David Penneys **Curriculum Vitae**

Contact Information:

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Employment/Education:

2016–Present	**The Ohio State University**, Ohio, USA. Assistant professor
2014-16	**University of California, Los Angeles**, California, USA. Assistant adjunct professor
2012-14	**University of Toronto**, Ontario, Canada. Mathematics postdoctoral fellow Postdoctoral supervisors: Dror Bar-Natan and George Elliott
2005-12	**University of California, Berkeley**, California, USA. Mathematics Ph.D. Advisor: Vaughan F.R. Jones Dissertation: "Planar structure for inclusions of finite von Neumann algebras"
2001-5	**The George Washington University**, Washington, D.C., USA, Mathematics, B.A., Ruggles Prize 2003 and 2005 Physics, B.S., Howard Hughes Fellow in Bioinformatics 2004 Chemistry, B.S., George Gamow Fellow 2003 Columbian School Distinguished Scholar, Summa Cum Laude, Phi Beta Kappa.

Scientific/Academic Honors and Grants:

- NSF CAREER grant DMS 1654159 2017-2022 "Representing and classifying enriched quantum symmetry"
- NSF DMS grant 1500387 2015-16 "Classifying subfactors and fusion categories", transferred to OSU as NSF DMS grant 1655912 2016-18
- AMS-Simons travel grant 2014-15
- Summer support for Summers 2013 and 2014 through DARPA grant HR0011-12-1-0009
- NSF East Asia and Pacific Summer Institute grant 1015571 Summer 2010
- Conference grants:
  - Contact organizer for a BIRS workshop 2018/10/14-19 on Subfactors and Fusion Categories (with Gannon, Morrison, and Plavnik)
  - Contact organizer for an AMS MRC workshop 2018/6/10-16 on Quantum symmetries: subfactors and fusion categories
  - Coauthored successful grant NSF DMS-1665434 for Quantum Symmetries: Subfactors and Planar Algebras Conference 2017 (with Brothier, Jones, Snyder, and Tener)
  - Contact organizer for AIM SQuaREs workshop 2016/9/12-16 and 2017/11/27 - 12/1 on Classifying fusion categories (with Grossman, Izumi, Morrison, Peters, and Snyder)
  - US Junior Oberwolfach Fellow for 2015 workshop Subfactors and Conformal Field Theory
  - Coauthored proposal for 2015 Oberwolfach workshop Subfactors and Conformal Field Theory (with official organizers Bisch, Gannon, Jones, and Kawahigashi)
  - Coauthored successful grant NSF DMS-1400275 for Subfactor Theory in Mathematics and Physics Conference 2014 (with Bisch, Brothier, Jones, Morrison, and Snyder)
  - Contact organizer for a BIRS workshop 2014/4/13-18 on Classifying Subfactors and Fusion Categories (with Jones, Morrison, Peters, and Snyder)

Peer reviewed journal articles:

1. *The classification of subfactors with index at most* $5\frac{1}{4}$ (with Narjess Afzaly and Scott Morrison). To appear **Mem. Amer. Math. Soc.** arXiv:1509.00038

