

Curriculum Vitae

Ken Kiers

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Citizenship: Canada and USA

Education and Employment:

- 2021-present: Ecuador Semester Program Director.
- 2019-present: Consultant for NearSpace Launch, Inc.
- 2008-present: Professor of Physics, Taylor University.
- 2006-2012; 2013-2016; 2021-22: Chair, Physics/Physics and Engineering Department, Taylor University (co-chair during 2021-22).
- 2003-2008: Associate Professor of Physics, Taylor University.
- 1998-2003: Assistant Professor of Physics, Taylor University.
- 1996-1998: Research Associate in the High Energy Theory Group at Brookhaven National Laboratory.
- 1991-1996: Ph.D. in Theoretical Particle Physics, University of British Columbia, Vancouver, Canada. Thesis: “A study of neutrino propagation and oscillations both in vacuum and in dense media,” under Dr. N. Weiss.
- 1989-1991: B.Sc. in Physics, McMaster University, Hamilton, Canada.
- 1986-1989: Redeemer College (transferred to McMaster), Ancaster, Canada.

Scholarships, Fellowships and Awards:

- Applied Research Institute, Inc. (with NearSpace Launch, Inc.; KK is a Co-PI; Taylor portion is \$49.5k), 2023-24.
- STTR PHASE I, SPACEWERX (with NearSpace Launch, Inc.; KK is a Co-PI; Taylor portion is \$76k of \$250k grant), 2022-23.
- Faculty Mentored Undergraduate Scholarship (Taylor), Summer, 2018.
- Faculty Mentored Undergraduate Scholarship (Taylor), Summer, 2016.
- Distinguished Professor Award (Taylor), 2015.
- National Science Foundation (\$90k over 3 years), 2012-15.
- Distinguished Lecture Award (School of Science, Taylor), 2010.
- National Science Foundation (\$90k over 3 years), 2009-12.
- National Science Foundation (approx. \$88k over 3 years), 2006-09.
- Franklin W. and Joan M. Forman Distinguished Faculty Scholar Award (Taylor), 2004.
- National Science Foundation (approx. \$76k over 3 years), 2003-06.
- Cottrell College Science Award (Research Corporation, approx. \$24k), 2000-04.
- NSERC Postdoctoral Fellowship, 1996-98.
- UBC Graduate Fellowship, 1995-96.
- NSERC Post Graduate Scholarship B, 1993-1995.
- NSERC Post Graduate Scholarship A, 1991-1993.
- University “Top Up” (UBC), 1991-1992.

- NSERC Undergraduate Research Fellowship, Summer, 1991.
- Boyd McLay Scholarship in Physics (McMaster), 1990-1991.
- NSERC Undergraduate Research Fellowship, Summer, 1990.

Research/Professional Interests:

- Satellite orbit determination using GPS data.
- Top quark physics: using observables in $t \rightarrow b\bar{b}c$ to search for evidence of physics beyond the Standard Model.
- Left-Right Model: numerical studies of the quark, lepton and Higgs sectors of the model.
- B and τ physics: low energy signals of new physics.
- Supersymmetry: CP-violating signals in the decays of supersymmetric particles; signals of supersymmetry at an $e\gamma$ collider.
- Chaos: precision measurements of chaos in simple circuits.
- Neutrino physics: effects due to low energy neutrinos in dense stars; quantum mechanical issues concerning neutrino propagation and detection.
- Scattering in one dimension: many-channel generalization of Levinson's theorem; time delay.

Programming Skills:

- **Languages:** Mathematica, Python, Javascript, Typescript, CSS, HTML, Fortran, FreeFlyer scripting language.
- **Frameworks:** Vue, Angular, Flask, Django, Django REST framework.
- **Sample project:** <https://particle-tracks.physics.taylor.edu> (work performed with two students).

Select Courses Taught:

- PHY 203-204, Taylor University (Algebra-based Introductory Physics sequence)
- PHY 311, Taylor University (Modern Physics)
- PHY 321, Taylor University (Electricity and Magnetism)
- PHY 313, Taylor University (Nuclear Radiation Exp. Methods; co-taught with H. Voss)
- PHY 341, Taylor University (Mathematical Methods in Physics and Engineering)
- PHY 342, Taylor University (Analytical Mechanics)
- PHY 412, Taylor University (Quantum Mechanics)
- PHY 413, Taylor University (Quantum Mechanics II)
- PHY 441, Taylor University (Advanced Mathematical Methods in Physics)
- PHY 493, Taylor University (Physics Senior Capstone)
- PHY 491, Taylor University (GRE Preparation Course)

Publications:

1. Joshua Kiers, Ken Kiers, Alejandro Szyrkman and Tatiana Tarutina, "Disentangling the seesaw mechanism in the left-right model: An algorithm for the general case," Phys. Rev. D **107**, pp. 075001-1 to 075001-22, 2023 (arXiv:2212.14837 [hep-ph]).

