023
Sydney-CPPC Seminar (via Zoom)	March 2023
University of Alberta, Theory Institute	December 2022
CERN BSM Theory Forum (via Zoom)	November 2022
Wayne State University (via Zoom)	November 2022
Boston University	September 2022
UC Berkeley	September 2022
University of Cincinnati (via Zoom)	April 2022
Texas A&M University (via Zoom)	September 2021

University of Heidelberg (via Zoom)	June 2021
BSM PANDEMIC (via Zoom)	May 2021
Weizmann Institute/Tel Aviv University/Technion joint HEP seminar (via Zoom)	April 2021
Brookhaven National Laboratory (via Zoom)	April 2021
SCIPP, UC Santa Cruz (via Zoom)	February 2021
Princeton University (via Zoom)	January 2021
UIUC Center for Artificial Intelligence Innovation (CAII) (via Zoom)	October 2020
Wayne State University (via Zoom)	September 2020
SLAC (via Zoom)	July 2020
Johns Hopkins University (via Zoom)	March 2020
Southern Methodist University (via Zoom)	March 2020
University of Illinois at Urbana-Champaign	March 2020
University of Illinois at Urbana-Champaign	September 2019
Florida State University	April 2019
Northeastern University	March 2019
Northwestern University	March 2019
Argonne National Laboratory	March 2019
University of Toronto	March 2019
UC Riverside	February 2019
Caltech	February 2019
University of Oregon	February 2019
University of Illinois at Urbana-Champaign	October 2018
University of Illinois Chicago	September 2018
Los Alamos National Laboratory	April 2018
Brookhaven National Laboratory	February 2018
University of Illinois at Urbana-Champaign	February 2018
Rutgers University	December 2017

Lawrence Berkeley National Laboratory	November 2017
University of Massachusetts Amherst	October 2017
Boston University	April 2017
University of Maryland, College Park	April 2017
SLAC	February 2017
Weizmann Institute/Tel Aviv University/Technion joint HEP seminar	January 2017
UT Austin	December 2016
Brown University	December 2016
Perimeter Institute	November 2016
Cornell University	September 2016
Harvard University	September 2016
Fermilab	April 2016
Argonne National Laboratory	April 2016
UC Irvine	April 2016
University of Oregon	April 2016
YITP, Stony Brook University	April 2016
MITP, University of Michigan	March 2016
CCPP, New York University	February 2016
SITP, Stanford University	February 2016
MIT/Tufts Joint Cosmology Seminar	December 2015
University of Minnesota	October 2015
Perimeter Institute	December 2014
Princeton University	November 2014
University of Washington	January 2014

INVITED
CONFERENCE
TALKS

(Plenary) *Cosmological Frontiers in Fundamental Physics*,
Perimeter Institute, Waterloo, ON, Canada
“Directional Detection of Dark Matter”

April 2026

(Plenary) <i>WNPPC 2026</i> , Banff, AB, Canada “HEP for AI for HEP”	February 2026
<i>Theoretical Physics and Artificial Intelligence</i> , Aspen, CO, USA “Jet Data as a Model for Data”	January 2026
(Plenary) <i>APS Global Physics Summit 2025:</i> <i>Electronic Structure Theory for Dark Matter Detection</i> Anaheim, CA “Dark Matter Meets Condensed Matter: A High-Energy Theory Perspective”	March 2025
<i>SPIE Photonics West Conference</i> , <i>Quantum Sensing, Imaging, and Precision Metrology III</i> , San Francisco, CA, USA “Renormalized cavity shifts for precision measurements of the electron magnetic moment”	January 2025
<i>IAIFI Summer Workshop 2024</i> Cambridge, MA, USA “Uncertainty Quantification from Neural Network Correlation Functions”	August 2024
<i>CETUP* 2024</i> Sanford Underground Research Facility, Lead, SD, USA “SPLENDOR: narrow-gap materials for sub-MeV dark matter detection”	June 2024
<i>American Physical Society Prairie Section Fall Meeting</i> Columbia, MO, USA “Dark Matter Meets Condensed Matter”	December 2023
<i>Quantum Technologies for Fundamental Physics</i> Erice, Italy “Quantum Sensors for New Particles”	September 2023
<i>SPIE Photonics West Conference</i> , <i>Quantum Sensing, Imaging, and Precision Metrology</i> , San Francisco, CA, USA “Axion dark matter detection with precision frequency metrology in superfluid helium-3”	January 2023
<i>Quantum Matter: Dynamics and Sensors</i> , Storrs, CT, USA (via Zoom) “Axion wind detection with the homogeneous precession domain of superfluid helium-3”	December 2022
<i>Japanese-American-German Kavli Frontiers of Science Symposium</i> , Beckman Center of the National Academy of Sciences, Irvine, CA, USA “The Dark Universe”	September 2022
(Plenary) <i>33rd Rencontres de Blois – Exploring the Dark Universe</i> , Blois, France “New materials for light dark matter detection”	May 2022
(Plenary) <i>Phenomenology Symposium: Pheno 2022</i> , Pittsburgh, PA USA “New approaches to dark matter direct detection”	May 2022