2. *Monoidal categories enriched in braided monoidal categories* (with Scott Morrison). 2017. To appear **Int. Math. Res. Not.** DOI:10.1093/imrn/rnx217, arXiv:1701.00567
3. *Operator algebras in rigid C*-tensor categories* (with Corey Jones). **Comm. Math. Phys.** 355 (2017), no. 3, 1121–1188, MR3687214, arXiv:1611.04620
4. *Bicommutant categories from fusion categories* (with André Henriques). **Selecta Math. (N.S.)** 23 (2017), no. 3, 1669–1708, MR3663592, arXiv:1511.05226.
5. *C*-algebras from planar algebras I: canonical C*-algebras associated to a planar algebra* (with Michael Hartglass). **Trans. Amer. Math. Soc.** 369 (2017), no. 6, 3977–4019, MR3624399, arXiv:1401.2485.
6. *Categorified trace for module tensor categories over braided tensor categories* (with André Henriques and James Tener). **Documenta Math.** 21 (2016) 1089–1149 arXiv:1509.02937
7. *Quotients of $A_2 * T_2$* (with Masaki Izumi and Scott Morrison). **Canad. J. Math.** 68 (2016), no. 5, 999–1022. MR3536926 (abbreviated version of *Fusion categories between $\mathcal{C} \boxtimes \mathcal{D}$ and $\mathcal{C} * \mathcal{D}$*, arXiv:1308.5723).
8. *Calculating two-strand jellyfish relations* (with Emily Peters). **Pacific J. Math.** 277 (2015), no. 2, 463-510. MR3402358, arXiv:1308.5197.
9. *2-supertransitive subfactors at index $3 + \sqrt{5}$* (with Scott Morrison). **J. Funct. Anal.** 269 (2015), no. 9, 2845-2870. MR3394622, arXiv:1406.3401
10. *Infinite index subfactors and the GICAR categories* (with Vaughan F. R. Jones). **Comm. Math. Phys.** 339 (2015), no. 2, 729-768. MR3370617, arXiv:1410.0856
11. *Subfactors of index exactly 5* (with Masaki Izumi, Scott Morrison, Emily Peters, and Noah Snyder). **B. Lond. Math. Soc.** (2015) 47 (2): 257-269. MR3335120, arXiv:1406.2389.
12. *Constructing spoke subfactors using the jellyfish algorithm* (with Scott Morrison). **Trans. Amer. Math. Soc.**, 367 (2015), no. 5, 3257-3298. MR3314808, arXiv:1208.3637
13. *Chirality and principal graph obstructions.* **Adv. Math.** 273 (2015), no. 19, 32–55. MR3311757, arXiv:1307.5890
14. *1-supertransitive subfactors with index at most $6\frac{1}{5}$* (with Zhengwei Liu and Scott Morrison). **Comm. Math. Phys.** 334 (2015), no. 2, 889-922. MR3306607, arXiv:1310.8566
15. *C*-algebras from planar algebras II: the Guionnet-Jones-Shlyakhtenko C*-algebras* (with Michael Hartglass). **J. Funct. Anal.** 267 (2014), no. 10, 3859–3893. MR3266249, arXiv:1401.2486
16. *Principal graph stability and the jellyfish algorithm* (with Stephen Bigelow). **Math. Ann.** 358 (2014), no. 1-2, 1-24. MR3157990, arXiv:1208.1564
17. *A planar calculus for infinite index subfactors.* **Comm. Math. Phys.** 319 (2013), no. 3, 595-648, MR3040370, arXiv:1110.3504
18. *Rigid C*-tensor categories of bimodules over interpolated free group factors* (with Arnaud Brothier and Michael Hartglass). **J. Math. Phys.** 53 (2012), no. 12, 123525 (43 pages), arXiv:1208.5505, DOI:10.1063/1.4769178
19. *A cyclic approach to the annular Temperley-Lieb category.* **J. Knot Theory Ramifications** 21 (2012), no. 6, 1250049, 40 pp. MR2903179, arXiv:0912.1320.
20. *Subfactors of index less than 5, Part 4: Vines* (with James Tener). **Internat. J. Math.** 23 (2012), no. 3, 1250017, 18 pp. MR2902286, arXiv:1010.3797
21. *Subfactors of index less than 5, Part 2: Triple points* (with Scott Morrison, Emily Peters, and Noah Snyder). **Internat. J. Math.** 23 (2012), no. 3, 1250016, 33 pp. MR2902285, arXiv:1007.2240.
22. *The embedding theorem for finite depth subfactor planar algebras* (with Vaughan F. R. Jones). **Quantum Topol.** 2 (2011), no. 3, 301–337. MR2812459, arXiv:1007.3173

Peer reviewed conference proceedings:

1. *Q-systems and compact W*-algebra objects* (with Corey Jones). To appear **Contemp. Math.** arXiv:1707.02155
2. *Lifting shadings on symmetrically self-dual subfactor planar algebras* (with Zhengwei Liu and Scott Morrison). To appear **Contemp. Math.** arXiv:1709.05023
3. *The generator conjecture for 3^G subfactor planar algebras* (with Zhengwei Liu). **Proceedings of the 2014 Maui and 2015 Qinhuangdao conferences in honour of Vaughan F. R. Jones' 60th birthday**, 344–366, Proc. Centre Math. Appl. Austral. Nat. Univ., 46, Austral. Nat. Univ., Canberra, 2017. MR3635674, arXiv:1507.04794