2. Isaac Bowser, Ken Kiers, Erica Mitchell and Joshua Kiers, “Weyl’s problem: A computational approach,” *Am. J. Phys.* **88**, pp. 769-783, 2020 (arXiv:2005.06985 [physics.comp-ph]).
3. Pratishruti Saha, Ken Kiers and Alejandro Szynkman, “Single-top production and rare top interactions,” *Phys. Rev. D* **98**, pp. 035003-1 to 035003-16, 2018 (arXiv:1712.08120 [hep-ph]).
4. Nicolás Mileo, Ken Kiers, Alejandro Szynkman, Daniel Crane and Ethan Gegner, “Pseudoscalar top-Higgs coupling: exploration of CP-odd observables to resolve the sign ambiguity,” *J. High Energ. Phys.* **1607**, 056, 2016 (30 pages; arXiv:1603.03632 [hep-ph]).
5. Pratishruti Saha, Ken Kiers, Bhubanjyoti Bhattacharya, David London, Alejandro Szynkman and Jordan Melendez, “Measuring CP-violating observables in rare top decays at the LHC,” *Phys. Rev. D* **93**, pp. 054044-1 to 054044-14, 2016 (arXiv:1510.00204 [hep-ph]).
6. Nicolás Mileo, Ken Kiers and Alejandro Szynkman, “Probing sensitivity to charged scalars through partial differential widths: $\tau \rightarrow K\pi\pi\nu_\tau$ decays,” *Phys. Rev. D* **91**, pp. 073006-1 to 073006-17, 2015 (arXiv:1410.1909 [hep-ph]).
7. Pratishruti Saha, Ken Kiers, David London and Alejandro Szynkman, “Detecting New Physics in Rare Top Decays at the LHC,” *Phys. Rev. D* **90**, pp. 094016-1 to 094016-12, 2014 (arXiv:1407.1725 [hep-ph]).
8. Ken Kiers, Pratishruti Saha, Alejandro Szynkman, David London, Samuel Judge and Jordan Melendez, “Search for New Physics in Rare Top Decays: $t\bar{t}$ Spin Correlations and Other Observables,” *Phys. Rev. D* **90**, pp. 094015-1 to 094015-14, 2014 (arXiv:1407.1724 [hep-ph]).
9. Ken Kiers, Tal Knighton, David London, Matthew Russell, Alejandro Szynkman and Kari Webster, “Using $t \rightarrow b\bar{b}c$ to Search for New Physics,” *Phys. Rev. D* **84**, pp. 074018-1 to 074018-13, 2011 (arXiv:1107.0754 [hep-ph]).
10. Makiko Nagashima, Ken Kiers, Alejandro Szynkman, David London, Jenna Hanchey and Kevin Little, “CP Violation in Three-Body Chargino Decays,” *Phys. Rev. D* **80**, pp. 095012-1 to 095012-10, 2009 (arXiv:0907.1063 [hep-ph]).
11. Ken Kiers, Kevin Little, Alakabha Datta, David London, Makiko Nagashima and Alejandro Szynkman, “CP Violation in $\tau \rightarrow K\pi\pi\nu_\tau$,” *Phys. Rev. D* **78**, pp. 113008-1 to 113008-13, 2008 (arXiv:0808.1707 [hep-ph]).
12. Alejandro Szynkman, Ken Kiers and David London, “CP Violation in Supersymmetric Theories: $\tilde{t}_2 \rightarrow \tilde{t}_1 HH$, $\tilde{t}_2 \rightarrow \tilde{t}_1 ZZ$, $\tilde{t}_2 \rightarrow \tilde{t}_1 W^+W^-$, $\tilde{t}_2 \rightarrow \tilde{t}_1 ZH$,” *Phys. Rev. D* **75**, pp. 075009-1 to 075009-8, 2007 (hep-ph/0701165).
13. Alakabha Datta, Ken Kiers, David London, Patrick J. O’Donnell and Alejandro Szynkman, “CP Violation in Hadronic τ Decays,” *Phys. Rev. D* **75**, pp. 074007-1 to 074007-12, 2007; **76**, p. 079902-1 (E), 2007 (hep-ph/0610162).