<i>Snowmass 2021 Theory Frontier Conference</i> , KITP, Santa Barbara, CA, USA “Quantum sensors”	February 2022
<i>EXCESS2022 Workshop</i> , Virtual conference “Exotic low-yield nuclear recoil”	February 2022
<i>SPIE Photonics West Conference</i> , <i>Optical and Quantum Sensing and Precision Metrology II</i> , San Francisco, CA, USA “Searching for axions and light-by-light scattering with superconducting RF cavities”	January 2022
<i>CPAD Instrumentation Frontier Workshop</i> , Virtual conference “Data-driven dark matter-electron scattering rates from the dielectric function”	March 2021
<i>International Conference on High-Energy Physics (ICHEP)</i> , Virtual conference “New Inelastic Channels for Sub-GeV Dark Matter Scattering”	July 2020
<i>Quantum Information Science for Fundamental Physics</i> , Aspen, CO, USA “Plasmons and Excesses in Low-Threshold Dark Matter Experiments”	February 2020
(Plenary) <i>Lake Louise Winter Institute 2020</i> , Lake Louise, AB, Canada “Dark Matter Review”	February 2020
<i>Light Dark Matter at Accelerators 2019</i> , Venice, Italy “ABRACADABRA: Current Status and Future Plans”	November 2019
(Plenary) <i>Interplay of Particle and Astrophysics (IPA) 2018</i> , Cincinnati, OH, USA “Perspectives on axions”	October 2018
(Plenary) <i>Dark Interactions 2018</i> , Brookhaven National Laboratory, Upton, NY, USA “Searching for axions with radio telescopes”	October 2018
<i>American Physical Society April Meeting 2018</i> , Columbus, OH, USA “Sub-eV thresholds for dark matter direct detection”	April 2018
<i>Towards Dark Matter Discovery</i> , Kavli Institute for Cosmological Physics, Chicago, IL, USA “Searching for keV freeze-in dark matter with Dirac materials”	April 2018
(Plenary) <i>International Workshop on Baryon and Lepton Number Violation</i> , Case Western Reserve University, Cleveland, OH, USA “Searches for Axion Dark Matter”	May 2017