Conference proceedings:

1. *Planar algebras in modular tensor categories.* (joint work with André Henriques and James Tener). 2015. **Oberwolfach Reports** DOI:10.4171/OWR/2015/16

arXiv preprints:

1. *Planar algebras in braided tensor categories* (with André Henriques and James Tener). arXiv:1607.06041
2. *Realizations of algebra objects and discrete subfactors* (with Corey Jones). arXiv:1704.02035
3. *Unitary dual functors for unitary multitensor categories* arXiv:1808.00323
4. *Completion for braided enriched monoidal categories* (with Scott Morrison and Julia Plavnik). arXiv:1809.09782
5. *The Extended Haagerup fusion categories* (with Pinhas Grossman, Scott Morrison, Emily Peters, and Noah Snyder). arXiv:1810.06076
6. *The module embedding theorem via towers of algebras* (with Desmond Coles, Peter Huston, and Srivatsa Srinivas). arXiv:1810.07049
7. Spontaneous symmetry breaking from anyon condensation (with Marcel Bischoff, Corey Jones, and Yuan-Ming Lu). arXiv:1811.00434

Computing packages:

1. `FusionAtlas`, *a package for Mathematica and Scala* (with Scott Morrison, Emily Peters, Noah Snyder, and James Tener), available at http://tqft.net/wiki/Atlas_of_subfactors.

Research Interests:
Subfactors, planar algebras, tensor and fusion categories, conformal and topological field theories, diagrammatic algebras, von Neumann algebras, C*-algebras, K-theory, noncommutative geometry, Hochschild and cyclic homology, knot theory

Visiting scholar positions:

- **The Australian National University**, Canberra, Australia, March 2017, March 2014, and Jan-Feb 2013, host researcher Scott Morrison
- **Isaac Newton Institute for the Mathematical Sciences**, Cambridge, England, January 2017, Programme on Operator Algebras: Subfactors and their Applications
- **Hausdorff Research Institute for Mathematics**, Bonn, Germany, May-June 2016, Trimester on von Neumann algebras
- **Institut Henri Poincaré**, Paris, France, May-June 2011, Trimester on von Neumann algebras and ergodic theory of groups actions
- **Vanderbilt University**, Nashville, USA Jan-Feb 2011, host researcher Jesse Peterson

- **University of Tokyo**, Japan, Summer 2010, NSF East Asia and Pacific Summer Institute, host researcher Yasuyuki Kawahigashi
- **Institute for the Mathematical Sciences** (IMSc), Chennai, India, Feb 2009, host researcher V.S. Sunder

Academic service:

- Conferences and seminars organized:
  - International conferences/workshops co-organized:
    1. 2018 BIRS workshop on Subfactors and Fusion Categories
    2. 2018 AMS MRC workshop on Quantum symmetries: subfactors and fusion categories
    3. 2017 Mathematical Congress of the Americas Special Session on von Neumann algebras
    4. 2016 AIM SQuaRE on Classifying Fusion Categories
    5. 2015 Oberwolfach workshop on Subfactors and Conformal Field Theory (coauthored proposal as unofficial organizer)
    6. 2014 Subfactor Theory in Mathematics and Physics
    7. 2014 BIRS workshop on Classifying Subfactors and Fusion Categories
  - National conferences co-organized:
    1. 2019 East Coast Operator Algebra Symposium at The Ohio State University
    2. 2018 AMS Special Session at the Central Spring Sectional Meeting on Quantum Symmetries
    3. 2017 Quantum Symmetries: Subfactors and Planar Algebras
    4. 2017 AMS JMM Special Session Advances in Operator Algebras
    5. 2015 AMS Special Session at Memphis sectional meeting on von Neumann algebras
    6. 2015 AMS JMM Special Session Classification Problems in Operator Algebras
    7. 2014 AMS JMM Special Session Classification Problems in Operator Algebras
    8. 2011 Subfactors in Maui
    9. 2011 Subfactors in Tahoe
    10. 2010 Subfactors in Tahoe
  - Micro-conferences co-organized:
    1. 2017 and 2018 Operators on Hilbert spaces In Ohio Conference at The Ohio State University
    2. 2016 Bodega Bay Subfactor Microconference
    3. 2015 UC Subfactor retreat at UC Santa Barbara
    4. 2015 Bodega Bay Subfactor Microconference
  - Organized many weekly seminars at UC Berkeley, the Fields institute, UCLA, and OSU:
    1. Fall 2016 - Present - OSU Non-Commutative Geometry and Operator Algebras seminar
    2. Fall 2016 - Present - OSU Quantum Algebra/Quantum Topology seminar
    3. Spring 2015 - Spring 2016 - UCLA Subfactor reading course
    4. Fall 2013 - Spring 2014 - Quantum Algebra Seminar at the Fields Institute
    5. Fall 2009 - Spring 2012 - UC Berkeley Subfactor seminar
    6. Spring 2008 - Fall 2009 - UC Berkeley Student subfactor seminar
- Co-editor for conference proceedings for 2014 and 2015 Subfactor Conferences on Mathematics and Physics, Maui and Qinhuangdao, in honor of Vaughan F. R. Jones' 60th birthday (with Scott Morrison)