14. Ken Kiers, Alejandro Szynkman and David London, “CP violation in supersymmetric theories: $\tilde{t}_2 \rightarrow \tilde{t}_1 \tau^- \tau^+$,” Phys. Rev. D **74**, pp. 035004-1 to 035004-12, 2006 (hep-ph/0605123).
15. Ken Kiers, Michael Assis, David Simons, Alexey A. Petrov and Amarjit Soni, “Neutrinos in a left-right model with a horizontal symmetry,” Phys. Rev. D **73**, pp. 033009-1 to 033009-17, 2006 (hep-ph/0510274).
16. Ken Kiers, Michael Assis and Alexey A. Petrov, “Higgs sector of the left-right model with explicit CP violation,” Phys. Rev. D **71**, pp. 115015-1 to 115015-13, 2005 (hep-ph/0503115).
17. Ken Kiers, Tim Klein, Jeff Kolb, Steve Price and J.C. Sprott, “Chaos in a Nonlinear Analog Computer,” Int. J. Bif. Chaos **14**, pp. 2867-2873, 2004.
18. Ken Kiers, Dory Schmidt and J.C. Sprott, “Precision Measurements of a Simple Chaotic Circuit,” Am. J. Phys. **72**, pp. 503-509, 2004.
19. W. van Dijk, K.A. Kiers, Y. Nogami, A. Platt and K. Spyksma, “Quantum mechanical and semi-classical treatment of quantum excitations due to the passage of a particle,” J. Phys. A: Math. Gen. **36**, pp. 5625-5643, 2003.
20. Ken Kiers, Jeff Kolb, John Lee, Amarjit Soni and Guo-Hong Wu, “Ubiquitous CP violation in a top-inspired left-right model,” Phys. Rev. D **66**, pp. 095002-1 to 095002-23, 2002 (hep-ph/0205082).
21. Ken Kiers, Amarjit Soni and Guo-Hong Wu, “Direct CP violation in radiative b decays in and beyond the standard model,” Phys. Rev. D **62**, pp. 116004-1 to 116004-12, 2000 (hep-ph/0006280).
22. Ken Kiers, Amarjit Soni and Guo-Hong Wu, “CP violation in a two-Higgs doublet model for the top quark: $B \rightarrow \psi K_S$,” Phys. Rev. D **59**, pp. 096001-1 to 096001-5, 1999 (hep-ph/9810552).
23. Ken Kiers and Michel Tytgat, “Neutrino ground state in a dense star,” Phys. Rev. D **57**, pp. 5970-5981, 1998 (hep-ph/9712463).
24. Ken Kiers and Nathan Weiss, “Neutrino oscillations in a model with a source and detector,” Phys. Rev. D **57**, pp. 3091-3105, 1998 (hep-ph/9710289).
25. Ken Kiers and Amarjit Soni, “Improving constraints on $\tan \beta/m_H$ using $B \rightarrow D\tau\bar{\nu}$,” Phys. Rev. D **56**, pp. 5786-5793, 1997 (hep-ph/9706337).
26. Ken Kiers and Nathan Weiss, “Coherent neutrino interactions in a dense medium,” Phys. Rev. D **56**, pp. 5776-5785, 1997 (hep-ph/9704346).
27. Guo-Hong Wu, Ken Kiers and John N. Ng, “Polarization measurements and T violation in exclusive semileptonic B decays,” Phys. Rev. D **56**, pp. 5413-5430, 1997 (hep-ph/9705293).

28. Guo-Hong Wu, Ken Kiers and John N. Ng, “Testing time reversal invariance in exclusive semileptonic B meson decays,” Phys. Lett. B **402**, pp. 159-166, 1997 (hep-ph/9701293).
29. Ken Kiers and Wytse van Dijk, “Scattering in one dimension: The coupled Schrödinger equation, threshold behaviour and Levinson’s theorem,” J. Math. Phys. **37**, pp. 6033-6059, 1996 (quant-ph/9608032).
30. Ken Kiers, John N. Ng and Guo-Hong Wu, “Supersymmetric signatures at an $e\gamma$ collider,” Phys. Lett. B **381**, pp. 177-184, 1996 (hep-ph/9604338).
31. Ken Kiers, Shmuel Nussinov and Nathan Weiss, “Coherence effects in neutrino oscillations,” Phys. Rev. D **53**, pp. 537-547, 1996 (hep-ph/9506271).
32. Ken Kiers and Nathan Weiss, “Scattering from a two-dimensional array of flux tubes: A study of the validity of mean field theory,” Phys. Rev. D **49**, pp. 2081-2091, 1994 (hep-th/9307113).
33. Wytse van Dijk and Ken Kiers, “Time delay in simple one-dimensional systems,” Am. J. Phys. **60**, pp. 520-527, 1992.