WORKSHOP PARTICIPATION	<i>2nd Workshop on Microwave Cavities and Detectors for Axion Research</i> , Lawrence Livermore National Laboratory, Livermore, CA, USA “ABRACADABRA: A Broadband/Resonant Search for Axions”	January 2017
	<i>Symmetry Tests in Nuclei and Atoms</i> , Kavli Institute for Theoretical Physics, Santa Barbara, CA, USA “SQUID Magnetometer Detection of Axion Dark Matter”	September 2016
	<i>American Physical Society April Meeting 2016</i> , Salt Lake City, UT, USA “Dark Forces Beyond the Standard Model”	April 2016
	<i>Enabling the Discovery of QCD Axion Dark Matter at the GUT Scale</i> , UC Berkeley, USA	May 2025
	<i>Physics of Learning workshop</i> , Perimeter Institute, Canada	April 2025
	<i>Theory + AI Workshop: Theoretical Physics for AI</i> , Perimeter institute, Canada	April 2025
	<i>YOUNGST@RS – Quantum Sensing for Fundamental Physics</i> (via Zoom)	November 2024
	<i>Fermilab Dark Wave Lab Workshop</i> , Fermilab, USA	April 2024
	<i>ALPS 2024-DM</i> , Obergurgl, Austria	April 2024
	<i>Hokkaido Workshop on Particle Physics at the Crossroads</i> , Hokkaido University, Japan	March 2024
	<i>Particle Theory Initiative/Deep Learning from the Perspective of Physics and Neuroscience</i> , KITP, USA	December 2023
	<i>Particle Theory Initiative/New Directions in Quantum Metrology</i> , KITP, USA	September 2023
	<i>Theoretical Physics for Deep Learning</i> , Aspen Center for Physics, USA	May–June 2023
	<i>Lighting New Lampposts for Dark Matter and Beyond the Standard Model</i> , Simons Center, Stony Brook University, USA	March 2023
	<i>GUINEAPIG 2022</i> , TRIUMF, Canada	September 2022
	<i>SchwingerFest 2022</i> (via Zoom)	June 2022
	<i>Potential Fermilab Muon Campus and Storage Ring Experiments</i> (via Zoom)	May 2021
	<i>Muon Collider Community Meeting</i> (via Zoom)	May 2021
	<i>Hidden Sector Fixed Target Experiments at Fermilab</i> , Fermilab, USA	September 2019
	<i>New Directions in the Search for Light Dark Matter</i> , Fermilab/KICP, USA	June 2019
	<i>New Ideas in Dark Matter Searches</i> , Denver, USA	April 2019
	<i>Signals of Dark Matter in its Natural Habitat</i> , TRIUMF, Canada	February 2019

	<i>Quantum Connections – Axions in Stockholm, Reloaded</i> , Nordita, Sweden	November 2018
	<i>High Energy Physics at the Sensitivity Frontier</i> , KITP, USA	May 2018
	<i>Ultralight Dark Matter and Axions</i> , University of Michigan	March 2018
	<i>Physics of Accelerator-Driven, Isotope-Based Neutrino Sources</i> , MIT	January 2018
	<i>Developing New Tools for Dark Matter Searches</i> , Aspen Center for Physics, USA	September 2017
	<i>Experimental Techniques in Table-Top Fundamental Physics</i> , Perimeter Institute, Canada	August 2017
	<i>Beyond WIMPs: from Theory to Detection</i> , Simons Center, Stony Brook University, USA	March 2017
	<i>The LHC Awakens: A New Energy Frontier</i> , Aspen Center for Physics, USA	Aug–Sept 2016
	<i>Precision for New Discoveries</i> , TRIUMF, Canada	June 2016
	<i>Dark Sectors Workshop 2016</i> , SLAC, USA	April 2016
CONTRIBUTED CONFERENCE PRESENTATIONS	<i>Interplay of Particle and Astrophysics (IPA) 2014</i> , Queen Mary’s University, UK	August 2014
	<i>SUSY 2014</i> , University of Manchester, UK	July 2014
	<i>Physics of Electron Beams</i> , MIT	March 2013
	<i>Spin Structure at Long Distance</i> , Jefferson Lab, USA	March 2009
TEACHING	University of Toronto	
	• PHY 2108H/2109H Physics of Machine Learning I and II	Winter 2026, Winter 2027
	• PHY 2403H Quantum Field Theory I	Fall 2025, Fall 2026
	• PHY 359F Understanding Neural Networks Using Physics	Fall 2026
	University of Illinois Urbana-Champaign	
	• PHYS 212 University Physics: Electricity and Magnetism	Fall 2024
	• PHYS 225 Relativity and Math Methods	Spring 2023, 2024
	• PHYS 575 Particle Physics I	Fall 2022, 2023; Spring 2020, 2021, 2022
	– Awarded “Teacher Ranked as Excellent”	Spring 2022, Fall 2022
	• PHYS 213/214 Thermal Physics/Quantum Physics (discussion coordinator)	Fall 2019
	Summer school lectures	
	• “Theory of Light Particles and Fields” SLAC Summer Institute 2026	2026
	• “The Future of Dark Matter Direct Detection” SNOLAB Underground Science Institute 2026	2026
	• “The Future of Dark Matter Direct Detection” TASI 2026	2026

- “Theory of light particles and fields” (virtual talk) **2021**
Quantum Sensing for Fundamental Physics 2021 school

APS Bridge Program **2014–2015**

Developed and taught an 8-week virtual Physics GRE prep course for students enrolled in the APS Bridge Program, a program designed to help minority physics students gain acceptance to graduate physics programs.