- Reviewed articles for Adv. Math., Algebr. Geom. Top., B. Lond. Math. Soc., Contemp. Math., Comm. Math. Phys., Documenta Math., Int. Math. Res. Not., J. Algebra Appl., J. Math. Phys., Math. Reports, Proc. Amer. Math. Soc., Trans. Amer. Math. Soc.
- Reviewed articles for Mathematical Reviews, and Zentralblatt MATH.

Postdocs and students mentored:
Postdocs at OSU:

- Corey Jones, Zassenhaus Assistant Professor 2018-2021

PhD students at OSU:

- Roberto Hernandez Palomares, expected PhD 2021
- Zachary Dell, expected PhD 2022
- Peter Huston, expected PhD 2022
- Quan Chen, expected PhD 2023

Undergraduate researchers:

- Desmond Coles and Srivatsa Srinivas (OSU)
  Project: The module embedding theorem via towers of algebras arXiv:1810.07049
- André Hernandez Espiet and Brian Reyes Vélez (University of Puerto Rico Mayagüez)
  Project: Skein theoretic approach to Liu's theorem for quotients of $\vec{(\mathbb{Z}/2)} * \mathrm{Fib}$
- Giovanni Ferrer (University of Puerto Rico)
  Project: Module categories for Temperley-Lieb 2-categories
- Unofficially co-mentored 3 Stanford undergraduates on computing Turaev-Viro invariants over 5 weeks during Summer 2015 SURIM program

Teaching:
2016-Present: Assistant Professor at The Ohio State University

- Quantum Algebra (8160, topics course)
- Functional Analysis (7211, 7212, grad course)
- Foundations of higher mathematics (3345)

2014-16 Assistant Adjunct Professor at UCLA

- Operator algebras (259A, grad course)
- Real analysis (131A, 131B)
- Linear algebra and applications (33A)
- Differential equations (33B)
- Calculus for Life Sciences Students (3B)
- Probability for Life Sciences Students (3C)

2012-14 Postdoctoral Fellow at University of Toronto

- Complex variables (MAT334H1)
- Linear algebra (MAT223F)
- Engineering Sciences enriched Calculus I (MAT194H1)
- Calculus 1A (MAT135H1)

2005-11 UC Berkeley Graduate Student Instructor (instructor and teaching assistant)
Instructor:

- Graduate Prelim workshop (Analysis)
- Undergraduate research seminar (191)
- Complex analysis (185)

- Linear algebra (110)
- Introduction to proof writing (74)
- Matrix theory/differential equations (54)
- Calculus (16B)

Teaching Assistant:

- Topology and analysis (202B, grad course)
- Complex analysis (185)
- Linear algebra (110)
- Discrete mathematics (55)
- Matrix theory/differential equations (54)
- Multivariable calculus (53)
- Calculus (1A, 16A, 16B)

Additional training and awards:

- Attended Autumn 2018 OSU program on Better Science Through Better Mentoring
- 2014 F. V. Atkinson Teaching Award at the University of Toronto (postdoctoral teaching award)
- 3 courses (2 hours each) at the University of Toronto's Centre for Teaching Support and Innovation
- Attended Spring 2011 UC Berkeley program on How Students Learn: http://gsi.berkeley.edu/howstudentslearn/schedule.html
- 2008-9 Outstanding GSI Award at UC Berkeley (can only receive once)