Publications in Conference Proceedings:

1. M.C. Voss, J.F. Dailey, M.B. Orvis, H.D. Voss, K. Kiers, S. Brandle, A. Glaze, A. White, J. Roberts, M. Coletti and M. Miller, “ID, GPS Tracking, 24/7 Tag Link for CubeSats and Constellations: Flight Results,” Proceedings of the AIAA/USU Conference on Small Satellites, SSC21-S1-47.
2. H.D. Voss, J.F. Dailey, M.B. Orvis, M.C. Voss, K. Kiers, S. Brandle, I. Bowser, and B. Marazzi, “*Black Box*” *RF Sat-Link for Space Debris, Mission Success and Risk Mitigation*, First International Orbital Debris Conference, Sugar Land, Texas, USA, Dec. 9-12, 2019.
3. Ken Kiers, “CP violation in hadronic τ decays,” Nucl. Phys. B (Proc. Suppl.) **253-255**, pp. 95-98, 2014. (Proceedings of the 12th International Workshop on Tau Lepton Physics (TAU2012), Nagoya, Japan, Sept. 17-21, 2012; arXiv:1212.6921 [hep-ph].)
4. Ken Kiers, “CP violation in hadronic τ decays,” proceedings of Flavor Physics and CP Violation (FPCP2008), Taiwan, May 5-9, 2008 (arXiv:0806.4585 [hep-ph]; poster presentation); published electronically (SPIRES Conf Num: C08/05/05).
5. Ken Kiers and Michel H.G. Tytgat, “Energetics of neutrinos in neutron stars,” proceedings of the 34th Rencontres de Moriond: Electroweak Interactions and Unified Theories, Les Arcs, France, Mar. 13-20, 1999 (hep-ph/9905532; talk given by M. Tytgat.)
6. Guo-Hong Wu, Ken Kiers and Amarjit Soni, “CP violation in B decays in a two-Higgs doublet model for the top quark,” in K. Arisaka and Z. Bern, editors, *DPF 99 Proceedings of the Los Angeles Meeting*, published electronically by UCLA, 1999 (<http://www.dpf99.library.ucla.edu>). (Proceedings of the 1999 Meeting of the Division of Particles and Fields of the American Physical Society (DPF 99), Los Angeles, CA, Jan. 5-9, 1999; hep-ph/9903343; talk given by G.-H. Wu.)

7. Ken Kiers and Michel H.G. Tytgat, “The neutrino ground state in a neutron star,” Nucl. Phys. Proc. Suppl. **77**, pp. 445-449, 1999. (Proceedings of the 18th International Conference on Neutrino Physics and Astrophysics (Neutrino 98), Takayama, Japan, June 4-9, 1998; hep-ph/9807412; talk given by K. Kiers.)
8. Ken Kiers and Nathan Weiss, “Coherent neutrino propagation in a dense medium,” in F. Csikor and Z. Fodor, editors, *Strong and Electroweak Matter '97: Proceedings*, pp. 337-341, Singapore, 1998. World Scientific. (Proceedings of Strong and Electroweak Matter (SEWM 97), Eger, Hungary, May 21-25, 1997; hep-ph/9709451; talk given by N. Weiss.)

Presentations:

- “Computational Physics Projects Related to Weyl’s Problem,” Jul. 19, 2020, at the 2020 AAPT Virtual Summer Meeting (co-authors on abstract: Isaac Bowser, Erica Mitchell, Joshua Kiers).
- “A web-based simulation of subatomic particle decays,” Jan. 8, 2018, at the 2018 AAPT Winter Meeting, San Diego, CA.
- “A web-based simulation of subatomic particle decays,” Jan. 8, 2018, poster session at the 2018 AAPT Winter Meeting, San Diego, CA.
- “Particle Physics and the Higgs Boson,” Dec. 18, 2012, Universidad del Azuay, Cuenca, Ecuador.
- “Synchronization and Encryption with a Pair of Simple Chaotic Circuits,” Dec. 10, 2012, Universidad del Azuay, Cuenca, Ecuador.
- “CP violation in hadronic τ decays,” Sept. 18, 2012, at the 12th International Workshop on Tau Lepton Physics (TAU2012), Nagoya, Japan.
- “Synchronization and Encryption with a Pair of Simple Chaotic Circuits,” July 26, 2012, workshop presented at the 2012 Conference on Laboratory Instruction Beyond the First Year of College, Philadelphia, PA.
- “Using $t \rightarrow b\bar{b}c$ to search for new physics,” Dec. 11, 2010, at the Anacapa West Coast Meeting, California State Polytechnic University, Pomona.
- “Particle physics in the era of the LHC,” April 30, 2010, Distinguished Lecture of the School of Natural and Applied Sciences, Taylor University.
- “CP violation in hadronic τ decays,” May 6, 2008, poster session at Flavor Physics and CP violation (FPCP2008), Taipei, Taiwan.
- “CP violation in supersymmetric particle decays,” May 31, 2007, at Brookhaven Forum 2007: New Horizons at Colliders, Brookhaven National Laboratory.
- “Chaos and encryption with a simple circuit,” Mar. 23, 2007, Redeemer College, Canada.
- “Chaos in a simple electronic circuit,” Feb. 21, 2006, “Midi-Pizza” seminar at the Université de Montréal.
- “Neutrinos and Higgs bosons in the left-right model,” Feb. 10, 2006, Montreal Joint High Energy Physics Seminar, at the Université de Montréal.
- “Neutrinos in the left-right model. . . and a bit of chaos,” Nov. 15, 2005, Physics and Astronomy Department Seminar, Calvin College.