MITES **Summer 2011**

Developed and taught 6-week course covering single-variable integral calculus and basic differential equations, for Minority Introduction to Engineering and Science (MITES) program at MIT.

Co-author, “*Conquering The Physics GRE*” (with Adam Anderson)

A reference to help undergraduate students prepare for the Physics GRE. Revised Third Edition published in 2018 by Cambridge University Press.

DEPARTMENTAL SERVICE

University of Toronto

- Awards nominations committee **2026 – 2027**
- Graduate admissions committee **2026 – 2027**
- Colloquium committee **2026 – 2027**
- Graduate programs committee **2025 – 2026**
- Graduate liaison committee **2025 – 2026**
- Admissions committee, physics liaison for MSc in Applied Computing **2024 – 2026**

University of Illinois Urbana-Champaign

- Faculty mentor for undergraduate physics majors **2019 – 2024**
- HEP/Pheno Seminar committee (co-chair) **2024**
- ICASU Theoretical Minimum seminar series (organizer) **2022 – 2024**
- ICASU Executive Committee (member) **2022–2024**
- Faculty Advisory Committee (member) **2022–2024**
- HEP/Pheno Seminar committee (co-chair) **2022–2023**
- Qualifying exam committee (member) **2021–2022**
- Saturday Physics for Everyone (faculty organizer) **2019–2022**
- High-Energy and Medium-Energy Seminar committee (co-chair) **2020–2021**
- ArtScience Physics Festival (invited speaker) **2021**
- High-energy experiment faculty search committee (member) **2019–2020**

CAMPUS SERVICE

University of Illinois Urbana-Champaign

- Clare Boothe Luce Research Scholarship selection committee (member) **2023**

Advisory Committees

- Invited presentation to SNOLAB Board of Directors retreat **September 2025**
- Member, SNOLAB Experiment Advisory Committee **2020–2024**
- Invited participant, U.S. Department of Energy Basic Research Needs Study on Dark Matter New Initiatives (cross-cutting panel) **2018**

Selection Committees

- McDonald Institute Theory Fellows Initiative **2025 – present**
- Churchill Scholarship **2023–2024**

Grant Review

- NSERC Physics Discovery Grant proposal merit review **2026**
- U.S.-Israel Binational Science Foundation proposal merit review **2025**
- UK Research and Innovation proposal merit review **2024**
- U.S. Department of Energy HEP Theory Laboratory Comparative Review (panel) **2024**
- Research Commission of ETH Zurich proposal merit review **2024**
- Israel Science Foundation proposal merit review **2021–2024**
- Royal Society University Research Fellowships merit review **2023**
- U.S. Department of Energy HEP Theory Comparative Review (panel) **2021**
- U.S. Department of Energy HEP Theory Comparative Review (mail-in) **2021**
- Dutch Research Council proposal merit review **2021**

Refereeing

- Physical Review Letters, Nature Communications, Physical Review D, Journal of High Energy Physics, Physics of the Dark Universe, Canadian Journal of Physics, Physics Letters B, European Physics Journal C, Cambridge University Press, Princeton University Press, Progress of Theoretical and Experimental Physics
- Selected as one of “Most Valued Reviewers” by Physics Letters B, 2017

Conference organization

- *Studying AI at Scale* **2025**
Perimeter Institute, Waterloo, Canada
- *Conference on the Intersections of Particle and Nuclear Physics (CIPANP) Dark Matter Session* **2025**
Madison, WI, USA
- *SPIE Photonics West – Quantum Sensing, Imaging, and Precision Metrology III* **2025**
San Francisco, CA, USA
- *PIKIMO*, UIUC **2024**
- *SPIE Photonics West – Quantum Sensing, Imaging, and Precision Metrology* **2024**
San Francisco, CA, USA
- *Chicago-Area Pheno Symposium*, UIUC **2023**
- *Quantum Technologies for Fundamental Physics*, Erice, Italy **2023**