- “Higgs sector of the left-right model with explicit CP violation,” May 5, 2005, at Pheno2005, Madison, WI.
- “Neutrinos in the left-right model. . . and a bit of chaos,” Feb. 24, 2005, Physics Department Colloquium, Ball State University.
- “Neutrinos in the left-right model,” Nov. 12, 2004, High Energy Nuclear/Particle Physics Seminar Series, Wayne State University.
- “Chaos in a Simple Electronic Circuit,” Aug. 6, 2003, at the 127th AAPT National Meeting, Madison, WI.
- “A Simple Chaotic Circuit,” Aug. 4, 2003, poster session at the 127th AAPT National Meeting, Madison, WI.
- “A top-inspired left-right model,” Oct. 21, 2002, Science Seminar Series, Taylor University.
- “Ubiquitous CP violation in a top-inspired left-right model,” May 25, 2002, at DPF2002, College of William & Mary, Williamsburg, VA.
- “Ubiquitous CP violation in a top-inspired left-right model,” April 23, 2002, at Pheno2002, Madison, WI.
- “A top-inspired left-right model,” March 20, 2002, Physics Department Colloquium Series, Taylor University.
- “A top-inspired left-right model,” March 7, 2002, Ball State University Physics Department seminar.
- “CP violation in B Physics,” Apr. 26, 2000, Physics Department, Taylor University.
- “Higgs-mediated CP violation in radiative b decays,” Apr. 17, 2000, at Pheno 2000 Symposium: Phenomenology for the Nu Century, Apr. 17-19, 2000, Madison.
- “Neutrino Oscillations,” Sept. 20, 1999, Science Seminar Series, Taylor University.
- “The neutrino ground state in a neutron star,” Jan. 18, 1999, Particle Theory Seminar, University of British Columbia.
- “The neutrino ground state in a neutron star,” June 9, 1998, at the 18th International Conference on Neutrino Physics and Astrophysics (Neutrino 98), June 4-9, 1998, Takayama, Japan.
- “The neutrino ground state in a neutron star,” May 12, 1998, Physics and Astronomy Colloquium, McMaster University.
- “The neutrino ground state in a dense star,” Apr. 7, 1998, at the Center for High Energy Physics, McGill University.
- “The neutrino ground state in a dense star,” Apr. 6, 1998, to the theory group at the Université de Montréal.
- “The neutrino ground state in a dense star,” Mar. 24, 1998, at Pheno-CTEQ Symposium 98: Frontiers of Phenomenology from Non-perturbative QCD to New Physics, Mar. 23-26, 1998, Madison.
- “The neutrino ground state in a dense star,” Feb. 23, 1998, at the Center for Theoretical Physics, MIT.
- “ B decays and the search for new physics,” June 23, 1997, to the theory group at McMaster University.

- “ T -odd observables in semileptonic B decays,” Mar. 19, 1997, at the BaBar Physics Workshop, Mar. 17-20, 1997, Princeton University.
- “ T -odd observables in semileptonic B decays,” Mar. 17, 1997, at Pheno97: Recent Developments in Phenomenology, Mar. 17-19, 1997, Madison.
- “Exclusive B decays and the search for new physics,” Mar. 3, 1997, at the ITP, Stony Brook.

Memberships:

- American Physical Society
- American Association of Physics Teachers

Other Professional Activities:

- Chair, Physics and Astronomy Section of the Indiana Academy of Science (2002-2003).
- Chair, Physics and Astronomy Section of the Indiana Academy of Science (2004-2005).