- *SPIE Photonics West – Optical and Quantum Sensing and Precision Metrology II* **2022**
San Francisco, CA, USA
- *2021 Chicago Quantum Exchange Member and Partner Workshop* (via Zoom) **2021**
Sensors and Detectors breakout session
- *Chicago-Area Pheno Symposium*, UIUC **2019**
- *Cosmic Controversies* (Dark Matter session), University of Chicago **2019**
- *New Directions in the Search for Light Dark Matter*, Fermilab/KICP, USA **2019**
- *Developing New Tools for Dark Matter Searches*, Aspen Center for Physics, USA **2017**
- *Workshop on non-WIMP Dark Matter*, Princeton Center for Theoretical Science, USA **2016**

Summer school organization

- *Quantum Computation and Sensing*, Galileo Galilei Institute, Florence, Italy **2021–2022**

Educational outreach

- “Physics of Music and Music as a Physicist,” Saturday Physics for Everyone at UIUC **2024**
- Astronomy on Tap, Urbana, IL, USA (virtual talk) **2020**
- Webinar on tips for Physics GRE preparation, American Physical Society **2017**

RESEARCH GRANTS

Note: () represents grants for which I am the PI, and the full dollar amount grant award including other co-PIs is listed. (†) represents large multi-institutional grants for which I am the PI or co-I, and the dollar amount awarded to my institution (currently University of Toronto, formerly UIUC) is listed. (Δ) represents single-institution grants to my institution, and the dollar amount allocated to me as a co-PI is listed.*

- The Alignment Project **2026–2027**
Funded by Canadian AI Safety Institute Research Program at CIFAR
(*) *Scaling laws, data distributions, and learning dynamics: simulated high-energy physics data as a benchmark for data in the wild* (CAD \$330,750)
PI: Yonatan Kahn
- U.S. Department of Energy, Office of Science **2025–2030**
(†) *Superconducting Quantum Materials and Systems Center (SQMS) 2.0* (US \$93,000)
PI: Anna Grassellino (University of Toronto PI: Yonatan Kahn)
- National Science and Engineering Research Council (NSERC) Discovery Grant **2025–2030**
(*) *Probing Fundamental Physics with Small-Scale Experiments, Particle Colliders, and Machine Learning* (CAD \$400,000)
PI: Yonatan Kahn
- Connaught Fund, New Researcher Award **2025–2027**
(*) *Discovering Dark Matter with Directional Detectors* (CAD \$29,790)
PI: Yonatan Kahn
- U.S. Department of Energy, Office of High Energy Physics **2023–2026**
(Δ) *High Energy Theory and Cosmology at the University of Illinois* (US \$405,000)
PI: Aida El-Khadra
- U.S. Department of Energy, Office of Science **2022–2026**
(*) *Uncertainty Quantification from Neural Network Correlation Functions* (US \$267,998)
PI: Yonatan Kahn

- Los Alamos National Laboratory **2021–2024**
 (†) *Dark Matter Detection with Quantum Materials* (US \$210,000)
 PI: Daniele Alves (UIUC PI: Yonatan Kahn)
- U.S. Department of Energy, Office of Science **2020–2025**
 (†) *Superconducting Quantum Materials and Systems Center (SQMS)* (US \$430,000)
 PI: Anna Grassellino (UIUC PI: Yonatan Kahn)
- U.S. Department of Energy, Office of High Energy Physics **2020–2023**
 (△) *High Energy Theory at the University of Illinois* (US \$367,446)
 PI: Aida El-Khadra

COMPUTER
SKILLS

- Languages: Python, C++, some Fortran
- Analysis software: Mathematica, ROOT
- Event generator simulations: MadGraph, PYTHIA
- Machine learning frameworks: PyTorch, TensorFlow
- Operating Systems: Unix/Linux, Mac, Windows

LANGUAGES

- English (native)
- French (level B2–C2, read/spoken/written)